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**MODELING IMPACT OF PRICING STRATEGY TO THE
MARKET SHARE, REVENUE SHARE, AND PROFIT SHARE
IN BUSINESS RIVALRY (CEMENT CASE STUDY)**

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APPROVAL SHEETS

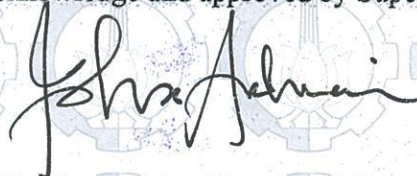
**MODELING IMPACT OF PRICING STRATEGY TO THE
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Proposed as a Requisite to Graduate in Industrial Engineering Major and to Achieve a
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SHARE, REVENUE SHARE, AND PROFIT SHARE IN BUSINESS
RIVALRY (CEMENT CASE STUDY)**

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ABSTRACT

Nowadays competition become more important value in business. Every company needs to be more competitive to stay in business. There are many factor that can be decided in term of competition. One factor that affect competitiveness is pricing strategy and it affects to competitive value. Competitive value in market can be determined by market share and revenue from each company.

This research aims to understand how pricing strategy can affect company value and give competitive advantages to company and their impact to competitive parameter. But naturally in pricing strategy each company will offer lower price to get more customer but in the other hand cheaper product means lower profit margin. Extreme pricing competition can be disastrous for business because buyer is sensitive through pricing.

. The premise is what should we do to response competitor price change? To study this behavior through out the year study has been led to two best methods to solve the problem, by using game theory and regression (data mining).

The result shows that market share is more sensitive toward price change rather than revenue shares. It Turns out the best decision is to optimize revenue and profits by optimizing price setting. The optimum value in profits and revenue will be gained by optimum price setting and sales volume. This result also affect all scenarios. The best scenario in the scenario testing is scenario with the best combination of their price setting regardless what the scenario is.

Keyword : *Pricing strategy, market share, revenue, game theory, pricing behavior.*

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PREFACE

Thanks to The Almighty Allah S.W.T who has given His bless to the author for finishing this final report entitled "**Modeling Impact Of Pricing Strategy to the Market Share, Revenue Share, and Profit Share in Business Rivalry (Cement Case Study)**".

This Final Report is the requirements to completing the study of Graduate Program in Industrial Engineering Department, Faculty of Industrial Technology Sepuluh Nopember Institute of Technology Surabaya. The author also wish to express his deep and sincere gratitude for those who have guided and helped him in completing this paper. Therefore, author would like to directly say thank you anyone who help him, which are :

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CHAPTER I

INTRODUCTION

In this chapter will be explain about background of the research, problem formulation, objective and benefit of the research, limitation, and writing systematic.

1.1 Background

At each of every market, there are a large number of different buyers and sellers for each good or service available (Hayes, 2018). Facing number of different buyers and sellers each party will try their best to get more advantage. It's common knowledge that goal of every sellers is to get more sales from buyer. But, as for buyer, their goal is to get cheaper, higher quality, faster, or anything that suit their intention from what sellers sells. This situation leads to competition with each entity try to achieve their goal.

Competition in market includes all the actual and potential offers from each entity that might consider (Kotler & Keller, 2012). By offers it means there are several acts that can affect buying decision. Competition in term of economic means the rivalry among sellers trying to achieve such goals as increasing profits, market share, and sales volume by varying the elements of the marketing mix: price, product, promotion and place (Merriam-Webster, 2018). In a market with many buyers and sellers, both the consumer and the supplier have equal ability to compete on price. But, buyers and sellers react differently towards price is change. When price increases, the willingness of sellers to offer goods will increase, while the willingness and ability of buyers to purchase goods will decrease (Whelan & Msefer, 1994).

Market situation when there are few seller supplies a large portion of all the products sold in the marketplace define as Oligopoly market (Skripak, 2016). As the result, sellers need to supplies large portion of product, thus they have had large production capacity lead to high initial cost to starting the business, cause number of firm entering this kind of market is low. Companies with this characteristic categorize as industry. As large firms supplying a sizeable portion of a market, these companies have more control over the prices they charge.

But there's a catch: because products are fairly similar, when one company lowers their prices, others are often to follow to remain competitive (Skripak, 2016). Therefore, product price is very sensitive. Also, due to similar production process, product much likely similar for each sellers to another. In buyers perspective, with same quality product, they will choose to buy cheaper product. But how each sellers must response to price change is uncertain. Each decision to respon the price change whether to follow what competitor do or to ignore it, it's uncertain how it's actually worth. Decreasing price will likely to gain more demand yet in total return not always benefit the companies. Decreasing price lead to decreasing profit margin. Increasing the price after decreasing will unlikely to gain previous demand. Because some buyer already change their decision to other product that already cheaper or called switching behavior (Wu, et al., 2017). Companies can respond by lowering their price at exact price as competitor, lower price, or may be just keeping the disparity with previous price before change.

New market entrant may decide to go for (low) penetration price and high initial growth or for (high) skimming price and slower initial growth (Kay, 2014). Which cause problem to market leader if new entrant decide to penetrate with lower price. Market leader will consider to decrease their price to keep their demand or ignore it. Best decision need to be taken, Because if they react in a wrong way they will lose some buyers and possibly revenue.

Naturally buyer will start to buy the cheaper product followed by each sellers start to decreasing their price (Skripak, 2016). But this consumer switch will not change significantly due to unfamiliarity to new product. Because factor to affect buying decision is not only price but there's preference to different quality and brand of the product. Willingness to buy a product at low prices is limited by taste and not infinite even when the price equals zero.

As a few number of competitor that involve in oligopoly market, identify loss can be done by observe what competitors do. Knowing the relation between total sales from each competitor and market share can give a firm ability to managers predict their market share (Cooper & Nakanishi, 2010). However, it's important to identify which factor that really affect competitiveness and knowing how it can be

measure. Companies need to create the right strategy by consider right factor. These to overcome dynamic of the market and to stay competitive.

Oligopolies competitiveness can be measure by evaluating it's market share (Economicsonline, 2017). Market share is effect of all decision taken by all buyers and sellers in the market. And it's only affect by number of sales in the market for each sellers. Which means that no matter how big promotion from each companies if buyers or customer not interested to buy it's not affect their competitiveness. Measure company value by evaluating it's market share is reasonable because mainly company objective is to get more profit which gain from their sales.

Osadchiy and Bendoly (2015) find that in a future purchase opportunity, up to 79% of customers exhibit strategic behavior. Strategic behavior means consumers will prefer to buy later, knowing that will be discounted prices in the future instead of paying premium prices up-front (Zhang & Wie, 2018). This indicates there's trend in demand. This indicates that consumer willingness to buy product also affected by time window. Furthermore, this affect how companies should formulated their competitive strategy. Knowing that there are factor such as consumer behavior also need to be consider.

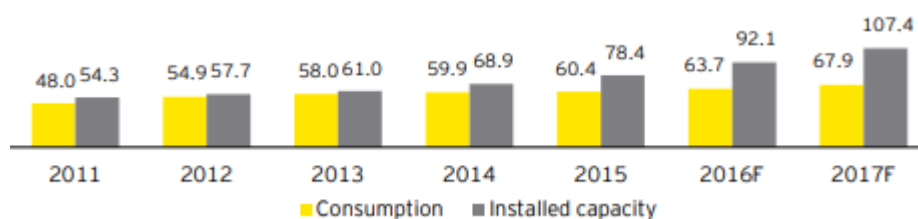
Market-share analysis is more complex than the sales analysis for a single product/brand simply because it's required to consider competitive factors (Cooper & Nakanishi, 2010). Analyze market share need accurate view of market and competition and aware of any variable that cause by it's own decision and what affect by other competitors do. Companies need to be able to explain relation between factor before analyze the market. Such as Relation between market share and price. Relation between competitor price and companies total sales. And relation between consumer behavior and companies price setting. Any strategy by ignored others response is tend to failure sooner or later, if the structure of the markets is oligopoly and monopolistic competition. Wardhani (2016) has been formulate pricing strategy in PT. Semen Gresik. Her research formulate necessary factor and to able analyse market share due to price change. But not consider competitor response. Vena (2016) also succed to formulated competition between cement industry in pricing strategies. Her research analyze competition

characteristic by using regression. But once again not consider competitor response in long time period.

Today, game theory approach have been used to analyze business competition, but with limited interaction between each other (Bravo, et al., 2010). Game theory support strong economical background to describe this phenomenon that define competitive actions. It suits the situation because game theory consider competitor act to decide best decision. Studies of competition dynamics are usually approach by a framework where the players are the companies and all competitor in the market. For this particular approach, Nash - Bertrand specification is useful, where players compete using prices as strategic variables decision.

Furthermore, to be able to study about competition in oligopoly market researcher need to observe appropriate case. There are many industry that categorize as oligopoly market. But to study all phenomena, the case must be possible to identify. Cement in one of industry that categorize as oligopoly market. It's sensitive toward price as buyer try to buy cement in bulk price different can highly determine buying decision. Recently Indonesia cement industry face many problem as the result by government policy that made this case interesting to study.

Indonesia has positive growth of infrastructure development after release of regulation of the President of the Republic of Indonesia Number 60 Year 2015 on Government Work Plan 2016. As the result, Many mega infrastructure mega project has been develop in the past 5 years. This is also result of growing economy and also government policy to invite more investor to our country. For about 30%-40% of infrastructure development is comes from cement and steel (Yovanda, 2017). Which cause increasing demand of cement. Increasing demand indicates more sales opportunity for cement industry.



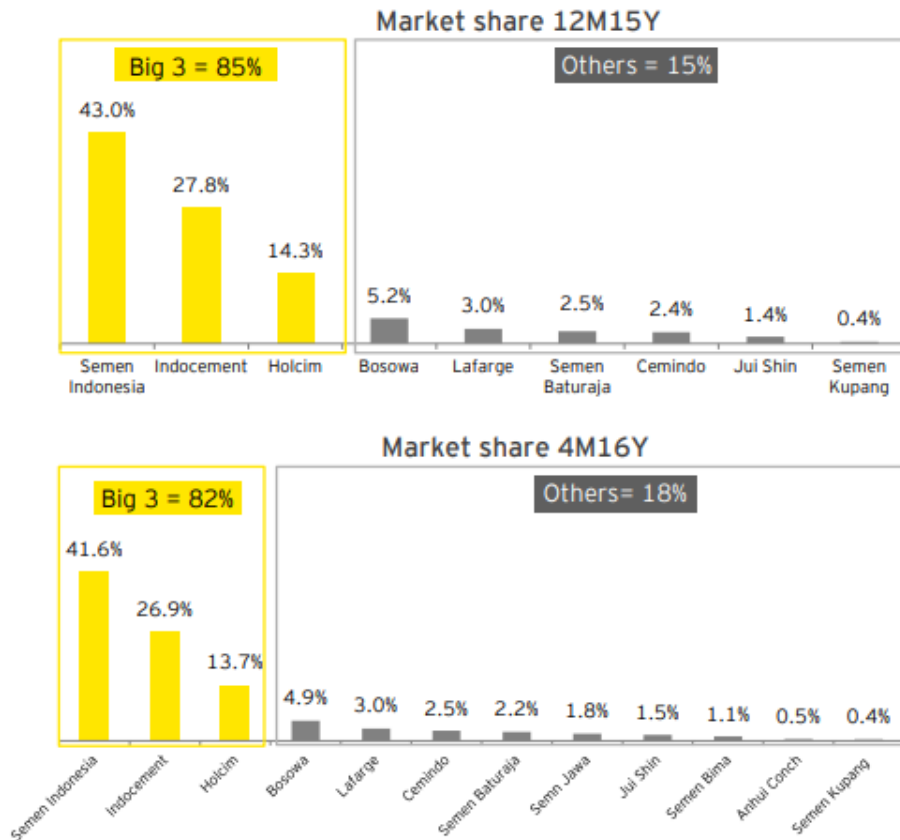
Source : www.ey.com

Figure 1.1.1 Indonesia domestic cement consumption

Indonesia government also creates new policy that invites more competitor in this sector for other country. In 2017, there are 10 new competitors in this industry (Supriadi, 2015). Indonesian government policy to open other competitor in cement industry is to reduce budget in developing infrastructure. This policy also leads to rapid increase in production facility which also cause Indonesia's cement market is getting more competitive.

Average net profitability margin has been in downward trend in the past 4 years, as the new players are offering much lower selling price in a market that is already oversupplied in an effort to penetrate the market (Ernst & Young, 2016). This creates problem to cement industry in Indonesia regardless demand keep growing the number of competitor also increasing. Therefore, cement industry firms needs to be carefull set their prics. Year-to-date (YTD) sales as of September 2016 is amounting to 44.7 million tons, increased slightly (2.95%) compared to last year YTD sales in the same period. However, month-to-month sales in September 2016 is declining -3.3% compared to September 2015 (Ernst & Young, 2016).

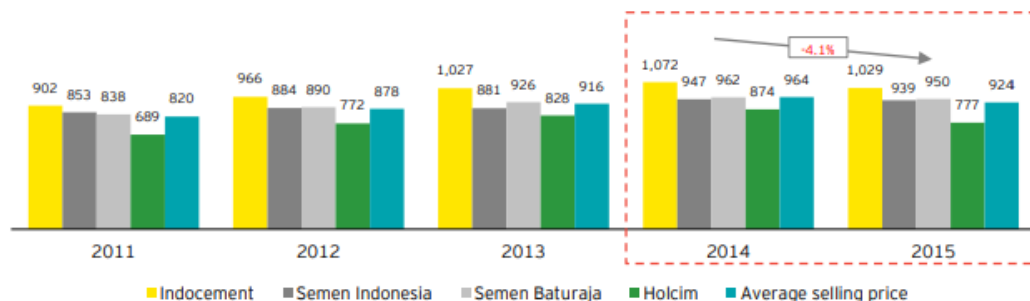
Declining sales indicates declining market share that can be caused by many problem. If the supply growth higher than the demand it will cause market to be oversupplied. Other factor might be declining brand awareness, cheaper product from competitor, higher quality product from competitor, or new substitute product which in this case is unlikely. As the new competitor begin to penetrate the market big player in cement industry start to lose their market share.



Source : www.ey.com and Indonesia Cement Association (ASI)

Figure 1.1.2 Market Share of Cement Players

New entrant have started price discounts since second quarter of 2015 due to increase in capacity. Prices offered by the 5 new players: Anhui Conch, Panasia, Siam Cement, Cemindo Gemilang and Jui Shin are approximately 20% lower than the big three (Semen Indonesia, Indocement, and Holcim) (Ernst & Young, 2016).



Source : www.ey.com

Figure 1.1.3 Average Selling Price of Indonesian public cement companies

One of the the new entrant in Anhui Conch. As the new entrant in the market it's fascinating to understand what it should do in the market do gain more profits. Further study to discuss how new entrant should react in the market and also the previous competitor in the market is needed. There are lot of Anhui Conch market region nowadays one of them is at Kalimantan Selatan. Another new entrant is Semen SBM that actively compete in Kepulauan Riau. In each of these region there are at least one incumbent player such as Holcim and one of Semen Indonesia group.

For two player pricing competition can be found in Aceh region. In this region found that only two cement industry that compete in the market. For multiplayer Kalimantan Selatan and Kepulauan Riau has new entrant in its region that could use as object study. This based on previou research in Wardhani (2017) research.

Price declining indicates problem due to pricing strategies. Is there any decision making that can give better result responding this problem. Market leader need to start formulate best strategies due to new entrant because in cement industry marketing effort is limited compare to another industry such as telecommunication, food, or other consumer goods. Better decision making in pricing strategies can give a company better competitiveness.

1.2 Problem Formulation

The problem formulation in this research is to study pricing competition behavior in cement market by identify best decision strategy made in pricing policy of cement industries in dynamic game. The scenario will be implemented to identify what decision is the best by using regression and game theory so best scenario can be identified.

1.3 Objective

Objective that want to be achieve in this research are:

1. Developing model to describe interaction between pricing strategy from each player with their sales volume.

2. Evaluate how price can influence revenue and revenue share, market share, and profit share and it's relation to each other.
3. Evaluate pricing strategy in different perspective from each player. Which is market leader, follower and new entrant.

1.4 Benefit

Benefit that can be gained from this research is to be able to profiling pricing competition behavior by understanding what best strategy in determining price in long period of time. Better understanding about pricing behavior can be advantage to decision maker in pricing management.

1.5 Scope of the Research

The scope of this research will be explained in separate point, limitation and assumption.

1.5.1 Assumption

This research consists of assumption used in strategic form in payoff table.

1. For revenue share the type of game is assume as Zero-Sum game with number of lost sales as consequence price is change is the factor that creates it's zero-sum game.
2. Each company considers to compete each other in price.
3. Decision from each company to assest their product price is done simultaneously, so they can only know competitor previous price. Not at the same time.
4. The game considers as dynamic game that goes overtime each month.

1.5.2 Limitation

Limitation that used for this research to is :

1. The pricing factor does not consider operating expense.
2. Data used for this research is monthly sales of cement industry in period of time 2014-2016.
3. The cement variance used as research object is cement with bag packaging.
4. For two player, data that used is data price and sales volume in Aceh.

- a. Players at Aceh Region are Semen Padang and Semen Andalas Indonesia
 - b. Only these two companies compete in this region.
5. For multiplayer player, data that used is data price and sales volume in Kepulauan Riau and Kalimantan Selatan.
- a. Players at Kepulauan Riau are Semen Padang, Holcim Indonesia, Semen Andalas Indonesia, Semen SBM, and Indocement Tunggul Perkasa.
 - b. Players at Kalimantan Selatan are Holcim Indonesia, Semen Gresik, Anhui Conch Indonesia, Indocement Tunggul Perkasa, and Semen Tonasa.
 - c. Only these Players compete in these region.

1.6 Writing Systematic

This report explain separately in 8-6 chapter, introduction, literature review, research methodology, data collecting, ~~data analysis and processing~~, ~~model development~~, scenario development ~~and behavior analysis~~, ~~result interpretation and analysis~~, also conclusion and suggestion. Here's the brief explanation for each chapter.

CHAPTER 1 INTRODUCTION

This chapter contain the brief explanation about reasoning for this research that explain separately in 6 point, background of the research, problem formulation, objective that want to achieve, benefit, scope of the research, and report writing systematic for this research.

CHAPTER 2 LITERATURE REVIEW

In this chapter will be explain about literature review to gain more valuable information to help this research. Literature review also done as based reference used in this research. some topic will be reviewed is concept of *Market Share*, , *Regression Technique*, *Game Theory*. *Sensitivity Analysis*. And study on previous research.

CHAPTER 3 RESEARCH METHODOLOGY AND MODEL DEVELOPMENT

Third Chapter will explain research flow that show step by step how this research is done systematically. This research will be done through 5 brief phase. First is literature review, then data collecting and processing, data interpretation and the last is analysis and scenario testing and lastly conclusion from the research.

In this chapter also explain how data needed in the research collected and processed. After all data is collected then continue to processing data to designated Game Theory model using regression technique. But first the regression model need to be developed. In this chapter will also explain about the regression model

CHAPTER 4 SCENARIO DEVELOPMENT AND BEHAVIOR ANALYSIS

This chapter explain how data processed. Data first process to develop mathematical model that can give result on relation between price and market share and other factor that might affect competitive parameter. After that all model and data processed in behavior analysis and scenario testing. In this chapter will also discussed about the result.

CHAPTER 5 CONCLUSION AND SUGGESTION

In last chapter all the result from this research will be concluded and there will be a suggestion for further research.

CHAPTER II

LITERATURE REVIEW

This chapter will explain about theory that used as reference in this research. literature that will be reviewed is Market Share, Regression, and Game Theory

2.1 Market Share

Market shares mean shares of potential consumers (Cooper & Nakanishi, 2010). These means that market is group of people that potentially buy a firm's product. Those consumer who never buy firm's product are out of the market. It means that eventhough that some people not buy the firm's product yet it considered in counting market shares.

However, in this case to get the exact knowledge of the potential buyer will be hard, so in this research market share that discussed is shares of an actual sales. Which is common definition of the market share. Market refered by this definition is shares of an actual sales of the product for given period of time and geographical area. Market in those situations should be taken as the sales performance of a product in the market, rather than a collection of buyers for the product (Cooper & Nakanishi, 2010). These term are stated in the following formula.

$$s_i = \frac{Q_i}{Q} \quad (2.1)$$

Where :

s_i = the market share of firm i

Q_i = the sales (quantity sold or revenue) of firms i 's product

Q = the total sales (quantity sold or revenue) for the market

$Q = \sum_{j=1}^m Q_j$

m = the number of competitor

2.1.1 Kotler's Fundamental Theorem

Kotler fundamental theorem speak about relationship between firm's market shares with its marketing activities. It assume that a relevant industry is defined and industry sales are measured. The theorem say that a firm's market share

is proportional to the marketing effort of its product (Kotler, 1984). It can be written as :

$$s_i = k \cdot M_i \quad (2.2)$$

where:

M_i = the marketing effort of the product of firm i

k = a constant of proportionality.

s_i = Market share of firm I

If a firm's marketing effort were measurable, this theorem indicates that the greater the marketing effort of one's firm the greater should be its market share. But in industry where there more than one competitor, the total market share should be one and cumulative from all market share of the competitor. Therefore, to describe this situation the formula can be written as :

$$S_i = \frac{M_i}{\sum_{j=1}^m M_j} \quad (2.3)$$

This last equation says that the market share of firm i is equal to the firm's marketing effort divided by the sum of marketing effort for all competitors in the industry. But, how big the marketing effort doesn't mean the market share is also big. How effective the marketing effort also affect how success firm marketing strategy is. In this case marketing effort effectiveness can be describe as α . Therefore, the formula can be written as :

$$S_i = \frac{\alpha_i \cdot M_i}{\sum_{j=1}^m \alpha_j \cdot M_j} \quad (2.4)$$

Kotler assumes that the marketing effort is a function of the marketing mix of the company, both in the past and the present. Mathematically can be written as follows :

$$M_i = f(P_i, A_i, D_i, \dots) \quad (2.5)$$

where:

P_i = the price of firm i's product

A_i = the advertising expenditures of firm i

D_i = the distribution efforts (e.g., trade allowances given by firm i).

Setting prices and determining the level of advertising expenditures are two key in marketing mix variable (Schlosser, 2015). Marketing done to attract more buyer and getting more sales. These activity become one important key for every business. As been describe by previous fomula, price, advertising expenditures affect market share of each firm.

2.1.2 Market-Share Theorem

Bell, Keeney, and Little consider a situation where, in making a purchase of a product, consumers must choose one brand from a set of alternative brands available in the market. They posit that the only determinant of market shares is the attraction which consumers feel toward each alternative brand, and make the following assumptions about attractions (David, et al., 1975). Letting A_i be the attraction of brand i ($i = 1, 2, \dots, m$) and s_i be its market share,

Axiom A 2.1 $A_i \geq 0$ for all i and $\sum_{i=1}^m A_i > 0$ (i.e., attractions are nonnegative and their sum is positive).

Axiom A 2.2 $A_i = 0 \Rightarrow s_i = 0$. (The symbol \Rightarrow should read “implies,” i.e., zero attraction implies zero market share.)

Axiom A 2.3 $A_i = A_j \Rightarrow s_i = s_j$ ($i \neq j$) (i.e., equal attraction implies equal market share).

Axiom A 2.4 When A_j changes by Δ , the corresponding change in s_i ($i \neq j$) is independent of j (e.g., a change in attraction has a symmetrically distributed effect on competitive market share).

From those four axioms they show that the following relationship between attractions and market shares may be derived.

$$S_i = \frac{A_i}{\sum_{j=1}^m A_j} \quad (2.6)$$

The last axiom establishes the relationship between attractions and market shares. BKL observe that, if we add an assumption that

$$\sum_{i=1}^m A_i = 1 \quad (2.7)$$

2.1.3 Alternative Model of Market Share

There five mathematical model to describe market share. That is Linear Model, Exponential Model, Multiplicative Model, MCI Model, and MNL Model. Below is the mathematical model from each model.

1. Linear Model

$$s_i = a_i + \sum_{k=1}^K \beta_k \cdot X_{ki} + \epsilon_i \quad (2.8)$$

2. Exponential Model

$$s_i = \exp(a_i) + \prod_{k=1}^k X_{ki}^{\beta_k} \cdot \epsilon_i \quad (2.9)$$

3. Multiplicative Model

$$s_i = \exp\left(a_i + \prod_{k=1}^k \beta_k \cdot X_{ki} + \epsilon_i\right) \quad (2.10)$$

4. Multiplicative Competitive Interaction (MCI) Model

$$s_i = \frac{\mathcal{A}_i}{\sum_{j=1}^m \mathcal{A}_j} \quad (2.11)$$

$$\mathcal{A}_i = \prod_{k=1}^K f_k(X_{ki})^{\beta_k} \quad (2.12)$$

5. Multinomial Logit (MNL) Model

$$\mathcal{A}_i = \exp\left(\alpha_i + \sum_{k=1}^K \beta_k \cdot X_{ki} + \epsilon_i\right) \quad (2.13)$$

$$s_i = \frac{\mathcal{A}_i}{\sum_{j=1}^m \mathcal{A}_j} \quad (2.14)$$

Where :

s_i = Market share of firm i

A_i = attractiveness to brand i

m = number of brand

X_{ki} = value of variable k in X_k , for brand i

K = number of variable

f_k = monotone transformation in X_k , ($f_k(.) > 0$)

β_k = estimated parameter for brand influence

2.2 Regression

There are many ways to determine relationship between each factor. Such as coefficient of correlation to examining whether two interval- or ratio-scale variables could be related. And one way to determine each relation is by using regression.

Regression analysis provides a “best-fit” mathematical equation for the values of the two variables (Welters, 2010). This mathematical equation can be form of linear or curvilinear. Regression use to predict the value of certain factor by match it by formulated mathematical equation. The formulation comes from identified data and predict it’s value from each pattern of data.

Simple Linear Regression

The simple linear regression model is a linear equation having a Y-intercept and a slope, with estimates of these population parameters based on sample data and determined by standard formulas (Welters, 2010). The model is can be described as follows:

$$y_i = \beta_0 + \beta_1 x_i + \epsilon_i \quad (2.15)$$

Where :

y_i = a value of the dependent variable, y

x_i = a value of the independent variable, x

β_0 = the y-intercept of the regression line

β_1 = the slope of the regression line

ϵ_i = random error, or residual

the y-intercept for the population of (x_i, y_i) pairs is β_0 and the slope is β_1 . The ϵ_i term is used for the random error, or residual, for the i th data. Residual means difference between the actual value (y_i) and the expected value from the regression line that formulated. There are three assumptions use in simple linear regression model:

1. For any given value of x , the y values are normally distributed with a mean that is on the regression line,
2. Regardless of the value of x , the standard deviation of the distribution of y values about the regression line is the same. The assumption of equal standard deviations about the regression line is called homoscedasticity.
3. The y values are statistically independent of each other. For example, if a given y value happens to exceed, this does not affect the probability that the next y value observed will also exceed .

2.3 Game Theory

Game theory is the breakthrough came with John von Neumann and Oscar Morgenstern's book, *Theory of Games and Economic Behavior*, published in 1944. Game theory say that in competition each player will act to gain most outcome from the game in normal situation. Game theory provides a formal language for the representation and analysis of interactive situations, that is, situations where several "entities", called players, take actions that affect each other by their decision (Bonanno, 2018).

Game theory is divided into two main branches. The first is cooperative game theory, which assumes that the players can communicate, form coalitions or can have all information regarded the game from other player. Second is Non-cooperative game where the players are most likely unavle to communicate and cant form coalition. It's simply say that other player gain is our lost.

In brief, game theory is optimization method that can be use if only there are 4 component exist, games (set of problem), player (decision maker), strategy (set

of action that can be made), and payoff (result of each decision for each player). The objective is to find best choice that consider all player with their strategy and payoff. Because game theory deals with interactive situation.

2.3.1 Best Responses and Dominant Strategies

For every possible strategy that the opponent might do, we asked what was our best strategy if the opponent played that strategy?. The best decision to answer that question is by finding the best response. Consider a game with N players. A best response for player N to the N-1 strategies of their opponent is a strategy that maximizes their payoff against these N -1 strategies of their opponents (Hermalin, 1998).

A single strategy for a player that is a best dominant strategy response to every strategy of their opponents (Hermalin, 1998). This means that no matter that their opponent do if a player got dominant strategies, they always pick that strategies. So the outcome of the game will be that dominant strategies. But in game theory dominant strategies also by considering all outcome that possibly be taken.

2.3.2 Strategic Form Games

Strategic form games is form of games that can be visualize by using table (cardinal) by assign each strategy from each player. This usually happen when each player make the decision simultaneously so payoff can be identify right away. Strategic form can be drawn as follows:

		Player 2	
		\$100	\$200
Player 1	\$100	2.5 3.5	1 4
	\$200	2 5	1.5 4.5

Figure 2.1 Strategic Form Games Payoff Table

2.3.3 *Nash Equilibrium*

Strategies chosen by the players of a game constitute a Nash equilibrium when each player's strategy is a best response to the strategies of the other players (Hermalin, 1998). In other words, when each player got to get one best response for every alternative it categorize as nash equilibrium. but, there are a unique Nash equilibrium that the solution concept yields a single prediction. Moreover, for many games in which it yields multiple solutions.

Nash equilibria are strategy profiles at which a game can no longer change, that can be good outcomes for all, some, or none of the players (Schechter & Gintis, 2016). Nash equilibrium happen when all player will stuck at same deicision. It consider as solution in game theory problem. Or can be called as stable solution to the game.

2.3.4 *The Bertrand Model of Competition*

Hermalin mention that there are one type of competition model known as Bertrand model of competition. This model help to analyze competitive for two or more competitive firm in the market. In Bertrand model firms compete over prices. Therefore, reaction function are expressed in prices, not quantities (Graham, 2013).

2.3.4.1 Assumptions Underlying the Bertrand Model

There are several assumption underlie Bertrand model of competition (Hermalin, 1998).

- Firms produce a homogenous product. Means that the product made by any one firm is absolutely equivalent in the consumers' minds.
- Customers know the price being charged by each firm.
- Customers incur no costs switching from one firm to another firm.
- No cost advantages: Regardless of the units produced by one firm versus another, they each have precisely the same marginal cost for the next unit produced.
- No capacity constraints: Each firm is capable of handling the entire industry on its own.

- No future considerations: Firms do not consider possible future interactions among themselves.

Customers know all prices and face no switching costs, customers will buy from the firm charging the lowest price. If more than one firm is charging the lowest price then it can assume that customers divide themselves equally, on average, among those firms charging this lowest price.

2.3.4.2 Equilibrium in the Bertrand Model

To solve Nash equilibrium of the Bertrand game is by calculating each firm's best response to various strategies of its rivals. The market price in a Nash equilibrium of the Bertrand model is equal to marginal cost (Hermalin, 1998).

In profit term, All firms in a Bertrand industry must make zero economic profits (Hermalin, 1998). This means that if each firm keep competing they must face the fact that the price is keep lower and lower until it reach zero profit margin. Better approach should be done to analyze this problem further. This is why being in a Bertrand industry is undesirable and why we will refer to being in the Bertrand model as being in the Bertrand trap.

2.4 Sensitivity Analysis

Sensitivity analysis plays a central role in structuring and analyzing decision models and often provides valuable insights for the decision maker (Clement & Reily, 2013). Sensitivity analysis is use by varying the input values, and determine the potential impact of each input variable in the mode. This method is used to overcome uncertainty by analyze each factor that might be change the optimum decision is each variable is change. In this change is used to analyze how change of the price can affect firms market share.

In practical engineering systems and mathematical models, uncertainties are often encountered in the input factors, which will lead to uncertain performance. Sensitivity analysis has been widely used to help decision makers understand the degree of confidence in the decision they made and assess the risk (Xiao, et al., 2017).

2.5 What-if Analysis

What-If Analysis is the process of changing the variable values in formula to see how those changes will affect the outcome of formula. This analysis tools is came up at MS. Excel. It's use to analyze how some variable affect its optimum value by changing its value. It similar with sensitifity analysis. The use of what-if analysis it's a way for a company, individual, or economist, to plug in different scenarios and values to determine a range of possible outcomes.

MS.Excel is one tool that can help to do what-if analysis. There are three kinds of What-If Analysis tools come with MS. Excel: Scenarios, Goal Seek, and Data Tables. Scenarios and Data tables take sets of input values and determine possible results.

2.6 Previous Research

There are several research that similar with this research that can be reference to conduct this research. below is the list of the similar research and it's brief explanation. Previous research help to give better understanding to the case, solution, and metholodgy in solve similar problem

Table 2-1 Table list of previous Research

No	Author	Research Title	Description
1	Fiki Aprilia Vena (2017)	<i>Analisis Karakteristik Persaingan Dan Strategi Semen Perspektif PT. Y Sumatera</i>	Analyze the market share by using regression to forecast future market share, regression also to identify relation between each variable
2	Dwika Puspa Wardhani (2017)	<i>Analisis Market Share Semen Gresik Varian Bag Dengan Menggunakan Log</i>	Analyze future market share of semen gresik by using regression and use price as an input variable to

No	Author	Research Title	Description
		Linear Regression Technique	determine market share and considering time, competitor historical data.
3	Adelia Stephanie Zarlinda (2015)	Comparison Analysis of Pricing Behaviour of Garuda Airlines Ticket Prices Between Peak and Non-Peak Departure time by days of Purchase	Study airlines pricing behavior in peak and non peak departure time using descriptive analysis to compare the behavior and using multiple regression to see mathematical relation between price change over time in different condition
4	Santi Purwantini (2014)	<i>Pengembangan Model Kompetisi Penetapan Harga Secara Dinamis Berbasis Waktu dan Persediaan Kursi untuk Penerbangan Paralel pada Low Cost Carrier dengan Mempertimbangkan Harga Tiket Competitor</i>	Focus on model development based on dynamic pricing in defining seat price using numeric experiment

To analyze this research and it's contribution it can be describe by defining research position compare to previous research. Below is table to to describe this research position compare to previous research.

Table 2-2 Research Position

No	Topic	Research				
		Vena	Wardhani	Zarlinda	Purwantini	This Research
1	Pricing Behaviour	√		√	√	√
2	Relation between Pricing to Market Share	√	√			√
3	Consider Time Frame in Pricing Strategies	√	√		√	√
4	Consider Pricing Historical Data	√	√	√	√	√
5	Consider Competitor Response	√			√	√
6	Object	Cement Industry	Cement Industry	Airlines	Airlines	Cement Industry
Tools						
1	Regression	√	√	√		√
2	Game Theory				√	√
3	Numerical Experiment				√	
4	Descriptive Analysis			√		
5	Sensitivity Analysis	√	√			√

This research try to create profiling pricing competition behavior in oligopoly market, previous research able to solve many research regarding pricing competition in two different object and different method. But not all research is focus on studying pricing behavior, the idea that different with other research this research try to test paradigm about lowering price to keep demand. What the best course should be taken if competitor lowering their price.

CHAPTER III

RESEARCH METHODOLOGY AND MODEL DEVELOPMENT

This chapter will explain about procedure to do this research. This chapter also explain and show data collection process and mathematical model formulation that used in strategic form table formulation and to determine future output or forecast from each player.

3.1 Research Methodology

This research is done in some straight procedure that has been planned before. all this research procedure is done in some methodology. This would help author to do this research systematically. Below is the research methodology drawn in flow chart.

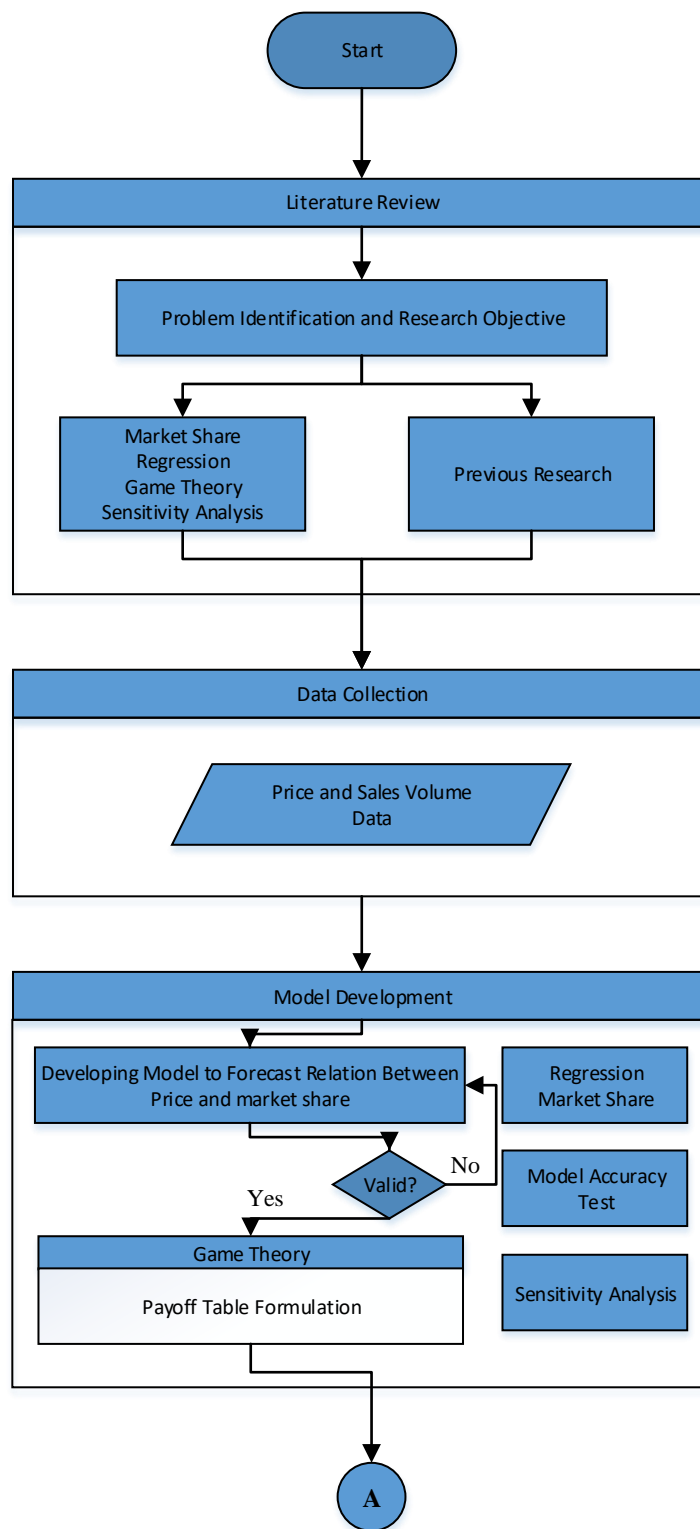


Figure 3.1 Research methodology Flowchart (Con't)

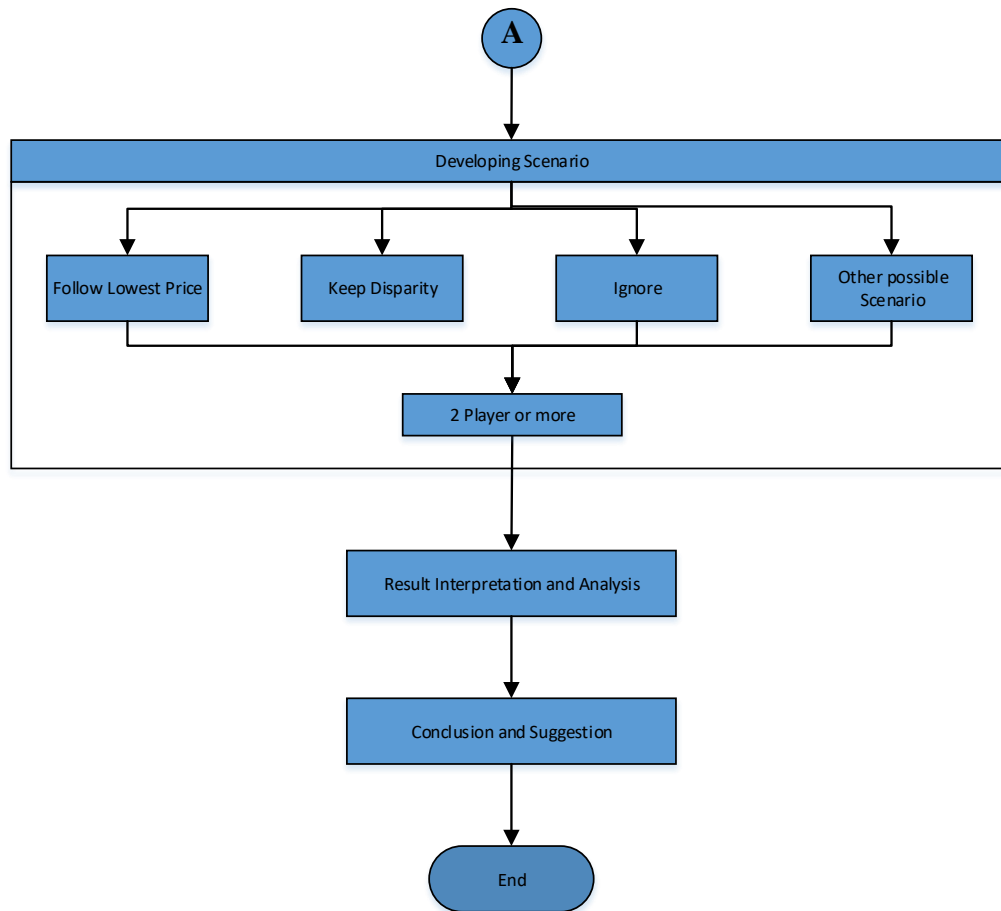


Figure 3.2 Research methodology Flowchart (Con't)

The following will explain each of the stages of this research, Literature Review, Data Collection, Model Development, Developing Scenario, Result interpretation and analysis, as well as conclusions and suggestions.

3.1.1 Literature Review

This section will explain about previous study in pricing competition in oligopoly market to give better understanding how previous research has been done. Also, to identify what factor that can affect the problem. After the present condition is known, problems and research objectives will be determined. The problem formulated in this research is study competition behavior in pricing strategy at oligopoly market by using cement industry as case study.

The problem here is what happen if we lose some market share but can gain more revenue. How to get more revenue by set the right price, what is best

decision to respond price change. This research tries to identify solution and study behavior in pricing competition.

Literature review is used as a basis and reference in this research. Every related knowledge regarded to research is studied such as game theory, market share, regression, and sensitivity analysis. Better understanding about this term can give better insight to this research.. Literature Review are obtained from a various sources, such as books or journals.

Literature review is also used to identify best tools and how to formulate the solution to enhance the understanding to the problem and the tools, by understand previous reseach and result

3.1.2 Data Collection

. Data collection is done by obtaining sales and price information from cement with bag packaging in some region from all sellers in that region. The data is set monthly.

3.1.3 Model Development

After data is collected, regression model is created to determine volume based on its price, competitor price, and monthly trend. Then, for each month, table payoff is created by assign predicted value using what-if and sensitivity analysis scenario in each cells. After each scenario is formulated, the best solution for each month is determine by using game theory

3.1.4 Developing Scenario

After all payoff table formulation is done, next is to assign scenario based on cement industry data. Variable that change in the scenario is pricing strategies and number of player. All scenario is design in long term period.

3.1.5 Scenario Development and Analysis

On this stage, result interpretation and analysis will be conducted from previous stage. After each best strategy in each month defined, next stage is to analyse and profiling picing behavior based on result from each scenario. Low then

high, keep low or keep high, or other possible scenario. Then, the result is compare and accumulated. After that, all of the result is gathered to get better understanding in pricing strategy.

3.1.6 Conclusion and Suggestion

Final stage of this research will be conclusion from the result and suggestion for future research.

3.2 Conceptual Model

The process of this research follows designated conceptual model. Conceptual model is a type of model or diagram which shows relation and integration between factor or process. Conceptual model tells in system oerspective. Which means that in this part, the research try to explain in input-process-output-analysis-conclusion scheme. These scheme helps author to develop report show data is used. Below is the conceptual model.

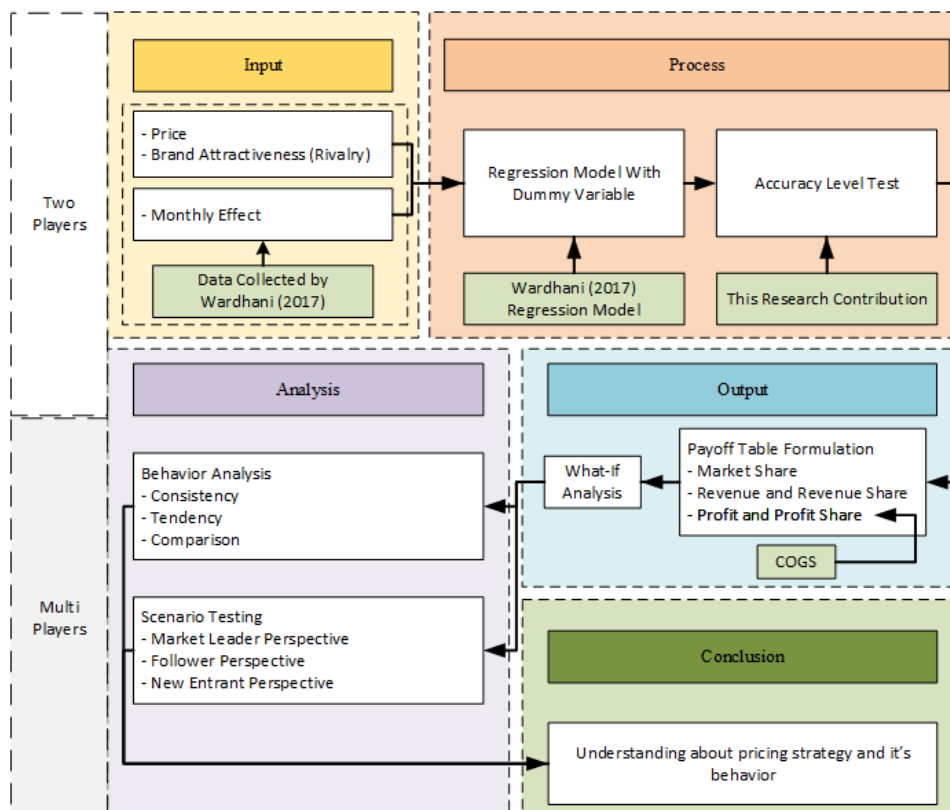


Figure 3.3 Conceptual Model of the research

This research start by formulating payoff using regression model that has been developed by Wardhani (2017). But before after payoff table formulation, the regression model is tests the accuracy level to forecast the output. Then it continue by doing scenario testing and behavior analysis.

3.3 Data Collection

Data Collected in this research is data that gathered in market survey by Wardhani (2017) and Vena (2017). The market survey is done by gathered sales volume of each cement company in each region related to their prices.

3.4 Regression Model

Regression model is used as mathematical formulation to get related outcome. This regression model used linear regression to all data for two player and multiplayer where volume is identified as response and the other data categorize as predictors. This regression model is the model that has been developed by Wardhani (2017) and Vena (2017). But, in the process, the authors do some improvement to get better result.

3.4.1.1 Wardhani (2017) and Vena (2017) Model

First initial regression model that already developed by Wardhani (2017) and Vena (2017). But there are slightly improvement in period identifier. That already shown in data arrangement. Second is model that developed by author that separate price variable to each player so that any change from 1 player could change the result.

This regression model is done by various confidence level to compare the result before it's continue. But in all confidence level the result is the same. All shows the similar result regardless the number of the confidence level.

These regression model is based on data arrangement that been showed in figure 4.2.3. but there are some improvement from these model which is the period that previously written 1-2-3... regardless the period. But in the improvement the period written based on the period. Means that in January 2014 the period will be numbered as 1, and in the next period will be 2.

In general this model can be written as

$$Y_{it} = \alpha \cdot P_i + \sum_{t=1}^{12} M_t + \beta \cdot B_k + \gamma \cdot Period_i \quad (3.1)$$

Where :

Y_{it} = Sales Volume at Month t in Period i

α = Price Coefficient

P_i = Price Setting in period i

M_t = Monthly Coefficient

β = Brand Coefficient

B_k = Brand Identifier player k

γ = Period Coefficient

$Period_i$ = Period Series i Identifier

As the formula above describe how each variable from sales volume to their respected period time relate to their prices. Below is the result of calculation from sales volume regression model in Aceh region with two player (SAI and SP)

$$\begin{aligned} \text{Volume} = & 101811 - 0.0746 \text{ Price} + 202.8 \text{ Period} - 12346 \text{ M1} - 17237 \text{ M2} - 15576 \text{ M3} - 18279 \text{ M4} \\ & - 12658 \text{ M5} - 10777 \text{ M6} - 20557 \text{ M7} - 3475 \text{ M8} - 7077 \text{ M9} - 4860 \text{ M10} + 841 \text{ M11} \\ & + 24504 \text{ SAI} \end{aligned}$$

At the result there are intercept that can be neglected by zero coefficient in regression menu. The result is similar. So Semen Padang sales volume if the price is Rp 900.000,- at 33 period from the first data, at January would be 29017.4 Kg. This calculation used as predictor method to formulated the outcome based on price input.

3.4.1.2 Interactive Regression Model

To improve the model so that if the competitor change their price the other player in that region will be affected, not only the player that change their price.

Authors try to develop model that can accommodate these problem through regression model. To do it data arrangement is slightly change by create new variable which is each player price in each data arrangement. Below is data arrangement for interactive regression model.

Table 3-1 Data Arrangement for Interactive Regression Model

Month	Brand	Volume	Price SAI	Price SP	Period	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	SAI	SP
Jan-14					1	1	0	0	0	0	0	0	0	0	0	0	0	1	0
					1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Feb-14					2	0	1	0	0	0	0	0	0	0	0	0	0	1	0
					2	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Mar-14					3	0	0	1	0	0	0	0	0	0	0	0	0	1	0
					3	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Apr-14					4	0	0	0	1	0	0	0	0	0	0	0	0	1	0
					4	0	0	0	1	0	0	0	0	0	0	0	0	0	1
May-14					5	0	0	0	0	1	0	0	0	0	0	0	0	1	0
					5	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Jun-14					6	0	0	0	0	0	1	0	0	0	0	0	0	1	0
					6	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Jul-14					7	0	0	0	0	0	0	1	0	0	0	0	0	1	0
					7	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Aug-14					8	0	0	0	0	0	0	0	1	0	0	0	0	1	0
					8	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Sep-14					9	0	0	0	0	0	0	0	0	1	0	0	0	1	0
					9	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Oct-14					10	0	0	0	0	0	0	0	0	0	1	0	0	1	0
					10	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Nov-14					11	0	0	0	0	0	0	0	0	0	0	1	0	1	0
					11	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Dec-14					12	0	0	0	0	0	0	0	0	0	0	0	1	1	0
					12	0	0	0	0	0	0	0	0	0	0	0	1	0	1

From this data arrangement there new variable that will affect the result of other player sales volume of theres price change from other player. These model can accommodate the sensitivity analysis and appropriate for zero-sum game. because any change could change all sales volume outcome.

In general this model can be written as

$$Y_{it} = \sum_{k=1}^k \alpha . P_{ik} + \sum_{t=1}^{12} M_t + \beta . B_k + \gamma . Period_i \tag{3.2}$$

Where :

Y_{it} = Sales Volume at Month t in Period i

α = Price Coefficient

P_{ik} = Price Setting for player k in period i

M_t = Monthly Coefficient

β	= Brand Coefficient
B_k	= Brand Identifier for Player k
γ	= Period Coefficient
$Period_i$	= Period Series i Identifier

The idea of interactive model is from the regression the price will directly affect the result for all player. Because the sales volume is affected by every player in the region.

3.5 Model Accuracy Test

After each regression model already been developed, to understand how good the model to be used for this research, the next step is to test how well this mathematical model can predict and forecast future outcome. The data that used for regression is cut to n-6 or n-3, then for each period the regression result is compare with the actual result.

This model accuracy testing is used also as validation effort towards this model. Because it's never been implemented to real system the result only compared to their result on it's actual period.

The model fit test is done by comparing result of regression and actual value. First regression is done to n-6 data, then the formula used to forecast outcome in n-5 period from all data gathered. Then for n-5 data the procedure is repeat so the regression is updated every period to forecast the next outcome. These means to forecast n-t period data, n-t-1 data is used. Next, the result compared with the actual outcome. Comparing process is done by calculate the error between actual outcome and regression result

3.5.1 *Wardhani (2017) and Vena (2017) Model Accuracy Test*

. Below is the model fit test of region aceh data from the first model accuracy test.

Table 3-2 Model Fit Test for Wardhani (2017) and Vena (2017) Model in Aceh Region

							Actual	
		Volume	Market Share	Revenue Share	PE	APE	Market Share	Revenue Share
Mar-16	SAI	48,889	65.88%	66.55%	0.54%	0.54%	64.55%	65.23%
	SP	25,316	34.12%	33.45%	6.20%	6.20%	35.45%	34.77%
Apr-16	SAI	48,875	65.77%	66.44%	-3.27%	3.27%	61.78%	62.48%
	SP	25,438	34.23%	33.56%	13.14%	13.14%	38.22%	37.52%
May-16	SAI	55,656	63.23%	63.92%	-3.98%	3.98%	60.49%	61.20%
	SP	32,365	36.77%	36.08%	7.41%	7.41%	39.51%	38.80%
Jun-16	SAI	56,769	62.67%	63.37%	-3.78%	3.78%	57.77%	58.50%
	SP	33,820	37.33%	36.63%	15.44%	15.44%	42.23%	41.50%
Jul-16	SAI	47,422	65.71%	66.40%	-6.41%	6.41%	60.29%	61.02%
	SP	24,741	34.29%	33.60%	15.71%	15.71%	39.71%	38.98%
Aug-16	SAI	66,172	60.19%	60.92%	6.77%	6.77%	55.39%	56.14%
	SP	43,760	39.81%	39.08%	23.44%	23.44%	44.61%	43.86%
Sep-16	SAI	63,621	60.60%	61.32%	-11.15%	11.15%	57.70%	58.44%
	SP	41,364	39.40%	38.68%	1.42%	1.42%	42.30%	41.56%
				Mean	4.39%	8.48%		

From the result, it can be seen that the Mean Percentage Error (MPE) Is 4.39 %. And for Mean Absolute Percentage Error (MAPE) the error is 8.48 %. These result indicates 90-95 % accuracy from these regression model.

In multiplayer perspective the model fit test done for Kalimantan Selatan Region. In Kalimantan selatan region there are 5 player. But because the error for Holcim Indonesia and Semen Tonasa is quite high these two player is removed for the calculation. Below is the calculation of model fit test for multi player.

Table 3-3 Model Fit Test for Wardhani (2017) and Vena (2017) Model in Kalimantan Selatan Region

							Actual	
Period	Brand	Volume	Market Share	Revenue Share	PE	APE	Market Share	Revenue Share
Jul-16	ITP	16,506	39.20%	41.37%	-6.03%	6.03%	26.4%	27.18%
	HI	(2,444)	-5.80%	-6.49%	197.75%	197.75%	4.2%	4.63%
	SG	6,186	14.69%	16.44%	28.69%	28.69%	14.7%	16.06%
	CCI	23,183	55.06%	52.30%	16.80%	16.80%	47.2%	43.79%
	ST	(1,326)	-3.15%	-3.62%	130.23%	130.23%	7.4%	8.34%
Aug-16	ITP	22801	30.65%	31.29%	21.28%	21.28%	35.3%	36.02%
	HI	4011	5.39%	5.83%	-16.87%	16.87%	4.2%	4.52%
	SG	12506	16.81%	18.19%	-11.35%	11.35%	13.7%	14.80%
	CCI	30060	40.41%	37.13%	6.39%	6.39%	39.1%	35.94%
	ST	5006	6.73%	7.56%	21.38%	21.38%	7.8%	8.71%
Sep-16	ITP	25236.6671	29.24%	29.76%	7.53%	7.53%	29.1%	29.87%
	HI	6196.1871	7.18%	7.75%	-100.14%	100.14%	3.3%	3.59%
	SG	14643.1871	16.97%	18.30%	8.46%	8.46%	17.1%	18.56%
	CCI	32525.8004	37.68%	34.52%	18.41%	18.41%	42.5%	39.27%
	ST	7709.5701	8.93%	9.67%	-3.11%	3.11%	8.0%	8.70%
				Mean	10.02%	13.88%		

3.5.2 Interactive Regression Model

But, the decision to use these model is based on how good these model can forecast the outcome in practical or in actual condition. Therefore, the model fit test for these model is needed. Below is the result of model fit test from the interactive regression model.

Table 3-4 Model Fit Test for Interactive Regression Model

								Actual	
		Volume	SP	Market Share	Revenue Share	PE	APE	Market Share	Revenue Share
Mar-16	SAI	48,815	0	66.05%	66.72%	0.69%	0.69%	64.55%	65.23%
	SP	25,086		33.95%	33.28%	7.05%	7.05%	35.45%	34.77%
Apr-16	SAI	48,816	0	65.87%	66.54%	-3.14%	3.14%	61.78%	62.48%
	SP	25,290		34.13%	33.46%	13.64%	13.64%	38.22%	37.52%
May-16	SAI	55,647	0	63.28%	63.97%	-3.97%	3.97%	60.49%	61.20%
	SP	32,292		36.72%	36.03%	7.62%	7.62%	39.51%	38.80%
Jun-16	SAI	56,729	0	62.76%	63.46%	-3.71%	3.71%	57.77%	58.50%
	SP	33,662		37.24%	36.54%	15.83%	15.83%	42.23%	41.50%
Jul-16	SAI	47,348	0	65.87%	66.55%	-6.24%	6.24%	60.29%	61.02%
	SP	24,534		34.13%	33.45%	16.41%	16.41%	39.71%	38.98%
Aug-16	SAI	66,137	0	60.27%	60.99%	6.81%	6.81%	55.39%	56.14%
	SP	43,604		39.73%	39.01%	23.71%	23.71%	44.61%	43.86%
Sep-16	SAI	63,583	0	60.64%	61.36%	-11.08%	11.08%	57.70%	58.44%
	SP	41,270		39.36%	38.64%	1.65%	1.65%	42.30%	41.56%
						Mean	4.66%	8.68%	

From the result it can be identified that Mean Percentage Error (MPE) for this model is 4.66% and Mean Absolute Percentage Error is 8.68%. this is slightly higher from the previous model. Also because the current result can be affected by changing the value this regression model is too sensitive to be used. Therefore model that used is initial model that already been developed by Wardhani (2017) and Vena (2017).

3.6 Payoff Model Formulation

After data arranged, to formulate payoff table in the market regression model fit test apply. Regression used is linear regression. By using sales volume as response and other factor as predictor. To detect trend, data is separated by categorical data from M1-M12. It's similar with brand. Below is the example of aceh regression result from Januari 2014 to March 2016 using MS. Excel.

Regression Statistics								
Multiple R	0.942157339							
R Square	0.887660451							
Adjusted R Square	0.796051383							
Standard Error	5717.532137							
Observations	54							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	16	10073862816	629616426	22.01155721	3.60975E-14			
Residual	39	1274916776	32690173.74					
Total	55	11348779592						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	83229.5019	36926.75214	2.253907996	0.029896668	8538.09564	157920.9082	8538.09564	157920.9082
Price	-0.076487182	0.042002473	-1.821016162	0.076282775	-0.161445202	0.008470839	-0.161445202	0.008470839
Period	315.6855341	114.9888459	2.74535788	0.009093974	83.09863968	548.2724286	83.09863968	548.2724286
M1	8383.655829	3771.026216	2.223176226	0.03206865	756.0353431	16011.27631	756.0353431	16011.27631
M2	3567.153649	3713.283212	0.960646804	0.342648142	-3943.670588	11077.97789	-3943.670588	11077.97789
M3	5328.185984	3741.016163	1.424261685	0.162323539	-2238.733441	12895.10541	-2238.733441	12895.10541
M4	2045.54622	4077.26773	0.50169534	0.618702401	-6201.506196	10292.59864	-6201.506196	10292.59864
M5	8191.745557	4094.601242	2.00062108	0.052429196	-90.36719551	16473.85831	-90.36719551	16473.85831
M6	9151.647635	4052.972097	2.25800904	0.029616982	953.7377758	17349.55749	953.7377758	17349.55749
M7	0	0	65535	#NUM!	0	0	0	0
M8	12633.58828	4045.683035	3.122733089	#NUM!	4450.421942	20816.75462	4450.421942	20816.75462
M9	15269.57696	4077.191314	3.745121528	0.000581941	7022.679113	23516.47481	7022.679113	23516.47481
M10	16145.44255	4129.471071	3.909808852	0.000358265	7792.798909	24498.08619	7792.798909	24498.08619
M11	21958.82484	4253.181324	5.162917629	7.48077E-06	13355.95359	30561.69608	13355.95359	30561.69608
M12	21254.27281	4659.394877	4.561595093	4.94044E-05	11829.7571	30678.78852	11829.7571	30678.78852
SAI	25747.54218	1910.396418	13.47759132	2.93305E-16	21883.40069	29611.68367	21883.40069	29611.68367
SP	0	0	65535	#NUM!	0	0	0	0

Figure 3.4 Aceh Data Regression Result

For data that have more than 16 variable regression process is not using Ms. Escel but using Minitab. Below is the screenshot and result of regression in Kepulauan Riau Area

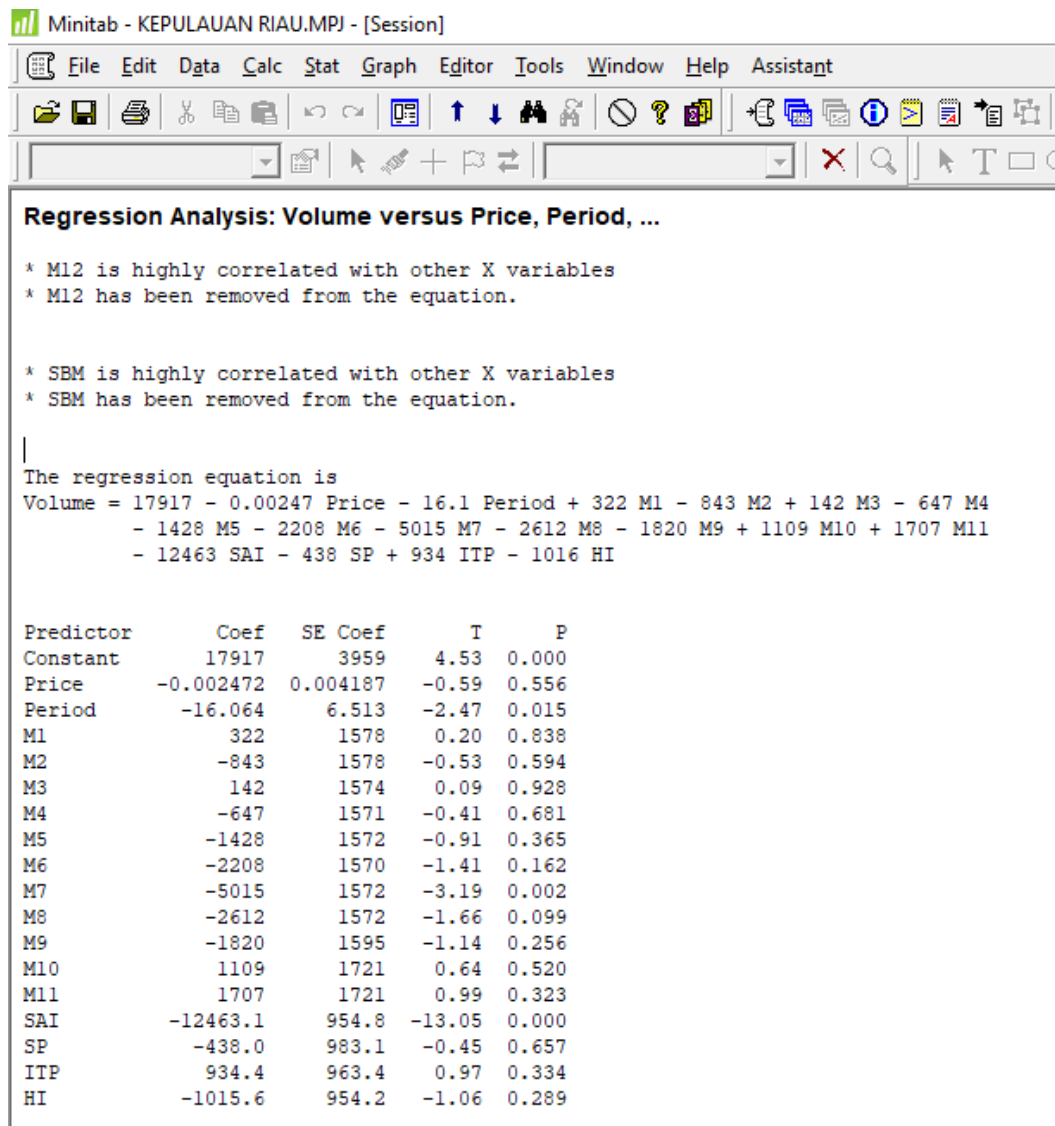


Figure 3.5 Regression Result of Aceh region Data

Then from regression model designated result (sales volume) can be identified if the price and the period is change and adjusted. This model can be used to calculate the output for the what if analysis and furthermore to formulated payoff table or strategic form.

3.7 What if Analysis

After payoff table has been developed, to find the solution is by using game theory. To do that, strategic form of game they must be developed. To develop this model, the input is change and to get it's related result. Then it's done to 7 possible input for two player and 5 and 3 outcome for multiplayer including it's initial price.

the price set for increasing and decreasing is change every 5% from it's initial price set.

3.7.1 Market Share Payoff Table

Market share payoff table is build based on outcome from regression model. The sales outcome from each player with their designated price. the percentage of the shares is each player sales volume divided by the total sales volume from each player in their region. Below is the example of market share what if analysis analysis for April 2016 based on the regression model in aceh region.

Table 3-5 Aceh Market Share Payoff Table for April 2016

MARKET SHARE								
1-Apr-16								
Payoff SP								
		SAI						
		796,991.94	843,873.82	890,755.70	937,637.58	984,519.45	1,031,401.33	1,078,283.21
SP	773,551.00	37.60%	39.09%	40.70%	42.44%	44.34%	46.42%	48.71%
	819,054.00	35.22%	36.66%	38.23%	39.94%	41.81%	43.87%	46.13%
	864,557.00	32.64%	34.03%	35.55%	37.22%	39.04%	41.06%	43.29%
	910,060.00	29.84%	31.18%	32.63%	34.23%	35.99%	37.95%	40.13%
	955,563.00	26.81%	28.06%	29.43%	30.95%	32.63%	34.50%	36.59%
	1,001,066.00	23.50%	24.65%	25.92%	27.32%	28.88%	30.64%	32.62%
	1,046,569.00	19.88%	20.90%	22.03%	23.29%	24.70%	26.29%	28.11%

These table is zero-sum payoff table, which means player A gain is Player B loss. Based on the payoff table the result or the nash equilibrium for market share for each player is when each player lower their price to the lowest possible. From this result, known that if market share is important lowering price is the best strategy to gain more sales volume.

Table 3-6 Region Kalimantan Selatan Market Share Payoff Table in September 2016 Indocement Tunggul Prakasa Payoff.

Payoff ITP	Lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/Hi	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031
749,171	636,088	751,737	28.2%	28.4%	28.6%	27.7%	27.9%	28.1%	27.1%	27.3%	27.6%
749,171	636,088	791,302	28.4%	28.6%	28.8%	27.9%	28.1%	28.3%	27.3%	27.6%	27.8%
749,171	636,088	830,867	28.6%	28.8%	29.1%	28.1%	28.3%	28.5%	27.6%	27.8%	28.0%
749,171	669,567	751,737	28.4%	28.6%	28.8%	27.8%	28.1%	28.3%	27.3%	27.5%	27.7%
749,171	669,567	791,302	28.6%	28.8%	29.0%	28.1%	28.3%	28.5%	27.5%	27.7%	28.0%
749,171	669,567	830,867	28.8%	29.0%	29.3%	28.3%	28.5%	28.7%	27.7%	28.0%	28.2%
749,171	703,045	751,737	28.5%	28.8%	29.0%	28.0%	28.2%	28.5%	27.5%	27.7%	27.9%
749,171	703,045	791,302	28.8%	29.0%	29.2%	28.2%	28.5%	28.7%	27.7%	27.9%	28.2%
749,171	703,045	830,867	29.0%	29.2%	29.4%	28.5%	28.7%	28.9%	27.9%	28.2%	28.4%
788,601	636,088	751,737	28.4%	28.6%	28.8%	27.9%	28.1%	28.3%	27.3%	27.6%	27.8%
788,601	636,088	791,302	28.6%	28.8%	29.1%	28.1%	28.3%	28.5%	27.6%	27.8%	28.0%
788,601	636,088	830,867	28.8%	29.1%	29.3%	28.3%	28.5%	28.8%	27.8%	28.0%	28.2%
788,601	669,567	751,737	28.6%	28.8%	29.0%	28.1%	28.3%	28.5%	27.5%	27.7%	28.0%
788,601	669,567	791,302	28.8%	29.0%	29.3%	28.3%	28.5%	28.7%	27.7%	28.0%	28.2%
788,601	669,567	830,867	29.0%	29.3%	29.5%	28.5%	28.7%	29.0%	28.0%	28.2%	28.4%
788,601	703,045	751,737	28.8%	29.0%	29.2%	28.2%	28.5%	28.7%	27.7%	27.9%	28.1%
788,601	703,045	791,302	29.0%	29.2%	29.4%	28.5%	28.7%	28.9%	27.9%	28.2%	28.4%
788,601	703,045	830,867	29.2%	29.4%	29.7%	28.7%	28.9%	29.1%	28.2%	28.4%	28.6%
828,031	636,088	751,737	28.6%	28.8%	29.1%	28.1%	28.3%	28.5%	27.6%	27.8%	28.0%
828,031	636,088	791,302	28.8%	29.1%	29.3%	28.3%	28.5%	28.8%	27.8%	28.0%	28.2%
828,031	636,088	830,867	29.1%	29.3%	29.5%	28.5%	28.8%	29.0%	28.0%	28.2%	28.4%
828,031	669,567	751,737	28.8%	29.0%	29.2%	28.3%	28.5%	28.7%	27.7%	28.0%	28.2%
828,031	669,567	791,302	29.0%	29.3%	29.5%	28.5%	28.7%	29.0%	28.0%	28.2%	28.4%
828,031	669,567	830,867	29.3%	29.5%	29.7%	28.7%	29.0%	29.2%	28.2%	28.4%	28.6%
828,031	703,045	751,737	29.0%	29.2%	29.4%	28.5%	28.7%	28.9%	27.9%	28.1%	28.4%
828,031	703,045	791,302	29.2%	29.4%	29.7%	28.7%	28.9%	29.1%	28.2%	28.4%	28.6%
828,031	703,045	830,867	29.4%	29.7%	29.9%	28.9%	29.1%	29.4%	28.4%	28.6%	28.8%

The result also similar for multiplayer, it can be seen that no matter what happen from other player. Lowering their price always gives the best result in market share perspective. In above table it shown that ITP gain more market share when they lowering their price.

3.7.2 Revenue Share Payoff Table

Revenue share is percentage share of revenue from each player in their region. Revenue share also based on sales volume and also affected by it's price. Total revenue from each player is total sales volume times their related price set. Below is the example of revenue share payoff table from Aceh Region on April 2016.

Table 3-7 Aceh Revenue Share Payoff Table for April 2016

REVENUE SHARE								
1-Apr-16								
Payoff SP								
96104.5116	SAI							
	33.56%	796,991.94	843,873.82	890,755.70	937,637.58	984,519.45	1,031,401.33	1,078,283.21
SP	773,551.00	36.91%	37.04%	37.34%	37.82%	38.50%	39.39%	40.52%
	819,054.00	35.84%	35.97%	36.27%	36.75%	37.41%	38.29%	39.41%
	864,557.00	34.45%	34.58%	34.87%	35.34%	36.00%	36.86%	37.97%
	910,060.00	32.69%	32.82%	33.11%	33.56%	34.20%	35.05%	36.13%
	955,563.00	30.52%	30.64%	30.91%	31.35%	31.97%	32.79%	33.84%
	1,001,066.00	27.84%	27.96%	28.22%	28.64%	29.23%	30.01%	31.01%
1,046,569.00	24.58%	24.68%	24.92%	25.31%	25.85%	26.58%	27.51%	

From the payoff table is known that the best solution or it's nash equilibrium for each player is when they lowering they price. all of them will try lowering their price as low as possible if their goal is to gain revenue shares. These solution is similar with market share. But in total revenue the reslt is not the same.

Optimum total revenue cant be reach by lowering price as low as possible. There are a point that become optimum value in some certain condition it can reach by lowering or increasing price.

3.7.3 Profit Share Payoff Table

Profit share is total percentage of profit gain from each player from total profit gained in their region. In calculating profit needed new variable to consider which is cost of good sold. Cost of good sold data is not available and hard to identify because it will related to each company and their factory location. Therefore cost of good sold is assume by several factor such as range to the market from their factory (logistic cost) and their estimates efficiency. Below is the payoff table for profit share in Aceh region on April 2016.

Table 3-8 Aceh Profits Share Payoff Table for April 2016

PROFIT SHARE								
1-Apr-16								
Payoff SP								
	0	SAI						
	33.56%	796,991.94	843,873.82	890,755.70	937,637.58	984,519.45	1,031,401.33	1,078,283.21
SP	773,551.00	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	819,054.00	16.41%	13.12%	11.22%	10.04%	9.28%	8.81%	8.56%
	864,557.00	26.24%	21.48%	18.63%	16.81%	15.63%	14.90%	14.49%
	910,060.00	32.02%	26.59%	23.27%	21.11%	19.70%	18.82%	18.33%
	955,563.00	35.16%	29.43%	25.88%	23.55%	22.03%	21.06%	20.53%
	1,001,066.00	36.28%	30.46%	26.82%	24.45%	22.88%	21.88%	21.34%
	1,046,569.00	35.58%	29.82%	26.23%	23.89%	22.35%	21.37%	20.84%

On contrary with market share and revenue share the best solution in profit share is by increasing their price. But, it happen not for all cases. In showed table above best profit shares gain for SP is in Rp, 1.001.066,-. When SP try to increase their price again, the result is not higher than their previous result.

What if analysis also used in scenario testing outcome. To identified the best scenario, the result from regression model is compared with initial result to know wheter it's good decision or not. From this also all competitive parameter is observe with their result. So behaviour can be identified by using game theory to find the best solution.

Table 3-9 Predictive Cummulative Total Profits Payoff Table in Kalimantan Selatan for September 2016

	Lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/Hi	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031
749,171	636,088	751,737	8,054	8,297	8,484	8,958	9,202	9,389	9,812	10,056	10,242
749,171	636,088	791,302	8,323	8,567	8,753	9,228	9,472	9,658	10,082	10,326	10,512
749,171	636,088	830,867	8,535	8,779	8,966	9,440	9,684	9,870	10,294	10,538	10,724
749,171	669,567	751,737	9,157	9,401	9,587	10,062	10,305	10,492	10,916	11,159	11,346
749,171	669,567	791,302	9,427	9,670	9,857	10,331	10,575	10,762	11,185	11,429	11,615
749,171	669,567	830,867	9,639	9,882	10,069	10,544	10,787	10,974	11,397	11,641	11,828
749,171	703,045	751,737	10,219	10,463	10,649	11,124	11,367	11,554	11,978	12,221	12,408
749,171	703,045	791,302	10,489	10,732	10,919	11,394	11,637	11,824	12,247	12,491	12,677
749,171	703,045	830,867	10,701	10,945	11,131	11,606	11,849	12,036	12,460	12,703	12,890
788,601	636,088	751,737	8,635	8,879	9,065	9,540	9,784	9,970	10,394	10,638	10,824
788,601	636,088	791,302	8,905	9,149	9,335	9,810	10,053	10,240	10,664	10,907	11,094
788,601	636,088	830,867	9,117	9,361	9,547	10,022	10,265	10,452	10,876	11,119	11,306
788,601	669,567	751,737	9,739	9,982	10,169	10,643	10,887	11,073	11,497	11,741	11,927
788,601	669,567	791,302	10,008	10,252	10,438	10,913	11,157	11,343	11,767	12,011	12,197
788,601	669,567	830,867	10,220	10,464	10,650	11,125	11,369	11,555	11,979	12,223	12,409
788,601	703,045	751,737	10,801	11,044	11,231	11,705	11,949	12,135	12,559	12,803	12,989
788,601	703,045	791,302	11,070	11,314	11,500	11,975	12,219	12,405	12,829	13,073	13,259
788,601	703,045	830,867	11,282	11,526	11,712	12,187	12,431	12,617	13,041	13,285	13,471
828,031	636,088	751,737	9,160	9,403	9,590	10,064	10,308	10,494	10,918	11,162	11,348
828,031	636,088	791,302	9,429	9,673	9,859	10,334	10,578	10,764	11,188	11,432	11,618
828,031	636,088	830,867	9,641	9,885	10,071	10,546	10,790	10,976	11,400	11,644	11,830
828,031	669,567	751,737	10,263	10,507	10,693	11,168	11,411	11,598	12,022	12,265	12,452
828,031	669,567	791,302	10,533	10,776	10,963	11,437	11,681	11,867	12,291	12,535	12,721
828,031	669,567	830,867	10,745	10,988	11,175	11,649	11,893	12,080	12,503	12,747	12,933
828,031	703,045	751,737	11,325	11,569	11,755	12,230	12,473	12,660	13,084	13,327	13,514
828,031	703,045	791,302	11,595	11,838	12,025	12,499	12,743	12,930	13,353	13,597	13,783
828,031	703,045	830,867	11,807	12,050	12,237	12,712	12,955	13,142	13,565	13,809	13,995

For multiplayer also known that cumulative profits that can be gain is higher when all of them increase their price. these means that for every player, the possibility of their income will be higher for all situation when they together increasing their price sets.

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CHAPTER IV

SCENARIO DEVELOPMENT AND BEHAVIOR ANALYSIS

In this chapter will be explain about the scenario that apply in each price strategies and the result of each test and model.

4.1 Behavior Analysis

Behavior analysis is done to study each competitive parameter. This is done by formulating each parameter and change price of each brand to identified the outcome. This also done by observing several case and test and look if there tendency in each case so it can be identified as behavior. To study this, each parameter observe what happen to them by changing the price set for each player. The price set is change in every 5%. Then, the solution will be identified using game theory principle. Below is the result from each parameter.

4.1.1 Market Share

Market share parameter change consistently as the price change. The change is moving in straight line. Lower price gives higher market share while higher price gives lower market share. Its market share getting higher when their competitor offer higher price. The best outcome that can be gain by each player is when they decrease their price as low as possible and other competitor increase their price as high as possible. These phenomenon accommodate in regression formula. The logic is when theres cheaper product and while other is more expensive, customer will change their buying decision to product who has lower price. Means that lowering price will give best outcome for market share. This is happen for all cases in all region that tested.

In comparison, market share known to be more sensitive than revenue share. Because, each price change decision do not give equal change for revenue share and market share. It means that eventhough company could lose market share, doesn't mean they lose same amount of shares in revenue.

4.1.2 Revenue and Revenue Share

Similar with market share, in consistency and tendency revenue and market have similar behavior. When one player decrease their price, they also gain sales volume which leads to market share and revenue share. This is tested for all region and cases.

The change occur in revenue share is lower than in market share. It can be concluded that market share is more sensitive towards price change rather than revenue share.

From all table also it has been identified that lowering their price also the best option in revenue share perspective. Eventhough the revenue is high, but it's only covered up as production cost with no profit.

But, it is also found that eventhough revenue share could increase, in total number of revenue the revenue movement is not move in straight line. optimum revenue that can be gain based on regression formula has one optimum value. Because when price is too high, demands will also too low. It also happen when price is too low, the demand will go higher. But in revenue perspective, revenue graph form a single peak over the centre.

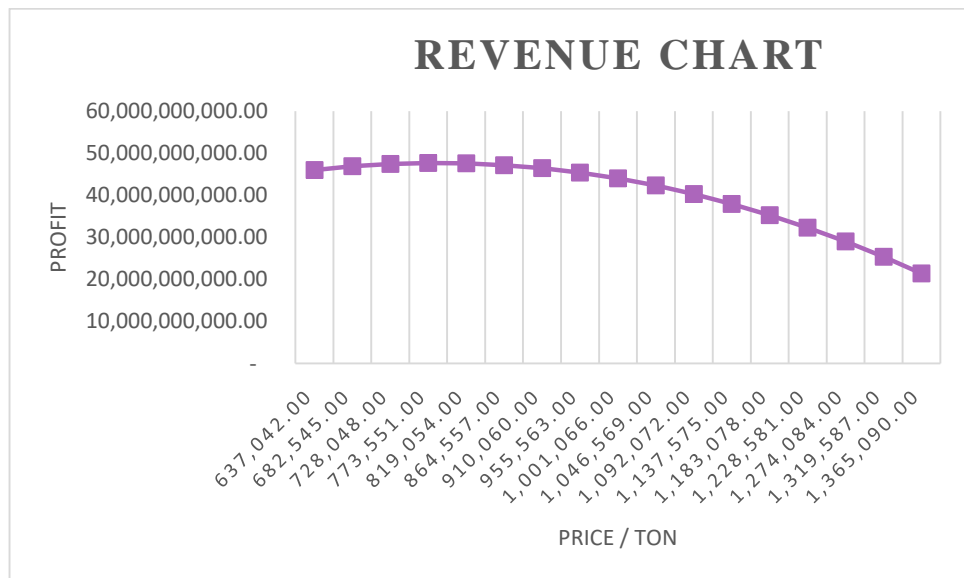


Figure 4.1 Revenue Chart

4.1.3 Profit and Profit Share

On contrary with market share and revenue share, profit will increase as price is increase. But if it's too low, profit will go down to 0 or even minus because the production cost is higher then product cost. If the price is too high, each company will not get any demand which leads too loss sales and cause high loss too. Below is payoff table that shows these phenomenon.

Table 4-1 Payoff Table for Semen Padang of Profit in Aceh Region for April 2016

Payoff SP (In Millions)								
		SAI						
		796,992	843,874	890,756	937,638	984,519	1,031,401	1,078,283
SP	773,551	(52)	(52)	(52)	(52)	(52)	(52)	(52)
	819,054	1,432	1,432	1,432	1,432	1,432	1,432	1,432
	864,557	2,595	2,595	2,595	2,595	2,595	2,595	2,595
	910,060	3,436	3,436	3,436	3,436	3,436	3,436	3,436
	955,563	3,955	3,955	3,955	3,955	3,955	3,955	3,955
	1,001,066	4,153	4,153	4,153	4,153	4,153	4,153	4,153
	1,046,569	4,030	4,030	4,030	4,030	4,030	4,030	4,030

Almost every payoff table shows the same result. The most profitable price setting is not the highest. Best scenario in profit perspective is all player cooperating to increase their price. But, optimum profit that able to be gain by each player is not infinite as price increasing. It has optimum point when the profits will not increasing again.

Optimum profits not always goes same direction as increasing price. Interesting finding from profits parameter is the optimum profit value can be gain by finding the best combination between price and demand in certain regression model. In table 5.15 can be seen that the optimum value is when the price is Rp. 1,000,066 per tons. If it got higher than that, the profits will start decreasing. This is because the demand is so low even if the company get high profits, their demand is very low.

To study more about these phenomenon, authors try to look all the price change in graph in all price range. Below is the graph that show price change and it's profits for SP in aceh region for april 2016.

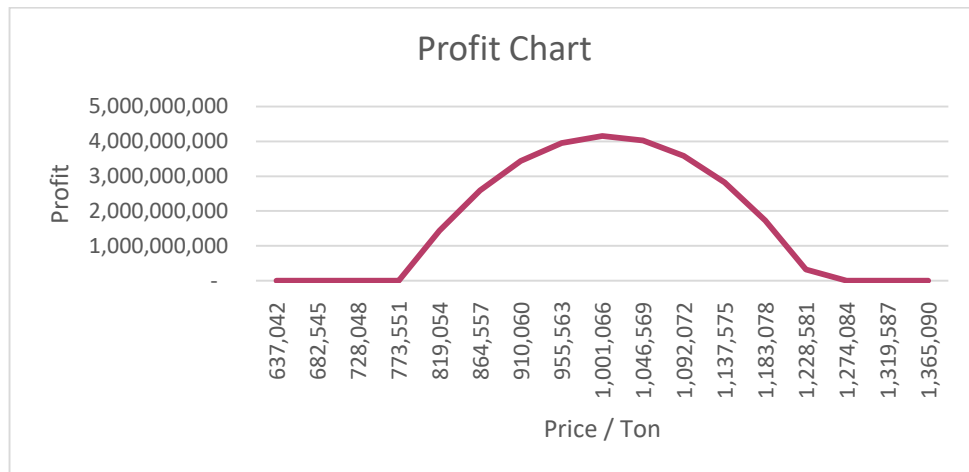


Figure 4.2 Profit Growth Graph

These graph shown that there are optimum profit value for price and demand combination. Means that if price and demand goes the same way as the regression variable (price, period, and brand) the best decision is to find best price which optimize profits. If its too low company will get loss or no profits and if too high company will not get any demand because it's too expensive. There are optimum point between these thing that can be consider in pricing strategies.

4.2 Scenario Testing

Scenario testing is done by testing three scenario for each case. These scenarios are based on how each player response for price change. Main goal for these scenario is to study about pricing strategies towards competitiveness parameter such market share, revenue, or profits. Below is the scenario that being tested:

1. To response competitor price change (lower) other player should follow the price change.
2. Keep disparity of our price with our competitor (Increase or decrease at same rate)

3. Price change doesn't matter. Each player can ignore and apply another price strategy

Each scenario is compared by seeing each parameter such as revenue, profit, market share, and revenue share to see how each parameter reacts to price change. These scenarios are done in two-player cases then compared with multiplayer cases. Below is the result of the scenario testing for each market leader, follower, and new entrant.

4.2.1 Market Leader Perspective

Market leader is defined as a player or company that sells the largest amount of a particular type of product in the market. To identify the market leader simply by identifying who dominates the market by selling the largest quantity of product. As they supply a larger number of products, they have a bigger brand awareness and influence toward the market. But, the market leader will always protect their competitive level to sustain in business. And also to try gaining more than they already have.

4.2.1.1 First Scenario Testing Result

For the test, the market leader will try to respond to competitor price changes by a designated scenario. The designated scenario is a scenario that has already been decided before. The first scenario is to respond to competitor price changes (lower) where other players should follow the price change. The other competitor will decrease their price from the previous price setting, and the market leader will try to follow the same price setting as a response. Decreasing the price rate is 5%. So the competitor will try to decrease their price 5% from the previous price setting, and the market leader will make the same decision in this scenario. Below is the table that shows the calculation of all competitive parameters that shows the outcome from the first scenario.

Table 4-2 Market Leader, First Scenario Testing in Aceh Region (Decreasing Price)

Period	Brand	Price	Volume	Market Share	Revenue Share	Revenue (millions)	Profit Share	Profits (million)
--------	-------	-------	--------	--------------	---------------	--------------------	--------------	-------------------

Sep-2016	SAI	921,683	64,167	61.3%	62.0%	59,142	76.6%	15,829
	SP	894,306	40,514	38.7%	38.0%	36,232	23.4%	4,834
Oct-2016	SAI	849,591	70,873	61.1%	61.1%	60,213	78.6%	12,374
	SP	849,591	45,125	38.9%	38.9%	38,338	21.4%	3,366

The volume in September is volume outcome from regression formula. To give comparable decision that both outcome (September and October outcome) is come from regression formula. price and volume is in tons. The market leader is SAI meanwhile SP as the other competitor. These result is come from two player perspective in aceh region.

On table above can be seen that number of volume for both company is increasing. It caused by monthly period effect when in October demand for all brand will increasing. But wo see wheter is good decision other factor must be evaluate.

In market share perspective SAI as market leader lose 0.2% of their market share. It also happen in revenue share when SAI lose 0.9% of their market share. The losing share is quite small although it still loss. So in market share and revenue share perspective, this scenario is not good.

As for profits, the total loss share is higher. SAI lose 2% of their profits share and also in their total share. The total loss profit caused by this scenario is the market leader lose 21.8% from their previous total profits. These indicates that this scenario is not good for market leader therefore it should not consider as pricing strategy in the future.

On the otherhand, in increasing scenario the result is different. To respon competitor that increasing their price, by following to increase the price market leader seems to gain advantage in this scenario. Below is the result from this the first scenario in increasing price situation.

Table 4-3 Market Leader, First Scenario Testing in Aceh Region (Increasing Price)

Period	Brand	Price	Volume	Market Share	Revenue Share	Revenue (millions)	Profit Share	Profits (million)
1-Sep	SAI	921,683	64,167	61.30%	62.01%	59,142	76.61%	15,829
	SP	894,306	40,514	38.70%	37.99%	36,232	23.39%	4,834
1-Oct	SAI	939,021	64,033	62.58%	62.58%	60,128	72.92%	16,906

	SP	939,021	38,285	37.42%	37.42%	35,951	27.08%	6,280
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On increasing scenario. The result is different. Both company lose small amount of sales volume. But in total revenue, market share gain more revenue while the other company loss their revenue. Market leader also gain 1.28% of market share from previous period and 0.57% of revenue share.

Interesting fact is that as market leader gain more profit from this scenario the profits share is dropping. It's cause from higher profit gain from competitor. To both player in this scenario is gaining more profit. Therefore it's can be say as win-win solution for both player.

4.2.1.2 Second Scenario Testing Result

In second scenario whenever competitor lower their price, they'll follow by decreasing in same rate. Below is the result of the second scenario when the competitor try to offer lower price.

Table 4-4 Market Leader, Second Scenario Testing in Aceh Region (Decreasing Price)

Period	Brand	Price	Volume	Market Share	Revenue Share	Revenue (millions)	Profit Share	Profits (million)
1-Sep	SAI	921,683	64,167	61.3%	62.0%	59,142	64.0%	15,829
	SP	894,306	40,514	38.7%	38.0%	36,232	36.0%	8,885
1-Oct	SAI	875,599	68,884	60.4%	61.1%	60,314	63.7%	13,818
	SP	849,591	45,125	39.6%	38.9%	38,338	36.3%	7,878

Both player got better sales volume when they lower their price. But in market share perspective market leader loss their shares in this scenario. Eventhough total sales volume is increasing, competitor gain is higher than market leader. This also happen in revenue. Market leader loss their market share and revenue share eventhough gain more in total sales volume and revenue.

This also happen in profits. Market leader lose their profits share and also their total profits. Competitor also lose their total profits. But market lose more than their competitor.

Table 4-5 Market Leader, Second Scenario Testing in Aceh Region (Increasing Price)

Period	Brand	Price	Volume	Market Share	Revenue Share	Revenue (millions)	Profit Share	Profits (million)
1-Sep	SAI	921,683	64,167	61.3%	62.0%	59,142	64.0%	15,829
	SP	894,306	40,514	38.7%	38.0%	36,232	36.0%	8,885
1-Oct	SAI	967,767	61,834	61.8%	62.5%	59,841	64.2%	18,103
	SP	939,021	38,285	38.2%	37.5%	35,951	35.8%	10,108

As for increasing price scenario, both company lose their sales volume. But, it's the only bad things in this scenario. As for other parameter, market leader gain more benefit than their competitor. This happen in all parameter. Which means increasing in same rate as competitor is good choice.

4.2.1.3 Third Scenario Testing Result

Third scenario testing is whenever competitor change their price, market leader try to offer same price setting regardless what their competitor do. Below is recapitulation table from this scenario testing.

Table 4-6 Market Leader, Third Scenario Testing in Aceh Region (Decreasing Price)

Period	Brand	Price	Volume	Market Share	Revenue Share	Revenue (millions)	Profit Share	Profits (million)
1-Sep	SAI	921,683	64,167	61.3%	62.0%	59,142	64.0%	15,829
	SP	894,306	40,514	38.7%	38.0%	36,232	36.0%	8,885
1-Oct	SAI	921,683	65,359	59.2%	61.1%	60,240	67.2%	16,123
	SP	849,591	45,125	40.8%	38.9%	38,338	32.8%	7,878

In this scenario, in market share, sales volume, and revenue market leader suffered loss. There are quite significant loss in market share, but lower at revenue share. Gain in revenue and profits in this scenario not cause from the price decision but from monthly effect. as revenue and profit gain comes from increasing number of demand caused by change of period. As for the competitor in profit perspective, they also loss profits eventhough gain more sales. Good thins is in term of profit share, market leader can gain more than their competitor in this scenario.

Table 4-7 Market Leader,Third Scenario Testing in Aceh Region (Increasing Price)

Period	Brand	Price	Volume	Market Share	Revenue Share	Revenue (millions)	Profit Share	Profits (million)
1-Sep	SAI	921,683	64,167	61.3%	62.0%	59,142	64.0%	15,829
	SP	894,306	40,514	38.7%	38.0%	36,232	36.0%	8,885
1-Oct	SAI	921,683	65,359	63.1%	62.6%	60,240	61.5%	16,123
	SP	939,021	38,285	36.9%	37.4%	35,951	38.5%	10,108

As for increasing price, the out come is similar the different is in their share. In market share and revenue share market leader gain more shares than competitor. This because when competitor increasing their price, their sales volume also decreasing. But in profits perspective, their competitor gain more profits in this scenario.

4.2.2 Follower Perspective

Follower defines in this study is competitor aside from market leader. Their sales volume in the market is not the highest and also not dominate the market. Below is the result for all scenario testing

4.2.2.1 First Scenario Testing Result

In first scenario, follower will ry to follow up market leader price setting as response. Below is the result for scenario testing in first scenario.

Table 4-8 Follower, First Scenario Testing in Aceh Region (Decreasing Price)

Period	Brand	Price	Volume	Market Share	Revenue Share	Revenue (millions)	Profit Share	Profits (million)
1-Sep	SAI	921,683	64,167	61.3%	62.0%	59,142	76.6%	15,829
	SP	894,306	40,514	38.7%	38.0%	36,232	23.4%	4,834
1-Oct	SAI	875,599	68,884	61.5%	61.5%	60,314	76.1%	13,818
	SP	875,599	43,136	38.5%	38.5%	37,770	23.9%	4,339

From the result it can be seen that both player gain more sales volume. But in follower perspective they lose more than market leader in this scenario/ as they lose more market share and revenue share. Eventhough total revenue for both player is increasing.

Total profit for both player also decreasing. But for follower the profit share is increasing rather than previous period. Of course there will be monthly effect but in total volume the different is hogher than motnly effect factor.

Table 4-9 Follower, First Scenario Testing in Aceh Region (Increasing Price)

Period	Brand	Price	Volume	Market Share	Revenue Share	Revenue (millions)	Profit Share	Profits (million)
1-Sep	SAI	921,683	64,167	61.3%	62.0%	59,142	76.6%	15,829
	SP	894,306	40,514	38.7%	38.0%	36,232	23.4%	4,834
1-Oct	SAI	967,767	61,834	63.1%	63.1%	59,841	72.2%	18,103
	SP	967,767	36,086	36.9%	36.9%	34,923	27.8%	6,956

As for increasing price scenario. Both player lose their sales volume. Follower also lose their market and revenue shares. On the other hand follower profits and profit share is also increasing. When both increasing their price. Both player got better result.

4.2.2.2 Second Scenario Testing Result

In second scenatio follower will try to follow market leader price change by keeping disparity of their price. The disparity here define in their rates which is 5%. The result is similar with market share perspective because both increasing and decreasing their price in the same rates.

4.2.2.3 Third Scenario Testing Result

In this case, follower will try to ignore all price change that offer by market leader. Below is the result of calculation of this scenario. First is in decreasing their price.

Table 4-10 Follower, Third Scenario Testing in Aceh Region (Decreasing Price)

Period	Brand	Price	Volume	Market Share	Revenue Share	Revenue (millions)	Profit Share	Profits (million)
1-Sep	SAI	921,683	64,167	61.3%	62.0%	59,142	76.6%	15,829
	SP	894,306	40,514	38.7%	38.0%	36,232	23.4%	4,834
1-Oct	SAI	875,599	68,884	62.3%	61.8%	60,314	73.5%	13,818
	SP	894,306	41,705	37.7%	38.2%	37,297	26.5%	4,976

Both player gain more sales volume as they decreasing their price. This scenario doesn't give more benefit in market shares. Eventhough their total sales volume is increasing. In total revenue follower gain more than previour period, also in revenue shares. But, gain in revenue share is quite small, only 0.2%.

Interesting part here is as market leader gain less profit than previous period on the other hand follower get opposite result. This gives follower added 3.1% profits share than previous profit shares. There are possibility that it's the effect of monthly effect.

Table 4-11 Follower, Third Scenario Testing in Aceh Region (Increasing Price)

Period	Brand	Price	Volume	Market Share	Revenue Share	Revenue (millions)	Profit Share	Profits (million)
1-Sep	SAI	921,683	64,167	61.3%	62.0%	59,142	76.6%	15,829
	SP	894,306	40,514	38.7%	38.0%	36,232	23.4%	4,834
1-Oct	SAI	967,767	61,834	59.7%	61.6%	59,841	78.4%	18,103
	SP	894,306	41,705	40.3%	38.4%	37,297	21.6%	4,976

As for increasing scenario, market leader will lose their market share while follower gain more. It's also apply in revenue shares. But both player gain more revenue than previous period.

Both player also gain more profits in the next period. But follower lose their shares in profits. Quite significant, follower lose 2.2% of their profits shares regardless their gain in total profits. This caused by market leader that increasing their price which also increasing their profit margin and end up gain higher profit gain than follower who just ignored the price change.

4.2.3 New Entrant Perspective

For new entrant perspective, the test is done in region that have new entrant in the market. This region is Kepulauan Riau and Kalimantan selatan. This region also used as multi player case testing. The new entrant here is CCI which is PT. Conch Cement Indonesia. In Kepulauan Riau, CCI succeeded to become market leader by offer much lower price. In Kalimantan Selatan they also can gain more sales but not as market leader.

The result is different for each case, as new entrant that able to become market leader the result is similar with market leader perspective. It's also apply for new entrant when they penetrate market by offering lower price but not able to become market leader in the area. The scenario testing for new entrant for all scenario similar with follower testing if the new entrant become follower in that region. Below is table payoff of CCI as new entrant in Kalimantan Selatan (as Market Leader)

Table 4-12 Market Share Payoff Table for CCI in Kalimantan Selatan

Payoff CCI	lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/HI	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031
749,171	636,088	751,737	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%	37.3%	37.5%	37.8%
749,171	636,088	791,302	37.0%	37.3%	37.6%	37.3%	37.6%	37.9%	37.5%	37.8%	38.1%
749,171	636,088	830,867	37.3%	37.6%	37.9%	37.6%	37.9%	38.2%	37.8%	38.1%	38.4%
749,171	669,567	751,737	36.3%	36.6%	36.9%	36.6%	36.9%	37.1%	36.8%	37.1%	37.4%
749,171	669,567	791,302	36.6%	36.9%	37.2%	36.9%	37.1%	37.4%	37.1%	37.4%	37.7%
749,171	669,567	830,867	36.9%	37.2%	37.5%	37.1%	37.4%	37.7%	37.4%	37.7%	38.0%
749,171	703,045	751,737	35.9%	36.2%	36.5%	36.2%	36.4%	36.7%	36.4%	36.7%	37.0%
749,171	703,045	791,302	36.2%	36.5%	36.7%	36.4%	36.7%	37.0%	36.7%	37.0%	37.3%
749,171	703,045	830,867	36.5%	36.7%	37.0%	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%
788,601	636,088	751,737	37.0%	37.3%	37.6%	37.3%	37.6%	37.9%	37.5%	37.8%	38.1%
788,601	636,088	791,302	37.3%	37.6%	37.9%	37.6%	37.9%	38.2%	37.8%	38.1%	38.4%
788,601	636,088	830,867	37.6%	37.9%	38.2%	37.9%	38.2%	38.5%	38.1%	38.4%	38.7%
788,601	669,567	751,737	36.6%	36.9%	37.2%	36.9%	37.1%	37.4%	37.1%	37.4%	37.7%
788,601	669,567	791,302	36.9%	37.2%	37.5%	37.1%	37.4%	37.7%	37.4%	37.7%	38.0%
788,601	669,567	830,867	37.2%	37.5%	37.8%	37.4%	37.7%	38.0%	37.7%	38.0%	38.3%
788,601	703,045	751,737	36.2%	36.5%	36.7%	36.4%	36.7%	37.0%	36.7%	37.0%	37.3%
788,601	703,045	791,302	36.5%	36.7%	37.0%	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%
788,601	703,045	830,867	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%	37.3%	37.6%	37.9%
828,031	636,088	751,737	37.3%	37.6%	37.9%	37.6%	37.9%	38.2%	37.8%	38.1%	38.4%
828,031	636,088	791,302	37.6%	37.9%	38.2%	37.9%	38.2%	38.5%	38.1%	38.4%	38.7%
828,031	636,088	830,867	37.9%	38.2%	38.5%	38.2%	38.5%	38.8%	38.4%	38.7%	39.1%
828,031	669,567	751,737	36.9%	37.2%	37.5%	37.1%	37.4%	37.7%	37.4%	37.7%	38.0%
828,031	669,567	791,302	37.2%	37.5%	37.8%	37.4%	37.7%	38.0%	37.7%	38.0%	38.3%
828,031	669,567	830,867	37.5%	37.8%	38.1%	37.7%	38.0%	38.3%	38.0%	38.3%	38.6%
828,031	703,045	751,737	36.5%	36.7%	37.0%	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%
828,031	703,045	791,302	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%	37.3%	37.6%	37.9%
828,031	703,045	830,867	37.0%	37.3%	37.6%	37.3%	37.6%	37.9%	37.6%	37.9%	38.2%

The table shows all possible movement for CCI in the next period. As market leader if CCI choose to increase their price, total market share will lower than if they decreasing their price. As for follower means that if market leader increasing their price, they will gain more market share than previous period. If 1 brand keeps offer lower price eventually customer will change their buying decision to cheaper product because in cement industry quality product, type of product is very similar.

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CHAPTER V

CONCLUSION AND SUGGESTION

In this chapter will be explain conclusion of this research and suggestion for this research or for further research.

5.1 Conclusion

After conducting this research, the conclusion from all these research is :

➤ Model Test Accuracy

The accuracy of this model is good enough to forecast the outcome.

➤ Behavior Analysis :

1. Market Share more sensitive to price change compared to revenue share (more stable).
2. All player will choose to lower their price to gain more Market Share or Revenue Share if it's their considerable competitive parameter.
3. Best solution by consider revenue as parameter is similar with market share and revenue share which lowering price.
4. Market Share and Revenue Share does not change similiarly with profits share. In profit share increasing price is the best solution.
5. Optimum Profit value for each player is not infinite, depends on optimum combination of price and demand.
6. Best solution to gain more profits is by cooperating to increase their price.

➤ Scenario Testing

1. Best Scenario to increase prof is all player cooperate to increase their price.
2. All scenario that develop in these result doesn't matter because it's not the appropriate factor that need to be consider as pricing strategies. Instead of the best combination between price and the sales volume formula. so all scenario can be good or not depend on it's demand characteristic and it's price combination

5.2 Suggestion

Suggestion for future research regarding about the pricing behavior.

1. To get better result in scenario testing, the research should continue and take to practical. means that each scenario needs to be implemented in real pricing strategies situation and compared to get the best conclusion.
2. To get better result in this research, this case should be tested in different case and Business line.

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ATTACHMENT

COGS Estimation

COGS SAI	675,000
COGS SP	775,000

Regression Calculation

➤ Aceh Region

January 2014 – March 2016

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.942157339							
R Square	0.887660451							
Adjusted R Square	0.796051383							
Standard Error	5717.532137							
Observations	54							
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	16	10073862816	629616426	22.01155721	3.60975E-14			
Residual	39	1274916776	32690173.74					
Total	55	11348779592						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	83229.5019	36926.75214	2.253907996	0.029896668	8538.09564	157920.9082	8538.09564	157920.9082
Price	-0.076487182	0.042002473	-1.821016162	0.076282775	-0.161445202	0.008470839	-0.161445202	0.008470839
Period	315.6855341	114.9888459	2.74535788	0.009093974	83.09863968	548.2724286	83.09863968	548.2724286
M1	8383.655829	3771.026216	2.223176226	0.03206865	756.0353431	16011.27631	756.0353431	16011.27631
M2	3567.153649	3713.283212	0.960646804	0.342648142	-3943.670588	11077.97789	-3943.670588	11077.97789
M3	5328.185984	3741.016163	1.424261685	0.162323539	-2238.733441	12895.10541	-2238.733441	12895.10541
M4	2045.54622	4077.26773	0.50169534	0.618702401	-6201.506196	10292.59864	-6201.506196	10292.59864
M5	8191.745557	4094.601242	2.00062108	0.052429196	-90.36719551	16473.85831	-90.36719551	16473.85831
M6	9151.647635	4052.972097	2.25800904	0.029616982	953.7377758	17349.55749	953.7377758	17349.55749
M7	0	0	65535	#NUM!	0	0	0	0
M8	12633.58828	4045.683035	3.122733089	#NUM!	4450.421942	20816.75462	4450.421942	20816.75462
M9	15269.57696	4077.191314	3.745121528	0.000581941	7022.679113	23516.47481	7022.679113	23516.47481
M10	16145.44255	4129.471071	3.909808852	0.000358265	7792.798909	24498.08619	7792.798909	24498.08619
M11	21958.82484	4253.181324	5.162917629	7.48077E-06	13355.95359	30561.69608	13355.95359	30561.69608
M12	21254.27281	4659.394877	4.561595093	4.94044E-05	11829.7571	30678.78852	11829.7571	30678.78852
SAI	25747.54218	1910.396418	13.47759132	2.93305E-16	21883.40069	29611.68367	21883.40069	29611.68367
SP	0	0	65535	#NUM!	0	0	0	0

January 2014 - April 2016

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.942120049							
R Square	0.887590187							
Adjusted R Square	0.80042586							
Standard Error	5619.150961							
Observations	56							
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	16	1.02E+10	6.39E+08	23.12406	4.93E-15			
Residual	41	1.29E+09	31574858					
Total	57	1.15E+10						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	84169.78183	36244.3	2.32229	0.025261	10972.94	157366.6	10972.94	157366.6
Price	-0.0776502	0.041197	-1.88486	0.06655	-0.16085	0.005548	-0.16085	0.005548
Period	330.7455554	106.0304	3.119347	0.003312	116.6129	544.8782	116.6129	544.8782
M1	8405.099079	3705.825	2.268078	0.028659	921.0344	15889.16	921.0344	15889.16
M2	3564.416426	3649.37	0.976721	0.334435	-3805.64	10934.47	-3805.64	10934.47
M3	5316.717498	3676.463	1.44615	0.155737	-2108.05	12741.48	-2108.05	12741.48
M4	2673.854168	3652.124	0.732137	0.46825	-4701.76	10049.47	-4701.76	10049.47
M5	8236.156767	4022.635	2.047453	0.047057	112.2804	16360.03	112.2804	16360.03
M6	9172.709412	3982.886	2.303031	0.026424	1129.108	17216.31	1129.108	17216.31
M7	0	0	65535	#NUM!	0	0	0	0
M8	12622.87737	3975.961	3.174799	#NUM!	4593.262	20652.49	4593.262	20652.49
M9	15255.60426	4006.814	3.807415	0.000461	7163.68	23347.53	7163.68	23347.53
M10	16125.971	4057.973	3.973898	0.00028	7930.728	24321.21	7930.728	24321.21
M11	21938.73563	4179.461	5.249178	5.02E-06	13498.14	30379.33	13498.14	30379.33
M12	21248.27056	4579.023	4.64035	3.54E-05	12000.75	30495.8	12000.75	30495.8
SAI	25578.44819	1854.892	13.78973	5.43E-17	21832.42	29324.48	21832.42	29324.48
SP	0	0	65535	#NUM!	0	0	0	0

January 2014 – May 2016

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.942654643							
R Square	0.888597775							
Adjusted R Square	0.805815656							
Standard Error	5511.738047							
Observations	58							
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	16	10419741662	6.51E+08	24.49919	5.48E-16			
Residual	43	1306308021	30379256					
Total	59	11726049683						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	106081.4841	37235.69256	2.848919	0.006706	30988.55	181174.4	30988.55	181174.4
Price	-0.078318764	0.039757827	-1.9699	0.055313	-0.1585	0.001861	-0.1585	0.001861
Period	333.8778108	96.49612035	3.460013	0.001232	139.2748	528.4808	139.2748	528.4808
M1	-12855.01956	3864.437193	-3.32649	0.001808	-20648.4	-5061.64	-20648.4	-5061.64
M2	-17704.07738	3999.684092	-4.42637	6.46E-05	-25770.2	-9637.95	-25770.2	-9637.95
M3	-15951.27046	3916.291383	-4.07306	0.000196	-23849.2	-8053.32	-23849.2	-8053.32
M4	-18600.63211	4015.844754	-4.63181	3.35E-05	-26699.4	-10501.9	-26699.4	-10501.9
M5	-12907.21003	4023.872017	-3.20766	0.002528	-21022.1	-4792.3	-21022.1	-4792.3
M6	-12093.15355	4381.992013	-2.75974	0.008466	-20930.3	-3256.02	-20930.3	-3256.02
M7	-21272.44535	4485.252614	-4.74275	2.34E-05	-30317.8	-12227.1	-30317.8	-12227.1
M8	-8650.200138	4425.018645	-1.95484	0.057123	-17574.1	273.7004	-17574.1	273.7004
M9	-6013.823246	4260.612806	-1.41149	0.165295	-14606.2	2578.521	-14606.2	2578.521
M10	-5141.092497	4149.288839	-1.23903	0.222055	-13508.9	3226.746	-13508.9	3226.746
M11	676.8421043	4014.300442	0.168608	0.866896	-7418.77	8772.45	-7418.77	8772.45
M12	0	0	65535	#NUM!	0	0	0	0
SAI	25427.42637	1789.269704	14.21106	#NUM!	21819.02	29035.83	21819.02	29035.83
SP	0	0	65535	#NUM!	0	0	0	0

January 2014 – June 2016

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.94152							
R Square	0.88646							
Adjusted R Square	0.806692							
Standard Error	5488.353							
Observations	60							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	16	1.06E+10	6.61E+08	25.09546	1.07E-16			
Residual	45	1.36E+09	30122019					
Total	61	1.19E+10						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	105668.1	37053.49	2.851771	0.006543	31038.5	180297.6	31038.5	180297.6
Price	-0.07809	0.039579	-1.97301	0.054656	-0.15781	0.001627	-0.15781	0.001627
Period	352.6685	92.20784	3.824713	0.000401	166.9524	538.3846	166.9524	538.3846
M1	-12751.7	3844.306	-3.31702	0.001807	-20494.5	-5008.83	-20494.5	-5008.83
M2	-17617.7	3979.917	-4.42665	6.03E-05	-25633.7	-9601.75	-25633.7	-9601.75
M3	-15884.9	3897.898	-4.07526	0.000184	-23735.7	-8034.17	-23735.7	-8034.17
M4	-18551.9	3997.671	-4.64069	3.01E-05	-26603.7	-10500.2	-26603.7	-10500.2
M5	-12877.4	4006.215	-3.21436	0.00242	-20946.3	-4808.47	-20946.3	-4808.47
M6	-10941.3	4014.41	-2.72549	0.009114	-19026.7	-2855.82	-19026.7	-2855.82
M7	-21164.9	4462.384	-4.74295	2.15E-05	-30152.6	-12177.2	-30152.6	-12177.2
M8	-8562.27	4403.514	-1.94442	0.058112	-17431.4	306.8617	-17431.4	306.8617
M9	-5947	4240.85	-1.40231	0.167683	-14488.5	2594.507	-14488.5	2594.507
M10	-5094.94	4130.795	-1.23341	0.223829	-13414.8	3224.905	-13414.8	3224.905
M11	701.362	3996.977	0.175473	0.861495	-7348.96	8751.686	-7348.96	8751.686
M12	0	0	65535	#NUM!	0	0	0	0
SAI	25137.21	1763.213	14.25648	#NUM!	21585.92	28688.5	21585.92	28688.5
SP	0	0	65535	#NUM!	0	0	0	0

January 2014 – July 2016

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.940824							
R Square	0.885149							
Adjusted R Square	0.808385							
Standard Error	5432.051							
Observations	62							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	16	1.07E+10	6.68E+08	25.87339	1.82E-17			
Residual	47	1.39E+09	29507177					
Total	63	1.21E+10						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	105433.2	36597.7	2.880871	0.005957	31808.18	179058.3	31808.18	179058.3
Price	-0.07785	0.039121	-1.98989	0.052438	-0.15655	0.000855	-0.15655	0.000855
Period	359.7377	88.33836	4.072271	0.000177	182.0239	537.4516	182.0239	537.4516
M1	-12706.3	3799.757	-3.34397	0.001629	-20350.4	-5062.14	-20350.4	-5062.14
M2	-17577.5	3934.496	-4.46753	4.96E-05	-25492.7	-9662.3	-25492.7	-9662.3
M3	-15853.1	3854.74	-4.11263	0.000156	-23607.8	-8098.37	-23607.8	-8098.37
M4	-18525.9	3954.046	-4.68531	2.42E-05	-26480.5	-10571.4	-26480.5	-10571.4
M5	-12858.6	3963.291	-3.24442	0.00217	-20831.7	-4885.45	-20831.7	-4885.45
M6	-10929.6	3972.05	-2.75163	0.008397	-18920.3	-2938.88	-18920.3	-2938.88
M7	-20676.4	4065.003	-5.08643	6.28E-06	-28854.1	-12498.6	-28854.1	-12498.6
M8	-8520.36	4353.563	-1.9571	0.05629	-17278.6	237.8758	-17278.6	237.8758
M9	-5914.64	4194.267	-1.41017	0.165073	-14352.4	2523.136	-14352.4	2523.136
M10	-5071.66	4086.618	-1.24104	0.22075	-13292.9	3149.559	-13292.9	3149.559
M11	714.5486	3955.292	0.180656	0.857414	-7242.47	8671.569	-7242.47	8671.569
M12	0	0	65535	#NUM!	0	0	0	0
SAI	24881.85	1727.352	14.40462	#NUM!	21406.86	28356.83	21406.86	28356.83
SP	0	0	65535	#NUM!	0	0	0	0

January 2014 – August 2016

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.93394							
R Square	0.872244							
Adjusted R Square	0.794925							
Standard Error	5884.138							
Observations	64							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	16	1.16E+10	7.24E+08	23.89587	2.83E-17			
Residual	49	1.7E+09	34623079					
Total	65	1.33E+10						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	109025	39625.38	2.751393	0.008294	29394.83	188655.2	29394.83	188655.2
Price	-0.08288	0.042342	-1.95744	0.056004	-0.16797	0.002207	-0.16797	0.002207
Period	433.822	91.99447	4.71574	2.04E-05	248.9522	618.6918	248.9522	618.6918
M1	-12543.1	4115.504	-3.04776	0.003709	-20813.5	-4272.66	-20813.5	-4272.66
M2	-17527.9	4261.861	-4.11273	0.000149	-26092.4	-8963.33	-26092.4	-8963.33
M3	-15850.2	4175.531	-3.79597	0.000406	-24241.2	-7459.13	-24241.2	-7459.13
M4	-18622.5	4283.002	-4.34799	6.93E-05	-27229.5	-10015.4	-27229.5	-10015.4
M5	-13027.2	4292.765	-3.0347	0.003847	-21653.9	-4400.6	-21653.9	-4400.6
M6	-11169.9	4301.855	-2.59652	0.012396	-19814.8	-2524.95	-19814.8	-2524.95
M7	-21009.9	4401.838	-4.77297	1.68E-05	-29855.7	-12164	-29855.7	-12164
M8	-3954.96	4422.786	-0.89422	0.375573	-12842.9	4932.958	-12842.9	4932.958
M9	-5922.55	4543.318	-1.30357	0.198471	-15052.7	3207.591	-15052.7	3207.591
M10	-5112.24	4426.704	-1.15486	0.253747	-14008	3783.551	-14008	3783.551
M11	662.4165	4284.438	0.15461	0.877764	-7947.48	9272.318	-7947.48	9272.318
M12	0	0	65535	#NUM!	0	0	0	0
SAI	24738.29	1853.009	13.35034	#NUM!	21014.53	28462.05	21014.53	28462.05
SP	0	0	65535	#NUM!	0	0	0	0

January 2014 – September 2016

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.933153							
R Square	0.870774							
Adjusted R Square	0.796084							
Standard Error	5858.026							
Observations	66							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	16	1.18E+10	7.37E+08	24.54694	5.43E-18			
Residual	51	1.75E+09	34316466					
Total	67	1.35E+10						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	101811.3	38593.4	2.638049	0.011028	24331.79	179290.8	24331.79	179290.8
Price	-0.07464	0.041141	-1.81429	0.075517	-0.15723	0.007952	-0.15723	0.007952
Period	405.5133	86.11249	4.709111	1.95E-05	232.6352	578.3913	232.6352	578.3913
M1	-12345.5	4091.215	-3.01757	0.00397	-20559	-4132.07	-20559	-4132.07
M2	-17237.4	4230.455	-4.07459	0.000161	-25730.4	-8744.39	-25730.4	-8744.39
M3	-15576.2	4145.682	-3.75722	0.000443	-23899	-7253.42	-23899	-7253.42
M4	-18278.7	4246.67	-4.30424	7.61E-05	-26804.2	-9753.16	-26804.2	-9753.16
M5	-12658.3	4253.84	-2.97574	0.00446	-21198.3	-4118.37	-21198.3	-4118.37
M6	-10776.7	4260.28	-2.52958	0.014552	-19329.6	-2223.87	-19329.6	-2223.87
M7	-20557	4353.172	-4.72231	1.86E-05	-29296.4	-11817.7	-29296.4	-11817.7
M8	-3474.91	4370.602	-0.79506	0.430261	-12249.3	5299.444	-12249.3	5299.444
M9	-7077.17	4344.28	-1.62908	0.109459	-15798.7	1644.333	-15798.7	1644.333
M10	-4859.99	4398.029	-1.10504	0.274329	-13689.4	3969.42	-13689.4	3969.42
M11	840.6406	4260.777	0.197297	0.844379	-7713.23	9394.507	-7713.23	9394.507
M12	0	0	65535	#NUM!	0	0	0	0
SAI	24300.93	1811.228	13.41683	#NUM!	20664.74	27937.13	20664.74	27937.13
SP	0	0	65535	#NUM!	0	0	0	0

Payoff Table Calculation

Revenue Share Payoff in Aceh Region From April 2016 – June 2016

REVENUE SHARE								
1-Apr-16								

Payoff SP								
79543.1102	SAI							
		796,991.94	843,873.82	890,755.70	937,637.58	984,519.45	1,031,401.33	1,078,283.21
SP	821,690.93	35.86%	35.67%	35.61%	35.67%	35.87%	36.20%	36.67%
	870,025.69	34.99%	34.80%	34.74%	34.81%	35.00%	35.33%	35.79%
	918,360.45	33.84%	33.65%	33.59%	33.66%	33.85%	34.17%	34.63%
	966,695.21	32.37%	32.19%	32.13%	32.19%	32.38%	32.69%	33.14%
	1,015,029.97	30.55%	30.38%	30.32%	30.38%	30.56%	30.87%	31.30%
	1,063,364.73	28.32%	28.16%	28.10%	28.16%	28.34%	28.63%	29.04%
	1,111,699.49	25.62%	25.47%	25.42%	25.47%	25.63%	25.91%	26.30%

1-May-16								
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Payoff SP								
81168.308	SAI							
		788,234.36	834,601.09	880,967.82	927,334.55	973,701.27	1,020,068.00	1,066,434.73
SP	796,991.94	37.90%	37.51%	37.22%	37.05%	36.98%	37.02%	37.16%
	843,873.82	37.64%	37.24%	36.96%	36.79%	36.72%	36.75%	36.90%
	890,755.70	37.18%	36.79%	36.51%	36.34%	36.27%	36.30%	36.44%
	937,637.58	36.53%	36.14%	35.86%	35.69%	35.62%	35.66%	35.80%
	984,519.45	35.67%	35.28%	35.01%	34.84%	34.77%	34.80%	34.94%
	1,031,401.33	34.58%	34.20%	33.93%	33.76%	33.69%	33.73%	33.86%
	1,078,283.21	33.24%	32.87%	32.60%	32.44%	32.37%	32.41%	32.54%

1-Jun-16								
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Payoff SP								
81650.8032	SAI							
		800,434.80	847,519.20	894,603.60	941,688.00	988,772.40	1,035,856.80	1,082,941.20
SP	788,234.36	38.41%	37.97%	37.65%	37.42%	37.30%	37.28%	37.36%
	834,601.09	38.33%	37.89%	37.56%	37.34%	37.22%	37.20%	37.28%
	880,967.82	38.08%	37.64%	37.32%	37.10%	36.98%	36.96%	37.03%
	927,334.55	37.66%	37.23%	36.90%	36.68%	36.56%	36.54%	36.62%
	973,701.27	37.07%	36.64%	36.31%	36.10%	35.98%	35.96%	36.03%
	1,020,068.00	36.29%	35.86%	35.54%	35.32%	35.21%	35.19%	35.26%
	1,066,434.73	35.31%	34.89%	34.57%	34.36%	34.24%	34.22%	34.30%

Market Share Payoff in Aceh Region From April 2016 – June 2016

MARKET SHARE								
1-Apr-16								
Payoff SP								
		SAI						
		796,991.94	843,873.82	890,755.70	937,637.58	984,519.45	1,031,401.33	1,078,283.21
SP	821,690.93	35.16%	36.28%	37.48%	38.76%	40.13%	41.59%	43.18%
	870,025.69	33.02%	34.11%	35.28%	36.52%	37.86%	39.30%	40.86%
	918,360.45	30.74%	31.79%	32.91%	34.12%	35.42%	36.83%	38.34%
	966,695.21	28.29%	29.30%	30.37%	31.53%	32.78%	34.14%	35.61%
	1,015,029.97	25.67%	26.62%	27.63%	28.73%	29.92%	31.21%	32.61%
	1,063,364.73	22.85%	23.72%	24.67%	25.69%	26.80%	28.01%	29.33%
	1,111,699.49	19.81%	20.59%	21.45%	22.38%	23.39%	24.49%	25.71%

MARKET SHARE								
1-May-16								
Payoff SP								
		SAI						
	0.39	788,234.36	834,601.09	880,967.82	927,334.55	973,701.27	1,020,068.00	1,066,434.73
SP	796,991.94	37.64%	38.59%	39.59%	40.65%	41.76%	42.93%	44.17%
	843,873.82	36.05%	36.98%	37.97%	39.01%	40.10%	41.26%	42.49%
	890,755.70	34.37%	35.29%	36.25%	37.27%	38.35%	39.49%	40.71%
	937,637.58	32.61%	33.50%	34.44%	35.44%	36.49%	37.61%	38.81%
	984,519.45	30.74%	31.61%	32.52%	33.49%	34.52%	35.61%	36.78%
	1,031,401.33	28.77%	29.60%	30.49%	31.42%	32.42%	33.48%	34.62%
	1,078,283.21	26.68%	27.48%	28.33%	29.22%	30.18%	31.20%	32.30%

MARKET SHARE								
1-Jun-16								
Payoff SP								
		SAI						
	0.38	800,434.80	847,519.20	894,603.60	941,688.00	988,772.40	1,035,856.80	1,082,941.20
SP	788,234.36	38.78%	39.70%	40.66%	41.67%	42.74%	43.86%	45.04%
	834,601.09	37.35%	38.25%	39.21%	40.21%	41.26%	42.37%	43.54%
	880,967.82	35.85%	36.74%	37.68%	38.66%	39.70%	40.80%	41.96%
	927,334.55	34.28%	35.15%	36.07%	37.04%	38.06%	39.15%	40.29%
	973,701.27	32.62%	33.48%	34.38%	35.33%	36.33%	37.39%	38.52%
	1,020,068.00	30.89%	31.72%	32.59%	33.52%	34.50%	35.54%	36.64%
	1,066,434.73	29.06%	29.86%	30.71%	31.61%	32.56%	33.57%	34.64%

Revenue in Aceh Region From April 2016 – June 2016

REVENUE																						
1-Apr-16																						
Payoff SAI, Payoff SP																						
SAI																						
		796,991.94			843,873.82			890,755.70			937,637.58			984,519.45			1,031,401.33			1,078,283.21		
SP	773,551.00	IDR 47,657,229,948	IDR 27,877,325,139	IDR 47,388,568,920	IDR 27,877,325,139	IDR 46,778,571,503	IDR 27,877,325,139	IDR 45,827,237,698	IDR 27,877,325,139	IDR 44,534,567,504	IDR 27,877,325,139	IDR 42,900,560,922	IDR 27,877,325,139	IDR 40,925,217,951	IDR 27,877,325,139							
	819,054.00	IDR 47,657,229,948	IDR 26,623,190,335	IDR 47,388,568,920	IDR 26,623,190,335	IDR 46,778,571,503	IDR 26,623,190,335	IDR 45,827,237,698	IDR 26,623,190,335	IDR 44,534,567,504	IDR 26,623,190,335	IDR 42,900,560,922	IDR 26,623,190,335	IDR 40,925,217,951	IDR 26,623,190,335							
	864,557.00	IDR 47,657,229,948	IDR 25,047,502,480	IDR 47,388,568,920	IDR 25,047,502,480	IDR 46,778,571,503	IDR 25,047,502,480	IDR 45,827,237,698	IDR 25,047,502,480	IDR 44,534,567,504	IDR 25,047,502,480	IDR 42,900,560,922	IDR 25,047,502,480	IDR 40,925,217,951	IDR 25,047,502,480							
	910,060.00	IDR 47,657,229,948	IDR 23,150,261,574	IDR 47,388,568,920	IDR 23,150,261,574	IDR 46,778,571,503	IDR 23,150,261,574	IDR 45,827,237,698	IDR 23,150,261,574	IDR 44,534,567,504	IDR 23,150,261,574	IDR 42,900,560,922	IDR 23,150,261,574	IDR 40,925,217,951	IDR 23,150,261,574							
	955,563.00	IDR 47,657,229,948	IDR 20,931,467,616	IDR 47,388,568,920	IDR 20,931,467,616	IDR 46,778,571,503	IDR 20,931,467,616	IDR 45,827,237,698	IDR 20,931,467,616	IDR 44,534,567,504	IDR 20,931,467,616	IDR 42,900,560,922	IDR 20,931,467,616	IDR 40,925,217,951	IDR 20,931,467,616							
	1,001,066.00	IDR 47,657,229,948	IDR 18,391,120,608	IDR 47,388,568,920	IDR 18,391,120,608	IDR 46,778,571,503	IDR 18,391,120,608	IDR 45,827,237,698	IDR 18,391,120,608	IDR 44,534,567,504	IDR 18,391,120,608	IDR 42,900,560,922	IDR 18,391,120,608	IDR 40,925,217,951	IDR 18,391,120,608							
	1,046,569.00	IDR 47,657,229,948	IDR 15,529,220,548	IDR 47,388,568,920	IDR 15,529,220,548	IDR 46,778,571,503	IDR 15,529,220,548	IDR 45,827,237,698	IDR 15,529,220,548	IDR 44,534,567,504	IDR 15,529,220,548	IDR 42,900,560,922	IDR 15,529,220,548	IDR 40,925,217,951	IDR 15,529,220,548							
		0.6%			1.3%			2.0%			-2.8%			-3.7%			-4.6%					
1-May-16																						
Payoff SAI, Payoff SP																						
SAI																						
		788,234.36			834,601.09			880,967.82			927,334.55			973,701.27			1,020,068.00			1,066,434.73		
SP	765,051.00	\$52,457,482,234	\$32,850,434,417	\$52,512,458,788	\$32,850,434,417	\$52,230,684,486	\$32,850,434,417	\$51,612,159,330	\$32,850,434,417	\$50,656,883,319	\$32,850,434,417	\$49,364,856,453	\$32,850,434,417	\$47,736,078,732	\$32,850,434,417							
	810,054.00	\$52,457,482,234	\$31,927,713,319	\$52,512,458,788	\$31,927,713,319	\$52,230,684,486	\$31,927,713,319	\$51,612,159,330	\$31,927,713,319	\$50,656,883,319	\$31,927,713,319	\$49,364,856,453	\$31,927,713,319	\$47,736,078,732	\$31,927,713,319							
	855,057.00	\$52,457,482,234	\$30,687,758,933	\$52,512,458,788	\$30,687,758,933	\$52,230,684,486	\$30,687,758,933	\$51,612,159,330	\$30,687,758,933	\$50,656,883,319	\$30,687,758,933	\$49,364,856,453	\$30,687,758,933	\$47,736,078,732	\$30,687,758,933							
	900,060.00	\$52,457,482,234	\$29,130,571,258	\$52,512,458,788	\$29,130,571,258	\$52,230,684,486	\$29,130,571,258	\$51,612,159,330	\$29,130,571,258	\$50,656,883,319	\$29,130,571,258	\$49,364,856,453	\$29,130,571,258	\$47,736,078,732	\$29,130,571,258							
	945,063.00	\$52,457,482,234	\$27,256,150,296	\$52,512,458,788	\$27,256,150,296	\$52,230,684,486	\$27,256,150,296	\$51,612,159,330	\$27,256,150,296	\$50,656,883,319	\$27,256,150,296	\$49,364,856,453	\$27,256,150,296	\$47,736,078,732	\$27,256,150,296							
	990,066.00	\$52,457,482,234	\$25,064,496,045	\$52,512,458,788	\$25,064,496,045	\$52,230,684,486	\$25,064,496,045	\$51,612,159,330	\$25,064,496,045	\$50,656,883,319	\$25,064,496,045	\$49,364,856,453	\$25,064,496,045	\$47,736,078,732	\$25,064,496,045							
	1,035,069.00	\$52,457,482,234	\$22,555,608,506	\$52,512,458,788	\$22,555,608,506	\$52,230,684,486	\$22,555,608,506	\$51,612,159,330	\$22,555,608,506	\$50,656,883,319	\$22,555,608,506	\$49,364,856,453	\$22,555,608,506	\$47,736,078,732	\$22,555,608,506							
1-Jun-16																						
Payoff SAI, Payoff SP																						
SAI																						
		800,434.80			847,519.20			894,603.60			941,688.00			988,772.40			1,035,856.80			1,082,941.20		
SP	778,122.30	\$54,379,924,374	\$34,660,023,380	\$54,462,560,900	\$34,660,023,380	\$54,198,954,919	\$34,660,023,380	\$53,589,106,433	\$34,660,023,380	\$52,633,015,440	\$34,660,023,380	\$51,330,681,941	\$34,660,023,380	\$49,682,105,936	\$34,660,023,380							
	823,894.20	\$54,379,924,374	\$33,753,974,460	\$54,462,560,900	\$33,753,974,460	\$54,198,954,919	\$33,753,974,460	\$53,589,106,433	\$33,753,974,460	\$52,633,015,440	\$33,753,974,460	\$51,330,681,941	\$33,753,974,460	\$49,682,105,936	\$33,753,974,460							
	869,666.10	\$54,379,924,374	\$32,520,717,338	\$54,462,560,900	\$32,520,717,338	\$54,198,954,919	\$32,520,717,338	\$53,589,106,433	\$32,520,717,338	\$52,633,015,440	\$32,520,717,338	\$51,330,681,941	\$32,520,717,338	\$49,682,105,936	\$32,520,717,338							
	915,438.00	\$54,379,924,374	\$30,960,252,013	\$54,462,560,900	\$30,960,252,013	\$54,198,954,919	\$30,960,252,013	\$53,589,106,433	\$30,960,252,013	\$52,633,015,440	\$30,960,252,013	\$51,330,681,941	\$30,960,252,013	\$49,682,105,936	\$30,960,252,013							
	961,209.90	\$54,379,924,374	\$29,072,578,485	\$54,462,560,900	\$29,072,578,485	\$54,198,954,919	\$29,072,578,485	\$53,589,106,433	\$29,072,578,485	\$52,633,015,440	\$29,072,578,485	\$51,330,681,941	\$29,072,578,485	\$49,682,105,936	\$29,072,578,485							
	1,006,981.80	\$54,379,924,374	\$26,857,696,754	\$54,462,560,900	\$26,857,696,754	\$54,198,954,919	\$26,857,696,754	\$53,589,106,433	\$26,857,696,754	\$52,633,015,440	\$26,857,696,754	\$51,330,681,941	\$26,857,696,754	\$49,682,105,936	\$26,857,696,754							
	1,052,753.70	\$54,379,924,374	\$24,315,606,821	\$54,462,560,900	\$24,315,606,821	\$54,198,954,919	\$24,315,606,821	\$53,589,106,433	\$24,315,606,821	\$52,633,015,440	\$24,315,606,821	\$51,330,681,941	\$24,315,606,821	\$49,682,105,936	\$24,315,606,821							

Profits in Aceh Region From April 2016 – June 2016

PROFIT									
1-Apr-16									
Payoff SP									
	0	SAI							
	0.00%	796,991.94	843,873.82	890,755.70	937,637.58	984,519.45	1,031,401.33	1,078,283.21	
SP	773,551.00	IDR (52,219,238.46)	IDR (52,219,238.46)	IDR (52,219,238.46)	IDR (52,219,238.46)	IDR (52,219,238.46)	IDR (52,219,238.46)	IDR (52,219,238.46)	IDR (52,219,238.46)
	819,054.00	IDR 1,431,966,667.68	IDR 1,431,966,667.68	IDR 1,431,966,667.68	IDR 1,431,966,667.68	IDR 1,431,966,667.68	IDR 1,431,966,667.68	IDR 1,431,966,667.68	IDR 1,431,966,667.68
	864,557.00	IDR 2,594,599,522.76	IDR 2,594,599,522.76	IDR 2,594,599,522.76	IDR 2,594,599,522.76	IDR 2,594,599,522.76	IDR 2,594,599,522.76	IDR 2,594,599,522.76	IDR 2,594,599,522.76
	910,060.00	IDR 3,435,679,326.79	IDR 3,435,679,326.79	IDR 3,435,679,326.79	IDR 3,435,679,326.79	IDR 3,435,679,326.79	IDR 3,435,679,326.79	IDR 3,435,679,326.79	IDR 3,435,679,326.79
	955,563.00	IDR 3,955,206,079.76	IDR 3,955,206,079.76	IDR 3,955,206,079.76	IDR 3,955,206,079.76	IDR 3,955,206,079.76	IDR 3,955,206,079.76	IDR 3,955,206,079.76	IDR 3,955,206,079.76
	1,001,066.00	IDR 4,153,179,781.68	IDR 4,153,179,781.68	IDR 4,153,179,781.68	IDR 4,153,179,781.68	IDR 4,153,179,781.68	IDR 4,153,179,781.68	IDR 4,153,179,781.68	IDR 4,153,179,781.68
	1,046,569.00	IDR 4,029,600,432.55	IDR 4,029,600,432.55	IDR 4,029,600,432.55	IDR 4,029,600,432.55	IDR 4,029,600,432.55	IDR 4,029,600,432.55	IDR 4,029,600,432.55	IDR 4,029,600,432.55
	1-May-16								
Payoff SP									
		SAI							
		788,234.36	834,601.09	880,967.82	927,334.55	973,701.27	1,020,068.00	1,066,434.73	
SP	765,051.00	IDR (427,198,934.47)	IDR (427,198,934.47)	IDR (427,198,934.47)	IDR (427,198,934.47)	IDR (427,198,934.47)	IDR (427,198,934.47)	IDR (427,198,934.47)	IDR (427,198,934.47)
	810,054.00	IDR 1,381,628,956.45	IDR 1,381,628,956.45	IDR 1,381,628,956.45	IDR 1,381,628,956.45	IDR 1,381,628,956.45	IDR 1,381,628,956.45	IDR 1,381,628,956.45	IDR 1,381,628,956.45
	855,057.00	IDR 2,873,223,559.23	IDR 2,873,223,559.23	IDR 2,873,223,559.23	IDR 2,873,223,559.23	IDR 2,873,223,559.23	IDR 2,873,223,559.23	IDR 2,873,223,559.23	IDR 2,873,223,559.23
	900,060.00	IDR 4,047,584,873.86	IDR 4,047,584,873.86	IDR 4,047,584,873.86	IDR 4,047,584,873.86	IDR 4,047,584,873.86	IDR 4,047,584,873.86	IDR 4,047,584,873.86	IDR 4,047,584,873.86
	945,063.00	IDR 4,904,712,900.34	IDR 4,904,712,900.34	IDR 4,904,712,900.34	IDR 4,904,712,900.34	IDR 4,904,712,900.34	IDR 4,904,712,900.34	IDR 4,904,712,900.34	IDR 4,904,712,900.34
	990,066.00	IDR 5,444,607,638.68	IDR 5,444,607,638.68	IDR 5,444,607,638.68	IDR 5,444,607,638.68	IDR 5,444,607,638.68	IDR 5,444,607,638.68	IDR 5,444,607,638.68	IDR 5,444,607,638.68
	1,035,069.00	IDR 5,667,269,088.86	IDR 5,667,269,088.86	IDR 5,667,269,088.86	IDR 5,667,269,088.86	IDR 5,667,269,088.86	IDR 5,667,269,088.86	IDR 5,667,269,088.86	IDR 5,667,269,088.86
	1-Jun-16								
Payoff SP									
		SAI							
	0.38	800,434.80	847,519.20	894,603.60	941,688.00	988,772.40	1,035,856.80	1,082,941.20	
SP	778,122.30	IDR 139,077,097.52	IDR 139,077,097.52	IDR 139,077,097.52	IDR 139,077,097.52	IDR 139,077,097.52	IDR 139,077,097.52	IDR 139,077,097.52	IDR 139,077,097.52
	823,894.20	IDR 2,003,137,754.88	IDR 2,003,137,754.88	IDR 2,003,137,754.88	IDR 2,003,137,754.88	IDR 2,003,137,754.88	IDR 2,003,137,754.88	IDR 2,003,137,754.88	IDR 2,003,137,754.88
	869,666.10	IDR 3,539,990,209.54	IDR 3,539,990,209.54	IDR 3,539,990,209.54	IDR 3,539,990,209.54	IDR 3,539,990,209.54	IDR 3,539,990,209.54	IDR 3,539,990,209.54	IDR 3,539,990,209.54
	915,438.00	IDR 4,749,634,461.48	IDR 4,749,634,461.48	IDR 4,749,634,461.48	IDR 4,749,634,461.48	IDR 4,749,634,461.48	IDR 4,749,634,461.48	IDR 4,749,634,461.48	IDR 4,749,634,461.48
	961,209.90	IDR 5,632,070,510.71	IDR 5,632,070,510.71	IDR 5,632,070,510.71	IDR 5,632,070,510.71	IDR 5,632,070,510.71	IDR 5,632,070,510.71	IDR 5,632,070,510.71	IDR 5,632,070,510.71
	1,006,981.80	IDR 6,187,298,357.23	IDR 6,187,298,357.23	IDR 6,187,298,357.23	IDR 6,187,298,357.23	IDR 6,187,298,357.23	IDR 6,187,298,357.23	IDR 6,187,298,357.23	IDR 6,187,298,357.23
	1,052,753.70	IDR 6,415,318,001.04	IDR 6,415,318,001.04	IDR 6,415,318,001.04	IDR 6,415,318,001.04	IDR 6,415,318,001.04	IDR 6,415,318,001.04	IDR 6,415,318,001.04	IDR 6,415,318,001.04

Cummulative Profits in Aceh Region From April 2016 – June 2016

CUMMULATIVE PROFIT									
1-Apr-16									
Payoff SP									
	0	SAI							
	0.00%	796,991.94	843,873.82	890,755.70	937,637.58	984,519.45	1,031,401.33	1,078,283.21	
SP	773,551.00	IDR 7,242,456,680.06	IDR 9,431,057,051.51	IDR 11,278,321,034.52	IDR 12,784,248,629.07	IDR 13,948,839,835.19	IDR 14,772,094,652.85	IDR 15,254,013,082.07	
	819,054.00	IDR 8,726,642,586.20	IDR 10,915,242,957.65	IDR 12,762,506,940.65	IDR 14,268,434,535.21	IDR 15,433,025,741.32	IDR 16,256,280,558.99	IDR 16,738,198,988.21	
	864,557.00	IDR 9,889,275,441.28	IDR 12,077,875,812.73	IDR 13,925,139,795.73	IDR 15,431,067,390.29	IDR 16,595,658,596.40	IDR 17,418,913,414.07	IDR 17,900,831,843.29	
	910,060.00	IDR 10,730,355,245.31	IDR 12,918,955,616.75	IDR 14,766,219,599.76	IDR 16,272,147,194.31	IDR 17,436,738,400.43	IDR 18,259,993,218.09	IDR 18,741,911,647.31	
	955,563.00	IDR 11,249,881,998.28	IDR 13,438,482,369.73	IDR 15,285,746,352.73	IDR 16,791,673,947.29	IDR 17,956,265,153.40	IDR 18,779,519,971.07	IDR 19,261,438,400.29	
	1,001,066.00	IDR 11,447,855,700.20	IDR 13,636,456,071.65	IDR 15,483,720,054.65	IDR 16,989,647,649.21	IDR 18,154,238,855.32	IDR 18,977,493,672.99	IDR 19,459,412,102.21	
	1,046,569.00	IDR 11,324,276,351.07	IDR 13,512,876,722.52	IDR 15,360,140,705.52	IDR 16,866,068,300.08	IDR 18,030,659,506.19	IDR 18,853,914,323.86	IDR 19,335,832,753.08	
1-May-16									
Payoff SP									
		SAI							
		788,234.36	834,601.09	880,967.82	927,334.55	973,701.27	1,020,068.00	1,066,434.73	
SP	765,051.00	IDR 7,108,617,686.45	IDR 9,614,778,963.82	IDR 11,784,189,386.19	IDR 13,616,848,953.55	IDR 15,112,757,665.92	IDR 16,271,915,523.27	IDR 17,094,322,525.63	
	810,054.00	IDR 8,917,445,577.38	IDR 11,423,606,854.75	IDR 13,593,017,277.12	IDR 15,425,676,844.48	IDR 16,921,585,556.84	IDR 18,080,743,414.20	IDR 18,903,150,416.55	
	855,057.00	IDR 10,409,040,180.16	IDR 12,915,201,457.53	IDR 15,084,611,879.89	IDR 16,917,271,447.26	IDR 18,413,180,159.62	IDR 19,572,338,016.98	IDR 20,394,745,019.33	
	900,060.00	IDR 11,583,401,494.79	IDR 14,089,562,772.16	IDR 16,258,973,194.52	IDR 18,091,632,761.89	IDR 19,587,541,474.25	IDR 20,746,699,331.61	IDR 21,569,106,333.96	
	945,063.00	IDR 12,440,529,521.27	IDR 14,946,690,798.64	IDR 17,116,101,221.01	IDR 18,948,760,788.37	IDR 20,444,669,500.73	IDR 21,603,827,358.09	IDR 22,426,234,360.44	
	990,066.00	IDR 12,980,424,259.60	IDR 15,486,585,536.97	IDR 17,655,995,959.34	IDR 19,488,655,526.71	IDR 20,984,564,239.07	IDR 22,143,722,096.42	IDR 22,966,129,098.78	
	1,035,069.00	IDR 13,203,085,709.79	IDR 15,709,246,987.16	IDR 17,878,657,409.53	IDR 19,711,316,976.89	IDR 21,207,225,689.25	IDR 22,366,383,546.61	IDR 23,188,790,548.96	
1-Jun-16									
Payoff SP									
		SAI							
	-	800,434.80	-	847,519.20	-	894,603.60	-	941,688.00	
SP	778,122.30	IDR 8,660,864,178.62	IDR 11,225,359,787.52	IDR 13,443,612,890.28	IDR 15,315,623,486.91	IDR 16,841,391,577.39	IDR 18,020,917,161.75	IDR 18,854,200,239.96	
	823,894.20	IDR 10,524,924,835.99	IDR 13,089,420,444.88	IDR 15,307,673,547.64	IDR 17,179,684,144.27	IDR 18,705,452,234.76	IDR 19,884,977,819.11	IDR 20,718,260,897.33	
	869,666.10	IDR 12,061,777,290.64	IDR 14,626,272,899.54	IDR 16,844,526,002.30	IDR 18,716,536,598.92	IDR 20,242,304,689.41	IDR 21,421,830,273.76	IDR 22,255,113,351.98	
	915,438.00	IDR 13,271,421,542.58	IDR 15,835,917,151.48	IDR 18,054,170,254.24	IDR 19,926,180,850.87	IDR 21,451,948,941.35	IDR 22,631,474,525.71	IDR 23,464,757,603.92	
	961,209.90	IDR 14,153,857,591.81	IDR 16,718,353,200.71	IDR 18,936,606,303.47	IDR 20,808,616,900.10	IDR 22,334,384,990.59	IDR 23,513,910,574.94	IDR 24,347,193,653.15	
	1,006,981.80	IDR 14,709,085,438.33	IDR 17,273,581,047.23	IDR 19,491,834,149.99	IDR 21,363,844,746.62	IDR 22,889,612,837.11	IDR 24,069,138,421.46	IDR 24,902,421,499.67	
	1,052,753.70	IDR 14,937,105,082.14	IDR 17,501,600,691.04	IDR 19,719,853,793.80	IDR 21,591,864,390.43	IDR 23,117,632,480.91	IDR 24,297,158,065.27	IDR 25,130,441,143.48	

Profit Share in Aceh Region From April 2016 – June 2016

PROFIT SHARE								
1-Apr-16								
Payoff SP								
	0	SAI						
	33.56%	796,991.94	843,873.82	890,755.70	937,637.58	984,519.45	1,031,401.33	1,078,283.21
SP	773,551.00	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	819,054.00	16.41%	13.12%	11.22%	10.04%	9.28%	8.81%	8.56%
	864,557.00	26.24%	21.48%	18.63%	16.81%	15.63%	14.90%	14.49%
	910,060.00	32.02%	26.59%	23.27%	21.11%	19.70%	18.82%	18.33%
	955,563.00	35.16%	29.43%	25.88%	23.55%	22.03%	21.06%	20.53%
	1,001,066.00	36.28%	30.46%	26.82%	24.45%	22.88%	21.88%	21.34%
	1,046,569.00	35.58%	29.82%	26.23%	23.89%	22.35%	21.37%	20.84%
1-May-16								
Payoff SP								
		SAI						
		788,234.36	834,601.09	880,967.82	927,334.55	973,701.27	1,020,068.00	1,066,434.73
SP	765,051.00	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	810,054.00	15.49%	12.09%	10.16%	8.96%	8.16%	7.64%	7.31%
	855,057.00	27.60%	22.25%	19.05%	16.98%	15.60%	14.68%	14.09%
	900,060.00	34.94%	28.73%	24.89%	22.37%	20.66%	19.51%	18.77%
	945,063.00	39.43%	32.81%	28.66%	25.88%	23.99%	22.70%	21.87%
	990,066.00	41.94%	35.16%	30.84%	27.94%	25.95%	24.59%	23.71%
	1,035,069.00	42.92%	36.08%	31.70%	28.75%	26.72%	25.34%	24.44%
1-Jun-16								
Payoff SP								
		SAI						
	0.38	800,434.80	847,519.20	894,603.60	941,688.00	988,772.40	1,035,856.80	1,082,941.20
SP	778,122.30	1.61%	1.24%	1.03%	0.91%	0.83%	0.77%	0.74%
	823,894.20	19.03%	15.30%	13.09%	11.66%	10.71%	10.07%	9.67%
	869,666.10	29.35%	24.20%	21.02%	18.91%	17.49%	16.53%	15.91%
	915,438.00	35.79%	29.99%	26.31%	23.84%	22.14%	20.99%	20.24%
	961,209.90	39.79%	33.69%	29.74%	27.07%	25.22%	23.95%	23.13%
	1,006,981.80	42.06%	35.82%	31.74%	28.96%	27.03%	25.71%	24.85%
	1,052,753.70	42.95%	36.66%	32.53%	29.71%	27.75%	26.40%	25.53%

➤ Kalimantan Selatan

Regression Model

January 2014 – July 2016

Volume = - 0.0155 Price - 325 Periode + 48313 M1 + 42911 M2 + 45892 M3
 + 46551 M4 + 48715 M5 + 46091 M6 + 43294 M7 + 49524 M8 + 52213 M9
 + 53524 M10 + 52703 M11 + 53535 M12 - 5562 ITP - 23843 HI - 15213 SG
 - 22404 ST - 29017 SBM

January 2014 – August 2016

Volume = - 0.0172 Price - 312 Periode + 49947 M1 + 44399 M2 + 47325 M3
+ 48102 M4 + 50190 M5 + 47597 M6 + 45962 M7 + 51180 M8 + 53936 M9
+ 55212 M10 + 54336 M11 + 55197 M12 - 6021 ITP - 24069 HI - 15574 SG
- 22580 ST - 29280 SBM

January 2014 – September 2016

Volume = - 0.0180 Price - 307 Periode + 50673 M1 + 45057 M2 + 47964 M3
+ 48799 M4 + 50852 M5 + 48277 M6 + 46628 M7 + 52371 M8 + 54709 M9
+ 55970 M10 + 55069 M11 + 55946 M12 - 5950 ITP - 24187 HI - 15740 SG
- 22625 ST - 29330 SBM

COGS Estimation

	ITP	HI	SG	CCI	ST
Factory Location	Kalsel	Jatim	Jatim	Kalsel	Sulsel
COGS Estimation	600,000	700,000	700,000	550,000	650,000

Payoff Table Calculation

Market Share Payoff Table for Kalimantan Selatan in January 2014

September 2016

Payoff ITP	Lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/Hi	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031
749,171	636,088	751,737	28.2%	28.4%	28.6%	27.7%	27.9%	28.1%	27.1%	27.3%	27.6%
749,171	636,088	791,302	28.4%	28.6%	28.8%	27.9%	28.1%	28.3%	27.3%	27.6%	27.8%
749,171	636,088	830,867	28.6%	28.8%	29.1%	28.1%	28.3%	28.5%	27.6%	27.8%	28.0%
749,171	669,567	751,737	28.4%	28.6%	28.8%	27.8%	28.1%	28.3%	27.3%	27.5%	27.7%
749,171	669,567	791,302	28.6%	28.8%	29.0%	28.1%	28.3%	28.5%	27.5%	27.7%	28.0%
749,171	669,567	830,867	28.8%	29.0%	29.3%	28.3%	28.5%	28.7%	27.7%	28.0%	28.2%
749,171	703,045	751,737	28.5%	28.8%	29.0%	28.0%	28.2%	28.5%	27.5%	27.7%	27.9%
749,171	703,045	791,302	28.8%	29.0%	29.2%	28.2%	28.5%	28.7%	27.7%	27.9%	28.2%
749,171	703,045	830,867	29.0%	29.2%	29.4%	28.5%	28.7%	28.9%	27.9%	28.2%	28.4%
788,601	636,088	751,737	28.4%	28.6%	28.8%	27.9%	28.1%	28.3%	27.3%	27.6%	27.8%
788,601	636,088	791,302	28.6%	28.8%	29.1%	28.1%	28.3%	28.5%	27.6%	27.8%	28.0%
788,601	636,088	830,867	28.8%	29.1%	29.3%	28.3%	28.5%	28.7%	27.8%	28.0%	28.2%
788,601	669,567	751,737	28.6%	28.8%	29.0%	28.1%	28.3%	28.5%	27.5%	27.7%	28.0%
788,601	669,567	791,302	28.8%	29.0%	29.3%	28.3%	28.5%	28.7%	27.7%	28.0%	28.2%
788,601	669,567	830,867	29.0%	29.3%	29.5%	28.5%	28.7%	29.0%	28.0%	28.2%	28.4%
788,601	703,045	751,737	28.8%	29.0%	29.2%	28.2%	28.5%	28.7%	27.7%	27.9%	28.1%
788,601	703,045	791,302	29.0%	29.2%	29.4%	28.5%	28.7%	28.9%	27.9%	28.2%	28.4%
788,601	703,045	830,867	29.2%	29.4%	29.7%	28.7%	28.9%	29.1%	28.2%	28.4%	28.6%
828,031	636,088	751,737	28.6%	28.8%	29.1%	28.1%	28.3%	28.5%	27.6%	27.8%	28.0%
828,031	636,088	791,302	28.8%	29.1%	29.3%	28.3%	28.5%	28.8%	27.8%	28.0%	28.2%
828,031	636,088	830,867	29.1%	29.3%	29.5%	28.5%	28.8%	29.0%	28.0%	28.2%	28.4%
828,031	669,567	751,737	28.8%	29.0%	29.2%	28.3%	28.5%	28.7%	27.7%	28.0%	28.2%
828,031	669,567	791,302	29.0%	29.3%	29.5%	28.5%	28.7%	29.0%	28.0%	28.2%	28.4%
828,031	669,567	830,867	29.3%	29.5%	29.7%	28.7%	29.0%	29.2%	28.2%	28.4%	28.6%
828,031	703,045	751,737	29.0%	29.2%	29.4%	28.5%	28.7%	28.9%	27.9%	28.1%	28.4%
828,031	703,045	791,302	29.2%	29.4%	29.7%	28.7%	28.9%	29.1%	28.2%	28.4%	28.6%
828,031	703,045	830,867	29.4%	29.7%	29.9%	28.9%	29.1%	29.4%	28.4%	28.6%	28.8%

Payoff HI	lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/Hi	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031
749,171	636,088	751,737	8.2%	7.5%	6.7%	8.2%	7.5%	6.8%	8.3%	7.6%	6.8%
749,171	636,088	791,302	8.2%	7.5%	6.8%	8.3%	7.6%	6.8%	8.3%	7.6%	6.9%
749,171	636,088	830,867	8.3%	7.6%	6.8%	8.3%	7.6%	6.9%	8.4%	7.7%	7.0%
749,171	669,567	751,737	8.2%	7.5%	6.8%	8.3%	7.6%	6.8%	8.3%	7.6%	6.9%
749,171	669,567	791,302	8.3%	7.6%	6.8%	8.3%	7.6%	6.9%	8.4%	7.7%	6.9%
749,171	669,567	830,867	8.3%	7.6%	6.9%	8.4%	7.7%	6.9%	8.5%	7.7%	7.0%
749,171	703,045	751,737	8.3%	7.6%	6.8%	8.3%	7.6%	6.9%	8.4%	7.7%	6.9%
749,171	703,045	791,302	8.3%	7.6%	6.9%	8.4%	7.7%	6.9%	8.5%	7.7%	7.0%
749,171	703,045	830,867	8.4%	7.7%	6.9%	8.5%	7.7%	7.0%	8.5%	7.8%	7.0%
788,601	636,088	751,737	8.2%	7.5%	6.8%	8.3%	7.6%	6.8%	8.3%	7.6%	6.9%
788,601	636,088	791,302	8.3%	7.6%	6.8%	8.3%	7.6%	6.9%	8.4%	7.7%	7.0%
788,601	636,088	830,867	8.3%	7.6%	6.9%	8.4%	7.7%	7.0%	8.5%	7.7%	7.0%
788,601	669,567	751,737	8.3%	7.6%	6.8%	8.3%	7.6%	6.9%	8.4%	7.7%	6.9%
788,601	669,567	791,302	8.3%	7.6%	6.9%	8.4%	7.7%	6.9%	8.5%	7.7%	7.0%
788,601	669,567	830,867	8.4%	7.7%	6.9%	8.5%	7.7%	7.0%	8.5%	7.8%	7.1%
788,601	703,045	751,737	8.3%	7.6%	6.9%	8.4%	7.7%	6.9%	8.5%	7.7%	7.0%
788,601	703,045	791,302	8.4%	7.7%	6.9%	8.5%	7.7%	7.0%	8.5%	7.8%	7.0%
788,601	703,045	830,867	8.5%	7.7%	7.0%	8.5%	7.8%	7.1%	8.6%	7.9%	7.1%
828,031	636,088	751,737	8.3%	7.6%	6.8%	8.3%	7.6%	6.9%	8.4%	7.7%	7.0%
828,031	636,088	791,302	8.3%	7.6%	6.9%	8.4%	7.7%	7.0%	8.5%	7.7%	7.0%
828,031	636,088	830,867	8.4%	7.7%	7.0%	8.5%	7.7%	7.0%	8.5%	7.8%	7.1%
828,031	669,567	751,737	8.3%	7.6%	6.9%	8.4%	7.7%	6.9%	8.5%	7.7%	7.0%
828,031	669,567	791,302	8.4%	7.7%	6.9%	8.5%	7.7%	7.0%	8.5%	7.8%	7.1%
828,031	669,567	830,867	8.5%	7.7%	7.0%	8.5%	7.8%	7.1%	8.6%	7.9%	7.1%
828,031	703,045	751,737	8.4%	7.7%	6.9%	8.5%	7.7%	7.0%	8.5%	7.8%	7.0%
828,031	703,045	791,302	8.5%	7.7%	7.0%	8.5%	7.8%	7.1%	8.6%	7.9%	7.1%
828,031	703,045	830,867	8.5%	7.8%	7.1%	8.6%	7.9%	7.1%	8.7%	7.9%	7.2%

Payoff SG	lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/HI	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031	749,171
749,171	636,088	751,737	17.1%	17.2%	17.4%	17.2%	17.4%	17.5%	17.4%	17.5%	17.6%	17.6%
749,171	636,088	791,302	17.2%	17.4%	17.5%	17.4%	17.5%	17.6%	17.5%	17.6%	17.7%	17.8%
749,171	636,088	830,867	17.4%	17.5%	17.6%	17.5%	17.6%	17.8%	17.6%	17.8%	17.9%	17.9%
749,171	669,567	751,737	17.2%	17.4%	17.5%	17.3%	17.5%	17.6%	17.5%	17.6%	17.7%	17.7%
749,171	669,567	791,302	17.4%	17.5%	17.6%	17.5%	17.6%	17.8%	17.6%	17.9%	17.9%	17.9%
749,171	669,567	830,867	17.5%	17.6%	17.8%	17.6%	17.8%	17.9%	17.7%	17.9%	18.0%	18.0%
749,171	703,045	751,737	17.3%	17.5%	17.6%	17.5%	17.6%	17.7%	17.6%	17.7%	17.9%	17.9%
749,171	703,045	791,302	17.5%	17.6%	17.7%	17.6%	17.7%	17.9%	17.7%	17.9%	18.0%	18.0%
749,171	703,045	830,867	17.6%	17.7%	17.9%	17.7%	17.9%	18.0%	17.9%	18.0%	18.2%	18.2%
788,601	636,088	751,737	16.5%	16.6%	16.7%	16.6%	16.7%	16.9%	16.7%	16.8%	17.0%	17.0%
788,601	636,088	791,302	16.6%	16.7%	16.9%	16.7%	16.9%	17.0%	16.8%	17.0%	17.1%	17.1%
788,601	636,088	830,867	16.7%	16.9%	17.0%	16.9%	17.0%	17.1%	17.0%	17.1%	17.3%	17.3%
788,601	669,567	751,737	16.6%	16.7%	16.8%	16.7%	16.8%	17.0%	16.8%	17.0%	17.1%	17.1%
788,601	669,567	791,302	16.7%	16.8%	17.0%	16.8%	17.0%	17.1%	17.0%	17.1%	17.2%	17.2%
788,601	669,567	830,867	16.8%	17.0%	17.1%	17.0%	17.1%	17.2%	17.1%	17.2%	17.4%	17.4%
788,601	703,045	751,737	16.7%	16.8%	17.0%	16.8%	16.9%	17.1%	16.9%	17.1%	17.2%	17.2%
788,601	703,045	791,302	16.8%	17.0%	17.1%	16.9%	17.1%	17.2%	17.1%	17.2%	17.3%	17.3%
788,601	703,045	830,867	17.0%	17.1%	17.2%	17.1%	17.2%	17.4%	17.2%	17.3%	17.5%	17.5%
828,031	636,088	751,737	15.8%	16.0%	16.1%	15.9%	16.1%	16.2%	16.1%	16.2%	16.3%	16.3%
828,031	636,088	791,302	16.0%	16.1%	16.2%	16.1%	16.2%	16.3%	16.2%	16.3%	16.5%	16.5%
828,031	636,088	830,867	16.1%	16.2%	16.3%	16.2%	16.3%	16.5%	16.3%	16.5%	16.6%	16.6%
828,031	669,567	751,737	15.9%	16.1%	16.2%	16.1%	16.2%	16.3%	16.2%	16.3%	16.4%	16.4%
828,031	669,567	791,302	16.1%	16.2%	16.3%	16.2%	16.3%	16.4%	16.3%	16.4%	16.6%	16.6%
828,031	669,567	830,867	16.2%	16.3%	16.4%	16.3%	16.4%	16.6%	16.4%	16.6%	16.7%	16.7%
828,031	703,045	751,737	16.0%	16.2%	16.3%	16.2%	16.3%	16.4%	16.3%	16.4%	16.5%	16.5%
828,031	703,045	791,302	16.2%	16.3%	16.4%	16.3%	16.4%	16.6%	16.4%	16.5%	16.7%	16.7%
828,031	703,045	830,867	16.3%	16.4%	16.6%	16.4%	16.6%	16.7%	16.5%	16.7%	16.8%	16.8%
Payoff CCI	lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/HI	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031	749,171
749,171	636,088	751,737	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%	37.3%	37.5%	37.8%	37.8%
749,171	636,088	791,302	37.0%	37.3%	37.6%	37.3%	37.6%	37.9%	37.9%	37.8%	38.1%	38.1%
749,171	636,088	830,867	37.3%	37.6%	37.9%	37.6%	37.9%	38.2%	37.8%	38.1%	38.4%	38.4%
749,171	669,567	751,737	36.3%	36.6%	36.9%	36.6%	36.9%	37.1%	36.8%	37.1%	37.4%	37.4%
749,171	669,567	791,302	36.6%	36.9%	37.2%	36.9%	37.1%	37.4%	37.1%	37.4%	37.7%	37.7%
749,171	669,567	830,867	36.9%	37.2%	37.5%	37.1%	37.4%	37.7%	37.4%	37.7%	38.0%	38.0%
749,171	703,045	751,737	35.9%	36.2%	36.5%	36.2%	36.4%	36.7%	36.4%	36.7%	37.0%	37.0%
749,171	703,045	791,302	36.2%	36.5%	36.7%	36.4%	36.7%	37.0%	36.7%	37.0%	37.3%	37.3%
749,171	703,045	830,867	36.5%	36.7%	37.0%	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%	37.6%
788,601	636,088	751,737	37.0%	37.3%	37.6%	37.3%	37.6%	37.9%	37.9%	37.8%	38.1%	38.1%
788,601	636,088	791,302	37.3%	37.6%	37.9%	37.6%	37.9%	38.2%	37.8%	38.1%	38.4%	38.4%
788,601	636,088	830,867	37.6%	37.9%	38.2%	37.9%	38.2%	38.5%	38.1%	38.4%	38.7%	38.7%
788,601	669,567	751,737	36.6%	36.9%	37.2%	36.9%	37.1%	37.4%	37.1%	37.4%	37.7%	37.7%
788,601	669,567	791,302	36.9%	37.2%	37.5%	37.1%	37.4%	37.7%	37.4%	37.7%	38.0%	38.0%
788,601	669,567	830,867	37.2%	37.5%	37.8%	37.4%	37.7%	38.0%	37.7%	38.0%	38.3%	38.3%
788,601	703,045	751,737	36.2%	36.5%	36.7%	36.4%	36.7%	37.0%	36.7%	37.0%	37.3%	37.3%
788,601	703,045	791,302	36.5%	36.7%	37.0%	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%	37.6%
788,601	703,045	830,867	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%	37.3%	37.6%	37.9%	37.9%
828,031	636,088	751,737	37.3%	37.6%	37.9%	37.6%	37.9%	38.2%	37.8%	38.1%	38.4%	38.4%
828,031	636,088	791,302	37.6%	37.9%	38.2%	37.9%	38.2%	38.5%	38.1%	38.4%	38.7%	38.7%
828,031	636,088	830,867	37.9%	38.2%	38.5%	38.2%	38.5%	38.8%	38.4%	38.7%	39.1%	39.1%
828,031	669,567	751,737	36.9%	37.2%	37.5%	37.1%	37.4%	37.7%	37.4%	37.7%	38.0%	38.0%
828,031	669,567	791,302	37.2%	37.5%	37.8%	37.4%	37.7%	38.0%	37.7%	38.0%	38.3%	38.3%
828,031	669,567	830,867	37.5%	37.8%	38.1%	37.7%	38.0%	38.3%	38.0%	38.3%	38.6%	38.6%
828,031	703,045	751,737	36.5%	36.7%	37.0%	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%	37.6%
828,031	703,045	791,302	36.7%	37.0%	37.3%	37.0%	37.3%	37.6%	37.3%	37.6%	37.9%	37.9%
828,031	703,045	830,867	37.0%	37.3%	37.6%	37.3%	37.6%	37.9%	37.6%	37.9%	38.2%	38.2%

Payoff ST	lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/HI	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031
749,171	636,088	751,737	9.8%	9.9%	10.0%	9.9%	10.0%	10.1%	10.0%	10.1%	10.1%
749,171	636,088	791,302	9.1%	9.2%	9.3%	9.2%	9.3%	9.4%	9.3%	9.4%	9.4%
749,171	636,088	830,867	8.4%	8.5%	8.6%	8.5%	8.6%	8.6%	8.6%	8.6%	8.7%
749,171	669,567	751,737	9.9%	10.0%	10.1%	10.0%	10.0%	10.1%	10.0%	10.1%	10.2%
749,171	669,567	791,302	9.2%	9.3%	9.3%	9.3%	9.3%	9.4%	9.3%	9.4%	9.5%
749,171	669,567	830,867	8.5%	8.6%	8.6%	8.6%	8.6%	8.7%	8.6%	8.7%	8.8%
749,171	703,045	751,737	10.0%	10.0%	10.1%	10.0%	10.1%	10.2%	10.1%	10.2%	10.3%
749,171	703,045	791,302	9.3%	9.3%	9.4%	9.3%	9.4%	9.5%	9.4%	9.5%	9.6%
749,171	703,045	830,867	8.6%	8.6%	8.7%	8.6%	8.7%	8.8%	8.7%	8.8%	8.8%
788,601	636,088	751,737	9.9%	10.0%	10.1%	10.0%	10.1%	10.1%	10.1%	10.1%	10.2%
788,601	636,088	791,302	9.2%	9.3%	9.4%	9.3%	9.4%	9.4%	9.4%	9.4%	9.5%
788,601	636,088	830,867	8.5%	8.6%	8.6%	8.6%	8.6%	8.7%	8.6%	8.7%	8.8%
788,601	669,567	751,737	10.0%	10.1%	10.1%	10.0%	10.1%	10.2%	10.1%	10.2%	10.3%
788,601	669,567	791,302	9.3%	9.3%	9.4%	9.3%	9.4%	9.5%	9.4%	9.5%	9.6%
788,601	669,567	830,867	8.6%	8.6%	8.7%	8.6%	8.7%	8.8%	8.7%	8.8%	8.8%
788,601	703,045	751,737	10.0%	10.1%	10.2%	10.1%	10.2%	10.3%	10.2%	10.3%	10.4%
788,601	703,045	791,302	9.3%	9.4%	9.5%	9.4%	9.5%	9.6%	9.5%	9.6%	9.6%
788,601	703,045	830,867	8.6%	8.7%	8.8%	8.7%	8.8%	8.8%	8.8%	8.8%	8.9%
828,031	636,088	751,737	10.0%	10.1%	10.1%	10.1%	10.1%	10.2%	10.1%	10.2%	10.3%
828,031	636,088	791,302	9.3%	9.4%	9.4%	9.4%	9.4%	9.5%	9.4%	9.5%	9.6%
828,031	636,088	830,867	8.6%	8.6%	8.7%	8.6%	8.7%	8.8%	8.7%	8.8%	8.8%
828,031	669,567	751,737	10.1%	10.1%	10.2%	10.1%	10.2%	10.3%	10.2%	10.3%	10.4%
828,031	669,567	791,302	9.3%	9.4%	9.5%	9.4%	9.5%	9.6%	9.5%	9.6%	9.6%
828,031	669,567	830,867	8.6%	8.7%	8.8%	8.7%	8.8%	8.8%	8.8%	8.8%	8.9%
828,031	703,045	751,737	10.1%	10.2%	10.3%	10.2%	10.3%	10.4%	10.3%	10.4%	10.4%
828,031	703,045	791,302	9.4%	9.5%	9.6%	9.5%	9.6%	9.6%	9.6%	9.6%	9.7%
828,031	703,045	830,867	8.7%	8.8%	8.8%	8.8%	8.8%	8.9%	8.8%	8.9%	9.0%

Payoff ST	lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/Hi	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031
749,171	636,088	751,737	958	958	958	958	958	958	958	958	958
749,171	636,088	791,302	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
749,171	636,088	830,867	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
749,171	669,567	751,737	958	958	958	958	958	958	958	958	958
749,171	669,567	791,302	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
749,171	669,567	830,867	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
749,171	703,045	751,737	958	958	958	958	958	958	958	958	958
749,171	703,045	791,302	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
749,171	703,045	830,867	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
788,601	636,088	751,737	958	958	958	958	958	958	958	958	958
788,601	636,088	791,302	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
788,601	636,088	830,867	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
788,601	669,567	751,737	958	958	958	958	958	958	958	958	958
788,601	669,567	791,302	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
788,601	669,567	830,867	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
788,601	703,045	751,737	958	958	958	958	958	958	958	958	958
788,601	703,045	791,302	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
788,601	703,045	830,867	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
828,031	636,088	751,737	958	958	958	958	958	958	958	958	958
828,031	636,088	791,302	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
828,031	636,088	830,867	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
828,031	669,567	751,737	958	958	958	958	958	958	958	958	958
828,031	669,567	791,302	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
828,031	669,567	830,867	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
828,031	703,045	751,737	958	958	958	958	958	958	958	958	958
828,031	703,045	791,302	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
828,031	703,045	830,867	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440

Prediction of Cummulative Profits in January 2014 – September 2016

Payoff ITP	Lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/Hi	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031
749,171	636,088	751,737	8,054	8,297	8,484	8,958	9,202	9,389	9,812	10,056	10,242
749,171	636,088	791,302	8,323	8,567	8,753	9,228	9,472	9,658	10,082	10,326	10,512
749,171	636,088	830,867	8,535	8,779	8,966	9,440	9,684	9,870	10,294	10,538	10,724
749,171	669,567	751,737	9,157	9,401	9,587	10,062	10,305	10,492	10,916	11,159	11,346
749,171	669,567	791,302	9,427	9,670	9,857	10,331	10,575	10,762	11,185	11,429	11,615
749,171	669,567	830,867	9,639	9,882	10,069	10,544	10,787	10,974	11,397	11,641	11,828
749,171	703,045	751,737	10,219	10,463	10,649	11,124	11,367	11,554	11,978	12,221	12,408
749,171	703,045	791,302	10,489	10,732	10,919	11,394	11,637	11,824	12,247	12,491	12,677
749,171	703,045	830,867	10,701	10,945	11,131	11,606	11,849	12,036	12,460	12,703	12,890
788,601	636,088	751,737	8,635	8,879	9,065	9,540	9,784	9,970	10,394	10,638	10,824
788,601	636,088	791,302	8,905	9,149	9,335	9,810	10,053	10,240	10,664	10,907	11,094
788,601	636,088	830,867	9,117	9,361	9,547	10,022	10,265	10,452	10,876	11,119	11,306
788,601	669,567	751,737	9,739	9,982	10,169	10,643	10,887	11,073	11,497	11,741	11,927
788,601	669,567	791,302	10,008	10,252	10,438	10,913	11,157	11,343	11,767	12,011	12,197
788,601	669,567	830,867	10,220	10,464	10,650	11,125	11,369	11,555	11,979	12,223	12,409
788,601	703,045	751,737	10,801	11,044	11,231	11,705	11,949	12,135	12,559	12,803	12,989
788,601	703,045	791,302	11,070	11,314	11,500	11,975	12,219	12,405	12,829	13,073	13,259
788,601	703,045	830,867	11,282	11,526	11,712	12,187	12,431	12,617	13,041	13,285	13,471
828,031	636,088	751,737	9,160	9,403	9,590	10,064	10,308	10,494	10,918	11,162	11,348
828,031	636,088	791,302	9,429	9,673	9,859	10,334	10,578	10,764	11,188	11,432	11,618
828,031	636,088	830,867	9,641	9,885	10,071	10,546	10,790	10,976	11,400	11,644	11,830
828,031	669,567	751,737	10,263	10,507	10,693	11,168	11,411	11,598	12,022	12,265	12,452
828,031	669,567	791,302	10,533	10,776	10,963	11,437	11,681	11,867	12,291	12,535	12,721
828,031	669,567	830,867	10,745	10,988	11,175	11,649	11,893	12,080	12,503	12,747	12,933
828,031	703,045	751,737	11,325	11,569	11,755	12,230	12,473	12,660	13,084	13,327	13,514
828,031	703,045	791,302	11,595	11,838	12,025	12,499	12,743	12,930	13,353	13,597	13,783
828,031	703,045	830,867	11,807	12,050	12,237	12,712	12,955	13,142	13,565	13,809	####

Prediction of Cummulative Sales Volume in January 2014 – September 2016

Payoff ITP	Lower	ITP	706,765	706,765	706,765	743,963	743,963	743,963	781,161	781,161	781,161
SG	CCI	ST/Hi	749,171	788,601	828,031	749,171	788,601	828,031	749,171	788,601	828,031
749,171	636,088	751,737	#####	95,009	94,283	95,050	94,324	93,599	94,365	93,640	92,914
749,171	636,088	791,302	95,006	94,281	93,555	94,322	93,596	92,871	93,637	92,912	92,186
749,171	636,088	830,867	94,278	93,553	92,827	93,594	92,868	92,143	92,909	92,184	91,458
749,171	669,567	751,737	95,118	94,393	93,667	94,434	93,708	92,983	93,749	93,024	92,298
749,171	669,567	791,302	94,390	93,665	92,939	93,706	92,980	92,255	93,021	92,296	91,570
749,171	669,567	830,867	93,662	92,937	92,211	92,978	92,252	91,527	92,293	91,568	90,842
749,171	703,045	751,737	94,502	93,777	93,051	93,818	93,092	92,367	93,133	92,408	91,682
749,171	703,045	791,302	93,774	93,049	92,323	93,090	92,364	91,639	92,405	91,680	90,954
749,171	703,045	830,867	93,046	92,321	91,595	92,362	91,636	90,911	91,677	90,952	90,226
788,601	636,088	751,737	95,009	94,283	93,558	94,324	93,599	92,873	93,640	92,914	92,189
788,601	636,088	791,302	94,281	93,555	92,830	93,596	92,871	92,145	92,912	92,186	91,461
788,601	636,088	830,867	93,553	92,827	92,102	92,868	92,143	91,417	92,184	91,458	90,733
788,601	669,567	751,737	94,393	93,667	92,942	93,708	92,983	92,257	93,024	92,298	91,573
788,601	669,567	791,302	93,665	92,939	92,214	92,980	92,255	91,529	92,296	91,570	90,845
788,601	669,567	830,867	92,937	92,211	91,486	92,252	91,527	90,801	91,568	90,842	90,117
788,601	703,045	751,737	93,777	93,051	92,326	93,092	92,367	91,641	92,408	91,682	90,957
788,601	703,045	791,302	93,049	92,323	91,598	92,364	91,639	90,913	91,680	90,954	90,229
788,601	703,045	830,867	92,321	91,595	90,870	91,636	90,911	90,185	90,952	90,226	89,501
828,031	636,088	751,737	94,283	93,558	92,832	93,599	92,873	92,148	92,914	92,189	91,463
828,031	636,088	791,302	93,555	92,830	92,104	92,871	92,145	91,420	92,186	91,461	90,735
828,031	636,088	830,867	92,827	92,102	91,376	92,143	91,417	90,692	91,458	90,733	90,007
828,031	669,567	751,737	93,667	92,942	92,216	92,983	92,257	91,532	92,298	91,573	90,847
828,031	669,567	791,302	92,939	92,214	91,488	92,255	91,529	90,804	91,570	90,845	90,119
828,031	669,567	830,867	92,211	91,486	90,760	91,527	90,801	90,076	90,842	90,117	89,391
828,031	703,045	751,737	93,051	92,326	91,600	92,367	91,641	90,916	91,682	90,957	90,231
828,031	703,045	791,302	92,323	91,598	90,872	91,639	90,913	90,188	90,954	90,229	89,503
828,031	703,045	830,867	91,595	90,870	90,144	90,911	90,185	89,460	90,226	89,501	88,775

➤ Kepulauan Riau

Model Fit Test for Kepulauan Riau

Period	Band	Volume	Error
Jul-16	SAI	-5800.34	-2823.17%
	SP	6391.655	-42.48%
	ITP	8728.939	55.87%
	HI	5604.939	-63.12%
	SBM	6852.222	-39.97%
Aug-16	SAI	-3082.23	-1250.09%
	SP	9025.766	-11.75%
	ITP	11150.67	335.57%
	HI	8184.672	-36.95%
	SBM	9400.578	-40.76%
Sep-16	SAI	-1665.62	-881.98%
	SP	10457.15	-5.90%
	ITP	12229.37	118.38%

Period	Band	Volume	Error
	HI	9735.371	-35.95%
	SBM	10989.6	-3.72%

Regression Formula

Jul-16	<p>Volume = - 0.0208 Price - 96.7 Period + 34093 M1 + 32586 M2 + 33687 M3 + 33103 M4 + 32820 M5 + 31628 M6 + 28497 M7 + 30851 M8 + 31873 M9 + 34836 M10 + 35333 M11 + 33866 M12 - 11344 SAI + 848 SP + 2531 ITP - 593 HI</p>
Aug-16	<p>Volume = - 0.0176 Price - 84.8 Period + 31114 M1 + 29658 M2 + 30730 M3 + 30101 M4 + 29721 M5 + 28592 M6 + 26117 M7 + 27872 M8 + 28925 M9 + 31837 M10 + 32343 M11 + 30825 M12 - 11377 SAI + 731 SP + 2303 ITP - 663 HI</p>
Sep-16	<p>Volume = - 0.0138 Price - 78.0 Period + 27965 M1 + 26575 M2 + 27620 M3 + 26945 M4 + 26460 M5 + 25412 M6 + 22849 M7 + 25120 M8 + 25825 M9 + 28687 M10 + 29210 M11 + 27639 M12 - 11694 SAI + 328 SP + 1670 ITP - 824 HI</p>

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Muhammad Fauzan, was born in Pasaman, at 3 Mei 1995 as the first son of three siblings. Author take his education at SD Insan Kamil Bogor, and Continue to SMPN 4 Bogor, but, in eight grade author moves to his hometown at Lubuk Sikaping and continue his education at SMPN 1 Lubuk Sikaping. And finish his high school at SMAN 1 Lubuk Sikaping before later continue at Industrial Engineering Department in Institut Teknologi Sepuluh Nopember (ITS) Surabaya through SBMPTN 2014.

During his study in graduate program, author joins several activities. In second year author active in Himpunan Mahasiswa Teknik Industri (HMTI) ITS as Entrepreneur Department Staff 2015/2016 and Staff of Syiar Department in Masyarakat Studi Islam (MSI) Ulul Ilmi. Then Continue as Mentor of Agitation and Propaganda at Badan Semi Otonom (BSO) Forum Kajian Strategis Himpunan Mahasiswa Teknik Industri (FORKASTRA HMTI) ITS 2016/2017. While join some crew of HMTI ITS activities such as SISTEM 2015 as Steering Committee, Inchall, IE Game, LKMW, and E-Club. In institute author active as Staff in Minister of Economy Badan Eksekutif Mahasiswa (BEM) while become Coordinator of Kelas Ekonomi Kebangsaan (KEK) and Vice Coordinator of Event in Pasar Malam Minggu ITS (PAMMITS).

To enhance his ability in industrial engineering knowledge, author join some activities. Such as, Quality Improvement Engineering Training (QIET), Business Model Design Camp, at Suranaree University of Technology, Thailand. In real work experience author finish his practical work at PT. Jakarta Industrial Estate Pulogadung in Strategy and System Developent Department in Organizatio Development Division for 2 month. Author can be contacted through email at muhammadfauzan617@gmail.com.