

Designing The Performance Measurement System And Sni Iso 9001:2008 Quality Objectives Of Pt Amm Using *Cascading Balanced Scorecard Method And Ahp*

Jarot Kusumo Wibowo¹, Bustanul Arifin Noer²

^{1,2,3} *Department of Industry Management, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia*
Corresponding Author: Jarot Kusumo Wibowo

Abstract- All this time, PT AMM has only apply SNI ISO 9001:2008 which as quality management system, wherein the measurement of organizational performance using quality objectives. SNI 9001:2008 gives only general overview, there is no priority and it can not be used as reference in decision making. PT AMM requires a performance management system that is comprehensive and synergistic with quality objectives of SNI ISO 9001:2008. The preferred method is the cascading balanced scorecard which cascade process means to distribute down (vertical alignment) the company's strategic objective to the department. After the determination and stipulation of the strategic objectives and key performance indicators then subsequently weighted each criterion using AHP (Analytical Hierachy Process). Weighting with AHP based on questionnaires that given to company respondents to see priority on each strategic objective and key performance indicators (KPI). Then measured using OMAX (objective Matrix) to see the performance of the company and department achievement. The use of Traffic Light Systems to see the achievement of company and department are already reach the condition that need improvement or already show the good performance. The design of performance measurement system of PT AMM, generates 17 strategic objectives and also 36 quality objectives. Implementation of company performance measurement system gives result (Current Performance Indicator) which obtain from scoring (OMAX) that is equal to 7,931 in 2016 and 5,197 in 2017. PT AMM performance in 2016 and 2017 conclude in mediocre category, it has not reached target and still need improvement in achieving the target. The design of performance measurement system of production operation department, generates 9 strategic objectives and also 23 quality objectives. Implementation of department performance measurement system gives result (Current Performance Indicator) which obtain from scoring (OMAX) that is equal to 8,604 in 2016 and 6,986 in 2017. Production operation department performance in 2016 is categorized as good but in 2017 it reaches mediocre category, it has not reached target and still need improvement in achieving the target

Keywords: Quality Objectives, SNI ISO 9001:2008, Cascading Balanced Scorecard, Analytical Hierarchy Process, OMAX (Objective Matrix), Traffic Light Systems, Current Performance Indicator.

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I. INTRODUCTION

Shifts in Indonesian food consumption patterns occur in wheat flour and its derivative products. Rising food consumption patterns or demand for wheat flour and its derivatives are supported by the growth of flour mills industry in Indonesia. According to Welirang (2016), after 1998 there was a rapid growth of flour mills from only 5 flour mills expanded to 12 flour mills in 2009 (shown on table 1) [1]. And it grew even larger in 2014 (28 flour mills). Finally in 2016 the total number of flour mills in Indonesia reach 30 factories [1]. The subject of this research is PT AMM which establish on 2005 and located in Mojokerto, East Java (Indonesia). PT AMM used to be wheat flour importer since 2005, which bought wheat flour from Turkey. In 2010, board of management (PT AMM) had a plan to build its own flour mills in order to handle the change which occurred by the Indonesian government policy (193/PMK.011/2012) about enactment safe guard tariff (BMTPS) on imported wheat flour product. BMTPS (safe guard tariff) made imported wheat flour products became less profitable. Wheat flour products are used as raw material for food industry such as instant noodles, bread, cakes and others. While by-products such as bran, pollard and industrial flour are used for farm animal feed and adhesive raw material for plywood industry purpose. Emerging phenomenon in wheat flour industry, forces PT AMM to be more adaptive and agile. It has to increase its performance to maintain competitiveness.

Table 1. Indonesian Flour Mills Growth (1970-2016)

Subject	Pre BULOG Deregulation	Post BULOG Deregulation			Total
	1970-1998	1999-2009	2010-2014	2015-2016	
Amount of Flour Mills	5	5+7=12	12+16=28	28+3(-1)=30	30
Flour Mills Location	Jakarta (1); Surabaya (1); Makassar (1); Semarang (1); Cilacap (1)	Gresik (1); Tangerang (1); Sidoarjo (3); Medan (1); Cilegon (1)	Cilegon (3); Tangerang (2); Medan (2); Bekasi (3); Gresik (3); Sidoarjo (1); Mojokerto (1); Semarang (1)	Jakarta (1); Cilegon (1); Medan (1); Tangerang (-1)	Java : 25; Outside Java Island : 5 (Centralized on Java island)
Wheat Milled Total Capacity : +/- 11,4 Million MT/Year					

Source: Welirang (2016)

Increased performance is one of them with improved product quality and product availability. This can be supported by the implementation of QMS (Quality Management System) at PT AMM. Wheat flour products based on Regulation of the Indonesian Minister of Industry (PERMEN Industri no. 59 / M-IND / PER / 7/2015) shall be treated legally as SNI compulsory (mandatory) food. With the regulation and compulsory provisions of SNI for wheat flour products is also set the quality standard of wheat flour (SNI 3751-2009 i.e wheat flour as food). PT AMM registering its products on LSPro (Indonesian Product Certification Institution) designated by KAN (National Accreditation Committee). Registration to LSPro in order to get SPPT SNI number (Product Certification Use SNI Signs). The granting of SPPT SNI number make PT AMM product that is wheat flour (SNI compulsory product) can be marketed throughout Indonesia.

After the implementation, QMS (Quality Management System) needs to be measured according to ISO 9001:2008 clause 5.4.1 (quality objectives) [2]. Quality objectives must be measured and consistent with quality policy. In ISO 9001:2008, quality objectives used as management (organization) performance measurement, because quality objectives contain organization performance indicator [2]. Basically quality objectives defined by top management of the organization. To conduct supervision and implementation, organization rely on Management Representative (MR). According to Sumaedi and Yarmen (2011), the quality objectives in SNI ISO 9001: 2008 are described in general form or only as general guidance for organization [3]. There is no clear priority in quality objectives when sudden or emergency improvement is needed. Implementation of quality objectives in QMS, done only at the time of internal audit and surveillance [3]. Responsibility and involvement of all parties (departments) in the implementation of SNI ISO 9001:2008 still minimum.

This fact encourages more efforts to identify priorities for the scope of quality objectives. To overcome this problem requires a method of performance measurement system that is comprehensive and can be synchronized according to the scope of quality objectives SNI ISO 9001: 2008. Performance measurement is one important factor in the company, in addition to assessing corporate performance as well as reference evaluation of previous performance results. According to Jovanovic et al (2008) based on research from Vloeberghs and Bellens (1996) his research provides an overview of the benefits of ISO 9001 from 4 aspects: employees, processes, customers and finance [4]. The four aspects mentioned in the research of Vloeberghs and Bellens (1996) show similarities with a performance measurement model that is Balanced Scorecard which has 4 similar perspectives: financial perspective, customer perspective, internal business process perspective and learning and growth perspective [5].

According to Jovanovic et al (2008), BSC is compatible with QMS (ISO 9001) but in the BSC's point of view, QMS (ISO 9001) has a weakness in managing corporate strategy. In the QMS (ISO 9001) point of view, BSC has a weakness that is the lack of customer orientation. Then the correlation between segments and perspectives in BSC with clauses in ISO 9001 standard can be seen in table 2.

Table 2. Correlation of BSC and QMS

<i>Balanced Scorecard</i>	<i>ISO 9001: 2000</i>
<i>Vision and Strategy</i>	<i>5.3 Quality policy</i> <i>5.4.1 Quality Objectives</i>
<i>Customer perspective</i>	<i>5.2 Customer focus</i> <i>7.2 Customer-related processes</i> <i>8.2.1 Customer satisfaction</i>
<i>Internal Process Perspective</i>	<i>4.1 QMS - general requirements</i> <i>7. Product Realization</i> <i>8.2.3 Monitoring and measurement</i>
<i>Learning And Growth perspective</i>	<i>6. Resource Management</i>
<i>Financial Perspective</i>	<i>Not specifically addressed in the standard</i>

Source : Jovanovic (2008)

Therefore the application of the company's vision and mission, the implementation of strategic objectives and the application of performance measurement indicators (KPIs) specified in the performance measurement system (Balanced Scorecard) must be aligned in all functions and departments within the company. To achieve such alignment, it is necessary to develop a method (Balanced Scorecard) that can facilitate the process alignment. This can be done after the emergence of the new tool (strategic map). Once a strategic map is established by the management, the strategic map can be derived and aligned to the division or department level. This process of alignment is called cascading (Luis, 2007) [6]. In this study also requires performance measurement support tools to determine the weight (priority) and to consolidate the various KPI types of metrics. AHP (Analytical Hierarchy Process) used to determine performance weights. AHP has the ability to solve problems that are multi objective and multi-criteria based on the comparison of preferences in each element in the hierarchy, so it can be a comprehensive decision-making model [7]. Then measurement and implementation of performance measurement system using Objective Matrix (OMAX) and traffic light system as scoring system.

The purposes of this research is to design and implement performance measurement system at PT AMM with the company's vision and strategic mission that sync with the implementation of Quality Management System SNI ISO 9001: 2008 that has been applied by the company. Then measuring the results of the implementation of performance measurement system which synchronized with the company quality objectives of SNI ISO 9001: 2008. The expected benefits of this research is help top management understand the performance measurement system which synchronized with quality objectives of SNI ISO 9001:2008. Performance measurement results are expected to be helpful and applicable for PT AMM to measure overall performance. Then help PT AMM to make strategic decisions to achieve goals and improve the company's performance in the future. The use of performance measurement indicators (KPI) on quality objectives in SNI ISO 9001: 2008 is expected to facilitate PT AMM in measuring the performance of the organization as well as measuring the achievement of the ISO 9001: 2008 quality objectives.

II. THEORY AND METHODS

2.1 Balanced Scorecard (BSC)

Balanced Scorecard is a contemporary management tool used to boost the organization's ability to multiply its financial performance (Mulyadi, 2001) [8]. Since the organization is essentially a wealth creation institution, the use of Balanced Scorecard in management promises significant improvements in organizational capability and creates wealth [9]. According Yuwono et. al (2007), Balanced Scorecard is a management system that can motivate various improvement findings in areas such as product, process, customer and product development [10]. In addition Balanced Scorecard used as a means to translate and implement strategies in various companies.

Balanced Scorecard (BSC) had a strategy objectives and performance indicators are based on the vision and mission of strategic companies that answered the wishes of an organization in measuring performance through management system strategies that contemporary consists of four perspectives (shown in figure 1): financial, customers, internal business process and learning and growth. four perspectives of the *Balanced*

Scorecard provide a balance between short-term and long-term goals then between desired outcomes and the driving forces of achievement of these results (Kaplan and Norton, 1996) [11].

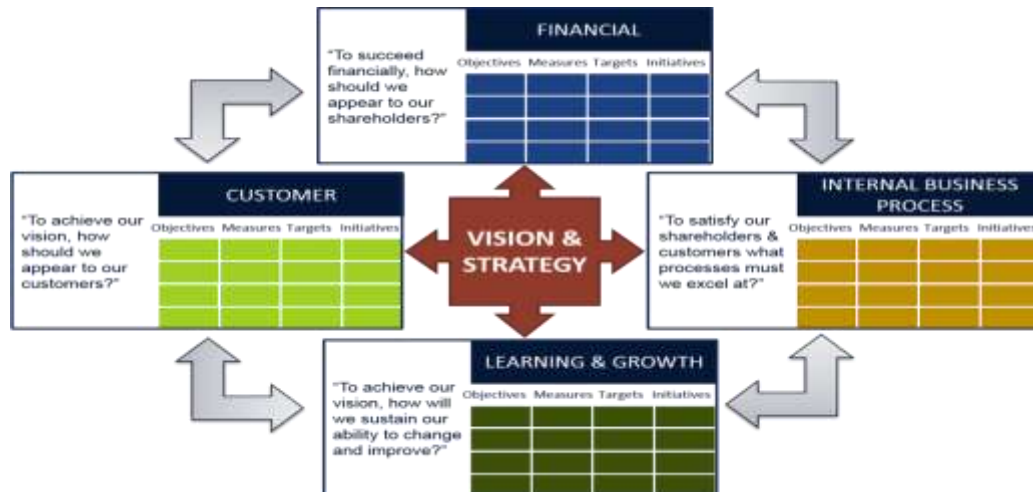


Figure 1. Balanced Scorecard Framework In 4 Perspectives

2.2 Cascading Balanced Scorecard (BSC)

According to Suwardi and Biromo (2007), the meaning cascade in the Cascading Balanced Scorecard is radiating down into more detail, with a clear relationship between general and detail. Cascading Balanced Scorecard intended that strategic objectives at the enterprise level are broken down into more detail and elaborated in division level, even down to the individual level, with a clear linkage. According to Robiady (2015), cascading is the process of lowering strategic goals, KPIs and strategic initiatives to lower organizational unit levels [12]. Cascading is also called vertical alignment, while horizontal alignment (hereinafter referred to as alignment) is a process to ensure that strategic objectives, KPIs and strategic initiatives built are aligned with the same units.

In this cascading process many important things and terms must be understood in each step such as corporate vision and mission as well as divisions, strategic goals, performance indicator indicators and strategic initiatives. Vision is a far-sighted view of the organization or dream to be achieved [13]. Mission is the purpose and reason for the existence of an organization. Mission states something to do and why the organization exists. Mission provides direction or limits on actions that can be done, explicitly or not implicitly imposed by the organization. A strategic goal is a concise statement that explains what the organization should do best, in the context of strategy execution. KPIs are indicators used to measure performance. Strategic initiatives are specific projects that must be implemented to support the achievement of strategic objectives [14].

2.3 SNI (Indonesian National Standard)

According to BSN (2008), SNI stands for Indonesian National Standard is the only nationally accepted standard in Indonesia. SNI is formulated by the Technical Committee and determined by National Standardization Agency (BSN). Meanwhile, the National Standardization Agency (BSN) was established based on Indonesian Presidential Decree no. 13 of 1997. The execution of duties and functions of National Standardization Body (BSN) in the field of accreditation conducted by National Accreditation Committee (KAN). Wheat flour products based on Regulation of the Indonesian Minister of Industry (PERMEN Industry) NO. 59 / M-IND / PER / 7/2015 shall be treated as SNI compulsory food.

2.4 ISO 9001:2008

According to Koc (2006), ISO 9001 comes from ISO 9000 series, where ISO 9000 is the standard set for quality management system (QMS) [15]. ISO 9000 formulated by TC 176 ISO, the international organization in the field of standardization. The history of ISO itself is long enough, that the ISO itself is a non-governmental organization (NGO) which stands for International Organization for Standardization which has the role of an international standard setting body consisting of representatives of national standardization bodies of each country. In 2000 appeared the ISO 9001: 2000 series and it has been adopted by the BSN. The adoption of ISO 9001 continues to be done by BSN, among others is SNI ISO 9001: 2008 and the latest is SNI ISO 9001: 2015. This adoption is because SNI is not only product certification but also certification of quality management system, for this reason BSN merge ISO 9001 into SNI. The role of ISO 9001 as QMS (Quality Management System) for companies that have SPPT-SNI.

In ISO 9001 there is an important clause of quality objectives contained in clause 5.4.1 which reads *"The top management shall ensure that quality objectives, including those necessary to meet product requirements are set at the functions and levels relevant in the organization. Quality objectives must be measurable and consistent with the quality policy"*. According to Koc (2006), quality objectives is one of the requirements in ISO 9001 [15]. Setting quality objectives is very important in the implementation of the requirements of ISO 9001. Quality target is the goal or target of an organization in doing a process to be achieved within a certain time.

2.5 Analytical Hierarchy Process (AHP)

Analytical Hierarchy Process (AHP) is a decision-making model that was developed by Thomas L. Saaty [16]. According Vanany (2009), AHP is used to get the weight of the performance based on the preferences gained from decision making by top management (company owners, directors and managers), on the importance of each perspective, metric group and KPI [17]. AHP has the ability to solve multi-objective problems (Vanany 2009). There is five steps in Analytical Hierarchy Process (AHP). First step is defining hierarchy, it is used to describe complex problems to be more structured and systematic. The next step is comparison scale, there is a relative scale in pairwise comparisons which comprise several different levels of importance with respect to human capacity to distinguish the number of comparative assessment scales. Table 3 defines the value scales used in pairwise comparisons.

Table 3. Comparison Scale Paired

Interest Level	Definition	Information
1 (Same)	Both variables are important	Both variables contribute equally to the trait
3 (Weak)	One variable slightly more important than other variables	Experience states slightly improved on one variable
5 (Strong)	One variable is actually more important than another variable	Experience strongly in favor of one variable
7 (Very Strong)	One variable is more important than another variable	Experience shows the strongly favored and dominated one variable that is clearly more important
9 (Absolute Strong)	One variable is more important than another variable	Experience shows one variable is absolutely more important.
2, 4, 6, 8	The middle value between two adjacent judgments	This value is given when compromise is needed
The opposite of the interest rate above		If the ij variable on the factor gets the value of x then the ji variable on the j factor gets the value $1/x$

Source: Vanany (2009)

Basically the mathematical formulation on the AHP model is determined using the help of a matrix. In an operating sub-system there are n elements of operation ie operating elements A_1, A_2, \dots, A_n , then obtained the result of the pairwise comparison of these elements which will form a pairwise matrix comparison, can be seen in figure 2. Pairwise comparison begins with the highest level first, where a criterion is used as the basis for making comparisons. Then consider the elements to be compared.

	A_1	A_2	...	A_n
A_1	A_{11}	A_{12}	...	A_{n1}
A_2	A_{21}	A_{22}	...	A_{n2}
-	-	-	...	-
-	-	-	...	-
-	-	-	...	-
A_n	A_{n1}	A_{n2}	...	A_{nn}

Source: Vanany (2009)

Figure 2. Pairwise Comparison Matrix

Matrix $A_n \times n$ is an assumed matrix of n elements W_1, W_2, \dots, W_n which will be assessed by comparison. Value (judgment) comparisons in pairs between (W_1, W_2) symbolize as $\frac{w_i}{w_j} = a(i, j)$. In this case the comparison matrix is a matrix A (shown in figure 3) with elements a is a_{ij} with $i, j = 1, 2, \dots, n$.

$$A = \begin{pmatrix} w_1/w_1 & w_1/w_2 & \dots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \dots & w_2/w_n \\ \dots & \dots & \dots & \dots \\ w_n/w_1 & w_n/w_2 & \dots & w_n/w_n \end{pmatrix}$$

Figure 3. Example of Matrix A

Final step is measuring consistency of AHP. The advantages of AHP that distinguish it from other decision-making are the absence of absolute consistency requirement. AHP uses perception of decision makers as inputs, inconsistencies may occur because decision makers have limitations in expressing their perceptions consistently especially if they have to compare many criteria. The measurement of the consistency of AHP is done in two stages: the stage of measuring the consistency of each comparison matrix and then compare the consistent index with random index.

2.6 Objective Matrix (OMAX)

The theory behind Objectives Matrix (OMAX) is that productivity is a function of several performance factors, where each factor describes the varying dimensions among work units, and the most practical way to assess unit productivity by assessing the most influential factor (Riggs, 1987) [18]. The Objective Matrix (OMAX) method is a method of scoring system that takes into account the measurement metrics of the existing KPI by consolidating the metric into a single measure often called the Current Performance. The description of Objective Matrix (OMAX) model framework shown in figure 4.

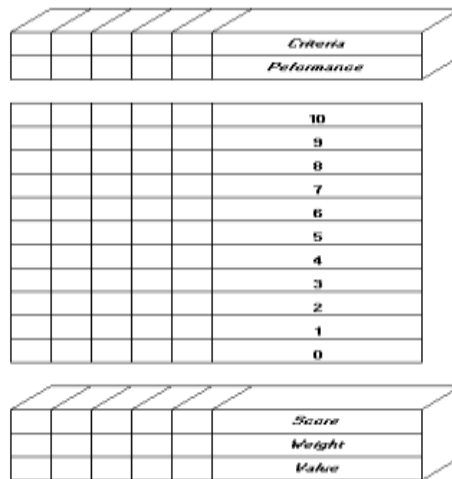


Figure 4. Objective Matrix Framework Model

2.7 Traffic Light System

According to Peryoga (2017), Traffic Light System is a sign or symbol used for categorizing whether the value of a performance measurement indicator requires improvement or not [19]. According to Prianto (2003), there are three categories of Traffic Light System [20].

- Green Color : indicator is in the green color category when the achievement results of a performance indicator has reached or succeeded in achieving a predetermined target, it will be given a green color. Indicator category stated in green if the value is in between 8 - 10.
- Yellow Color : indicator is in the yellow category which means that the achievement of a performance indicator has not been achieved or has not reach the target but the value is close to the target so it is advisable for the company to be aware in order to avoid the worst possible situation. Indicator category stated in yellow when the value is in between 4 - 7.
- Red Color : indicator is in the red category which means the achievement results of a performance indicator far below the target that set by the company, so it is important that the company immediately take any action in order to improve the performance.

2.8 Research Methodology

This research objectives is to design the corporate (PT AMM) performance measurement system and the department (Production Operation) performance measurement system. Initial step is to design the corporate (PT AMM) performance measurement system which begin with describing the vision and mision of the corporate. Director choose respondents from company top management, there are 8 respondents which have rights to define the corporate strategic objectives and key performance indicators during FGD (Focus Group Discussion) that held by the company (PT AMM). After all the respondents were finish to define the corporate strategic objectives and key performance indicators, then they have to stipulate the corporate strategic objectives and key performance indicators questionnaires. When provision of the corporate strategic objectives and key performance indicators were finish, a strategic map must be arranged with the intention to understand the relations between each strategic objectives and KPI's. Afterwards they had to fill in the corporate strategic objectives and key performance indicators weighting questionnaires, in order to find the weight or priority among strategic objectives and KPI's. Next step is to implement the corporate performance measurement system using scoring system i.e OMAX. Before measuring the corporate performance, they must determine the corporate performance standards and goals for each KPI's. Finally the scoring system must run simultaneously with traffic light system (three color category) to know each KPI's performance.

Second objective is to design the department (Production Operation) performance measurement system. Initial step is to describe the department (Production Operation) vision and mision, then explaining the department (Production Operation) main function, department customer and expectation of the department customer. Afterwards the researcher and the top management must define which strategic objectives from corporate performance measurement system should be cascade to department (production operation) strategic objectives. Next step is to arranged a strategic map with the intention to understand the relations between each strategic objectives and KPI's. Hereinafter the researcher must choose the respondents, in order to fill in the department (production operation) strategic objectives and key performance indicators weighting questionnaires. Further step is to implement the department performance measurement system using scoring system i.e OMAX. Before measuring the department performance, they must determine the department performance standards and goals for each KPI's. Finally the scoring system must run simultaneously with traffic light system (three color category) to know each KPI's performance.

III. RESULT AND DISCUSSION

3.1 Corporate Vision And Mission Description

The initial step is describing corporate vision and mission, that give guidance and the right direction to this research. PT AMM vision : *"Being a superior wheat flour producer in customized product"*. Vision describes PT AMM's goal to become a wheat flour producer or *customized* product company that excels in quality and service to fulfill costumer demand. And PT AMM mission are to produce products according to customer demand (*customized*), creating mutual cooperation with customers and interested parties, conducting business professionally through the implementation of international standardized management system and enhance business capacity optimally and sustainably.

3.2 Designing Corporate Performance Measurement System

There is eight respondents according to management appointment. The first step in designing a corporate performance measurement system is to set corporate strategic objectives that have been formulated in the FGD. This corporate strategic targeting is done by spreading the questionnaire with the aim of establishing strategic goals based on the level of importance determined by each respondent. The respondents have to fill in the importance level questionnaires of each strategic objectives and KPI's, in order to get the appropriate strategic objectives and KPI's. From the FGD they had 18 strategic objective and 40 KPI, after they fill in the importance level questionnaires there were only 17 strategic objectives and 36 KPI's left. Figure 5 shown performance measurement system hierarchy.

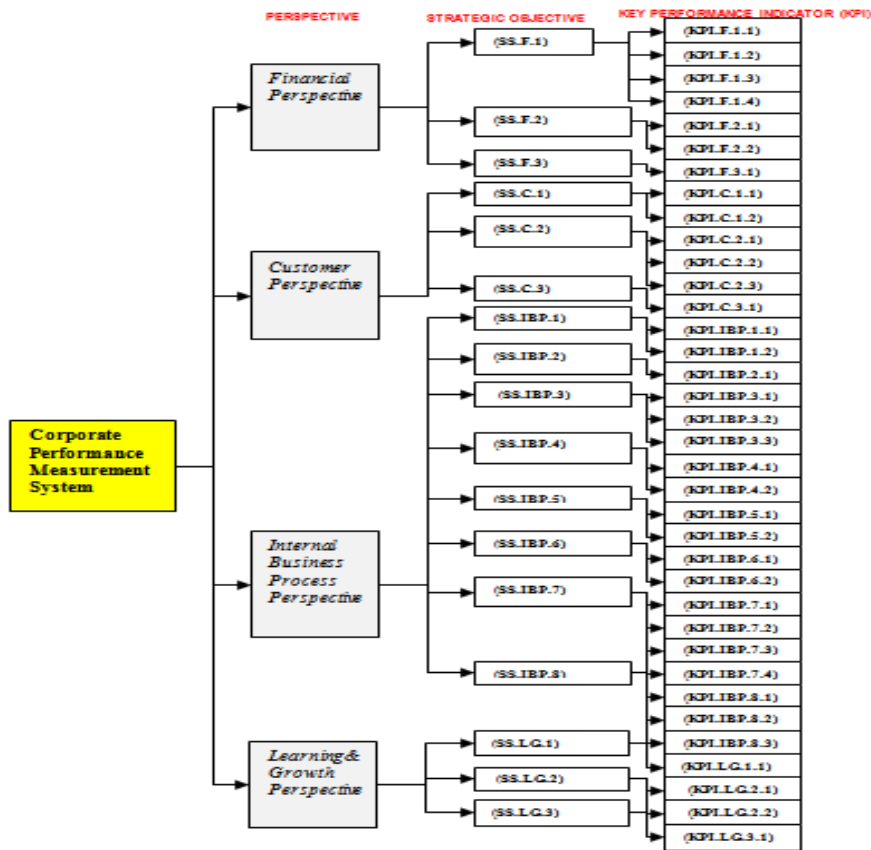


Figure 5. Corporate Performance Measurement System Hierarchy

Afterwards the next step is preparation strategy map which can be seen in Figure 6. The main objective of arranging the strategic map is to understand the relation between each strategic objectives or key performance indicators.

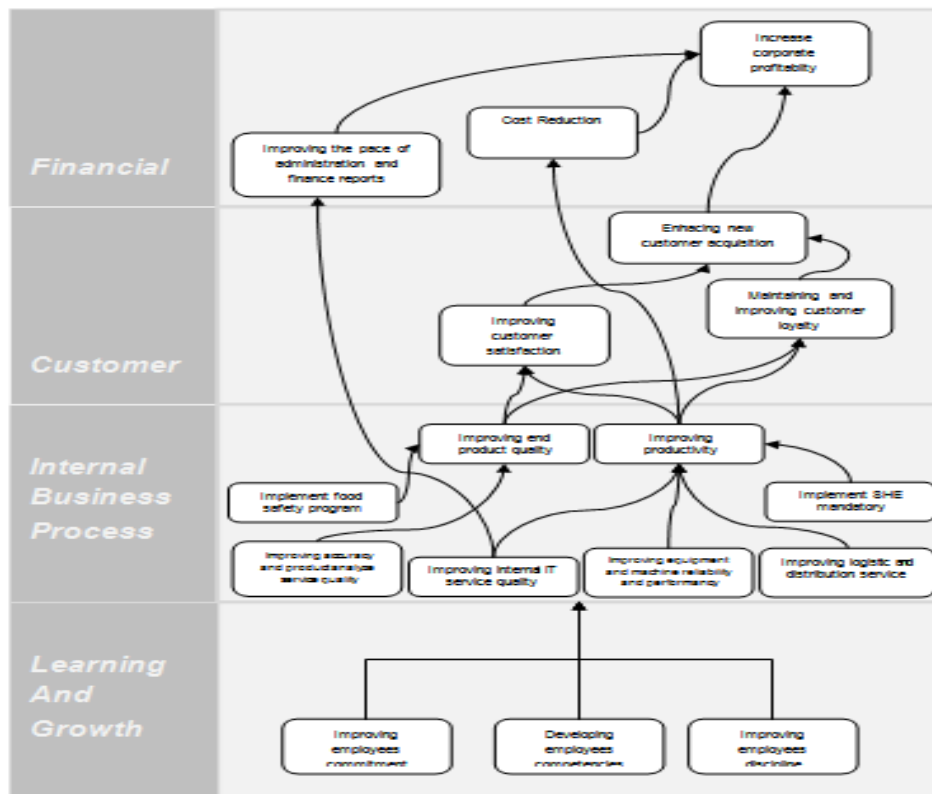


Figure 6. Corporate Strategic Map

Hereinafter the arrange of corporate strategic map, all the respondents have to fill in others questionnaires which are corporate strategic objectives weighting questionnaires and corporate key performance indicators weighting questionnaires. This weighting uses Analytical Hierarchy Process method (AHP) with the help of Expert Choice software. Determining the importance or priority of each strategic objective is done by pairwise comparison using AHP (Expert Choice). The principle of this weighting is the higher the priority of a variable then the value of the weight will be higher. A pairwise comparison matrix will be an input in weighting with Expert Choice software. The form of paired matrix pairing in Expert Choice can be seen in figure 7.

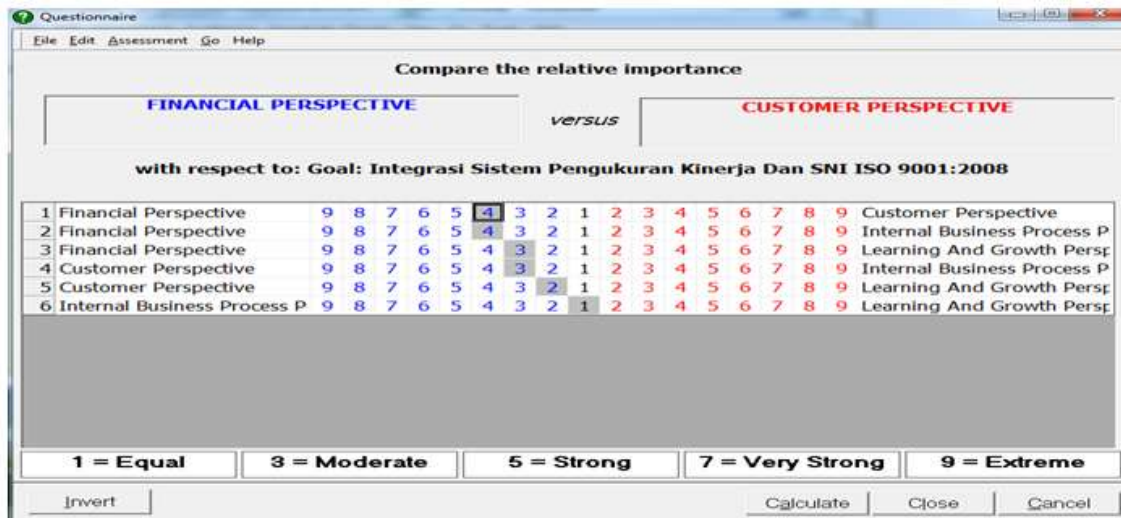


Figure 7. Expert Choice Inquiry Questionnaire Model

In Expert Choice software allows to weighting on the same object with multi respondents (participants). So this makes it easier to do the calculation by minimizing the occurrence of errors. Processing data using Expert Choice software generate weight on the variable. Interpretation the results of the weight which the highest value is 100% or equal to 1. Weight is considered valid if the value of inconsistency is worth ≤ 0.10 (10%). Figure 8 shown the inconsistency result from expert choice software.

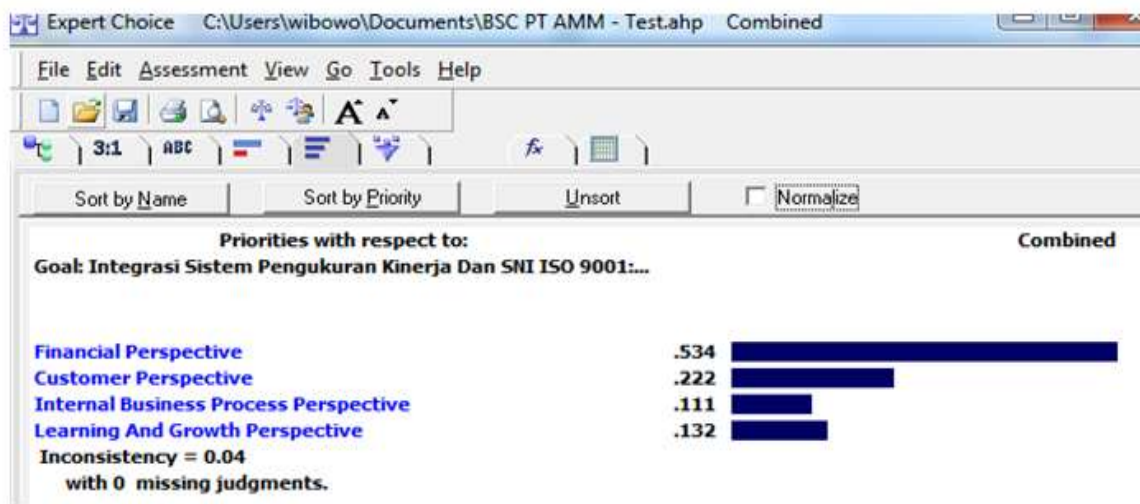


Figure 8. Inconsistency Result From Expert Choice Data Processing

The result of weighting of each perspective and between strategic objectives can be seen in table 4. For weighting for each key performance indicator (KPI) can be seen in table 5. Data processing from the *Combined* module is also displayed in global form, which is the total weight form of corporate strategic objectives and total weight of corporate KPI. The total weight is obtained by multiplying the weight of the corporate perspective.

Table 4. Weighting Result of Corporate Inter-Perspective and Corporate Inter-Strategic Objective

Perspective	Perspective Weight	Perspective Inconsistency Ratio	Strategic Objective Variable Code	Strategic Objective	Strategic Objective Weight	Strategic Objective Inconsistency Ratio	Strategic Objective Total Weight
Financial	0.534	0.04	SS.F.1	Cost reduction	0.301	0.03	0.161
			SS.F.2	Increase corporate profitability	0.611		0.326
			SS.F.3	Improving the pace of administration and finance reports	0.088		0.047
Customer	0.222		SS.C.1	Improving customer satisfaction	0.542	0.04	0.121
			SS.C.2	Maintaining and improving customer loyalty	0.300		0.067
			SS.C.3	Enhancing new customer acquisition	0.158		0.035
Internal Business Process	0.111		SS.IBP.1	Improving productivity	0.310	0.06	0.035
			SS.IBP.2	Improving end product quality	0.235		0.026
			SS.IBP.3	Implementing SHE mandatory	0.076		0.008
			SS.IBP.4	Implementing food safety program	0.175		0.020
		SS.IBP.5	Improving internal IT service quality	0.024	0.003		
		SS.IBP.6	Improving distribution and logistics services	0.049	0.005		
		SS.IBP.7	Improving accuracy and product analysis service quality	0.046	0.005		
		SS.IBP.8	Improving equipment and machine reliability and performancy	0.085	0.010		
Learning and Growth	0.132	SS.LG.1	Improving employees commitment	0.564	0.03	0.075	
		SS.LG.2	Developing employees competence	0.284		0.038	
		SS.LG.3	Improving employees discipline	0.152		0.020	
TOTAL	1					TOTAL	1

Table 5. Weighting Result of Corporate Inter-KPI's

Strategic Objectives	Weight of Strategic Objectives	Total Weight of S. Objectives	KPI Variable Code	KPI Weight	Inconsistency Ratio	Total Weight of KPI's
SS.F.1	0,301	0,161	KPI.F.1.1	0,523	0,005	0,084
			KPI.F.1.2	0,156		0,025
			KPI.F.1.3	0,156		0,025
			KPI.F.1.4	0,164		0,026
SS.F.2	0,611	0,326	KPI.F.2.1	0,793	0,000	0,259
			KPI.F.2.2	0,207		0,067
SS.F.3	0,088	0,047	KPI.F.3.1	1,000	0,000	0,047
SS.C.1	0,542	0,121	KPI.C.1.1	0,839	0,000	0,101
			KPI.C.1.2	0,161		0,019
SS.C.2	0,300	0,067	KPI.C.2.1	0,644	0,040	0,043
			KPI.C.2.2	0,098		0,007
			KPI.C.2.3	0,257		0,017
SS.C.3	0,158	0,035	KPI.C.3.1	1,000	0,000	0,035
SS.IBP.1	0,310	0,035	KPI.IBP.1.1	0,786	0,000	0,027
			KPI.IBP.1.2	0,214		0,007
SS.IBP.2	0,235	0,026	KPI.IBP.2.1	1,000	0,000	0,026
SS.IBP.3	0,076	0,008	KPI.IBP.3.1	0,620	0,004	0,005
			KPI.IBP.3.2	0,124		0,001
			KPI.IBP.3.3	0,257		0,002
SS.IBP.4	0,175	0,020	KPI.IBP.4.1	0,829	0,000	0,016
			KPI.IBP.4.2	0,171		0,003
SS.IBP.5	0,024	0,003	KPI.IBP.5.1	0,213	0,000	0,001
			KPI.IBP.5.2	0,787		0,002
SS.IBP.6	0,049	0,005	KPI.IBP.6.1	0,763	0,000	0,004
			KPI.IBP.6.2	0,237		0,001
SS.IBP.7	0,046	0,005	KPI.IBP.7.1	0,089	0,060	0,001
			KPI.IBP.7.2	0,154		0,001
			KPI.IBP.7.3	0,504		0,003
			KPI.IBP.7.4	0,253		0,001
SS.IBP.8	0,085	0,010	KPI.IBP.8.1	0,305	0,020	0,003
			KPI.IBP.8.2	0,583		0,006
			KPI.IBP.8.3	0,113		0,001
SS.I.G.1	0,564	0,075	KPI.I.G.1.1	1,000	0,000	0,075
SS.I.G.2	0,284	0,038	KPI.I.G.2.1	0,439	0,000	0,016
			KPI.I.G.2.2	0,561		0,021
SS.I.G.3	0,152	0,020	KPI.I.G.3.1	1,000	0,000	0,020
TOTAL		1	TOTAL			1

The next stage after performing weighting in order to get weighted values for perspectives, strategic objectives and KPI's of the corporation are to establish a scoring system. This scoring system uses OMAX (Objective Matrix) model. The OMAX scoring system is used to assess the performance either corporate or department. Then use traffic light system method as a sign whether the KPI has reached the target or not. This research comparing data between 2016 corporate achievement and 2017 corporate achievement as seen on table 6 and table 7.

Table 6. Calculation Result of Corporate Performance Measurement Data On 2016

Key Performance Indicator	Score	Weight	Value	Key Performance Indicator	Score	Weight	Value
KPLF.1.1	8	0.084	0.672	KPLIBP.3.3	10	0.002	0.02
KPLF.1.2	10	0.025	0.25	KPLIBP.4.1	7	0.016	0.112
KPL F.1.3	10	0.025	0.25	KPLIBP.4.2	7	0.003	0.021
KPLF.1.4	3	0.026	0.078	KPLIBP.5.1	8	0.001	0.008
KPLF.2.1	9	0.259	2.331	KPLIBP.5.2	8	0.002	0.016
KPI F.2.2	5	0.067	0.335	KPLIBP.6.1	6	0.004	0.024
KPLF.3.1	8	0.047	0.376	KPLIBP.6.2	6	0.001	0.006
KPLC.1.1	7	0.101	0.707	KPLIBP.7.1	6	0.001	0.006
KPLC. 1.2	10	0.019	0.19	KPLIBP.7.2	5	0.001	0.005
KPLC.2.1	7	0.043	0.301	KPLIBP.7.3	6	0.003	0.018
KPLC.2.2	7	0.007	0.049	KPLIBP.7.4	4	0.001	0.004
KPLC. 2.3	7	0.017	0.119	KPLIBP.8.1	4	0.003	0.012
KPLC.3.1	0	0.035	0	KPLIBP.8.2	5	0.006	0.03
KPLIBP.1.1	9	0,027	0,243	KPLIBP.8.3	7	0,001	0,007
KPLIBP. 1.2	6	0.007	0.042	KPLLG.1.1	5	0.075	0.375
KPLIBP.2.1	10	0.026	0.26	KPLLG.2.1	6	0.016	0.096
KPLIBP.3.1	10	0.005	0.05	KPLLG.2.2	10	0.021	0.21
KPLIBP.3.2	8	0.001	0.008	KPLLG.3.1	8	0.02	0.16

According to table 6, there are 36 KPI's in corporate performance measurement system on 2016. There are 15 KPI's in green color category (range 8-10) which means the achievement has reached the target or close to the target. Then there are 19 KPI's in the yellow color category (range 4-7) which means the achievement of the company has not reached the target and this indicator indicates that the company must be cautious. Then there are 2 KPI's in the red category (range 0-3) which means that the achievement of the company does not meet the target even far from the target set. It is recommended for the company management to be able to conduct evaluation and corrective action.

Table 7. Calculation Result of Corporate Performance Measurement Data On 2017

Key Performance Indicator	Score	Weight	Value	Key Performance Indicator	Score	Weight	Value
KPLF.1.1	8	0.084	0.672	KPLIBP.3.3	10	0.002	0.02
KPLF.1.2	10	0.025	0.25	KPLIBP.4.1	7	0.016	0.112
KPLF.1.3	6	0.025	0.15	KPLIBP.4.2	3	0.003	0.009
KPLF.1.4	10	0,026	0,026	KPLIBP.5.1	5	0,001	0,005
KPLF.2.1	5	0.259	1.295	KPLIBP.5.2	4	0.002	0.008
KPLF.2.2	3	0.067	0.201	KPLIBP.6.1	5	0.004	0.02
KPLF.3.1	4	0.047	0.188	KPLIBP.6.2	6	0.001	0.006
KPLC.1.1	4	0.101	0.404	KPLIBP.7.1	5	0.001	0.005
KPLC.1.2	7	0.019	0.133	KPLIBP.7.2	8	0.001	0.008
KPLC.2.1	3	0.043	0.129	KPLIBP.7.3	6	0,003	0,018
KPLC.2.2	5	0,007	0,035	KPLIBP.7.4	4	0.001	0.004
KPLC.2.3	8	0.017	0.136	KPLIBP.8.1	7	0,003	0,021
KPLC.3.1	0	0,035	0	KPLIBP.8.2	8	0.006	0.048
KPLIBP.1.1	7	0.027	0.189	KPLIBP.8.3	10	0,001	0.01
KPLIBP.1.2	5	0,007	0,035	KPLLG.1.1	2	0,075	0.15
KPLIBP.2.1	8	0.026	0.208	KPLLG.2.1	5	0.016	0.08
KPLIBP.3.1	10	0.005	0.05	KPLLG. 2.2	10	0.021	0.21
KPLIBP.3.2	8	0.001	0.008	KPLLG.3.1	6	0.02	0.12

According to table 7, there are 36 KPI's in corporate performance measurement system on 2017. There are 12 KPI's in green color category (range 8-10) which means the achievement has reached the target or close to the target. Then there are 19 KPI's in the yellow color category (range 4-7) which means the achievement of the company has not reached the target and this indicator indicates that the company must be cautious. Then there are 5 KPI's in the red category (range 0-3) which means that the achievement of the company does not

meet the target even far from the target set. It is recommended for the company management to be able to conduct evaluation and corrective action.

Table 8 describes the achievement value of each perspective that contributes to current performance indicator in 2016 and 2017. The overall achievement value of the year 2016 is 7.391 and the overall achievement value of the year 2017 is 5.197. Corporate's overall achievement score in 2016 and 2017 is still in the yellow color category.

Table 8. The Result of Corporate Performance Measurement (Inter-Perspectives) in 2016-2017

PERSPECTIVES	WEIGHTED PERSPECTIVES	ACHIEVEMENTS	
		2016	2017
<i>FINANCIAL</i>	0.534	4.292	3.016
<i>CUSTOMER</i>	0.222	1.366	0.837
<i>INTERNAL BUSINESS PROCESS</i>	0.111	0.892	0.784
<i>LEARNING AND GROWTH</i>	0.132	0.841	0,560
TOTAL	1	7,391	5,197

3.3 Designing Department (Production Operation) Performance Measurement System

The design of department (production operation) performance measurement system is a form of vertical alignment (cascading), where corporate strategic objectives and KPI's will be deployed in departmental strategic objectives and KPI's. The alignment process from corporate level to department level (division) even to individual level, has the intention that the strategic objectives and performance measurement indicators can be implemented by all parties within the organization. Cascading process is define through FGD (Focus Group Discussion) between researcher, director and department top management.

Cascading process will go through several stages such as analyzing the department's vision and mission, identifying the department's contribution to the company as well as the department's customers, identifying the main tasks as well as tabulating the work outputs, customers and their expectations of the department. Next step is cascading corporate strategic objectives or KPI's into departments strategic objectives and KPI's. The first stage of cascading is to analyze the vision and mission of the department, where the vision and mission of the department must be in line with the company's vision and mission. The process of understanding the vision and mission of this department is important, because with a good understanding of the vision and mission of the department then the strategy will be formulated will be right on target. The vision of production operations department is "*produce superior wheat flour and by-product in quality and service*". And the mission of production operations department is to makes and ensures that the final product (wheat flour) and by-product complies with the quality requirements of the customers. Ensure food safety on the products, promote continous improvement, creating good cooperation and relationships between departments, developing productive, competent and credible human resources and using company resources efficiently and effectively in achieving company targets.

It is necessary to review the corporate strategy map to get the relationship or linkage between the strategic objectives of the company in the strategic map with the core tasks and core processes of the production operation department. Identification of outputs, customers and customer expectations aims to know the needs of the customers. By knowing the customer, the resulting output and customer expectation, then can be formulated the right strategic target for department production operation. Identification is done by conducting FGD (Focus Group Discussion) with employees in the department of production operation. The results of identification main tasks, outputs, customers and customer expectations of production operation departments should be described comprehensively. Formulation strategic objectives of production operation department based on the cascading of the strategic objectives of the company having relevance contribution to the production operation department. Table 9 and table 10 describes the cascading of the corporate strategic objectives to the strategic objectives of production operation department.

Table 9. Cascading Production Operation Departement Strategic Objectives

Perspectives	Code	Corporate Strategic Objectives	Cascading	Department Strategic Objectives	Code
Financial	F.1	Cost reduction	○	Cost reduction	K.1
	F.2	Increase corporate profitability	-	N/A	-
	F.3	Improving the pace of administration and finance reports	-	N/A	-
Customer	C.1	Improving customer satisfaction	Δ	Improving customer satisfaction	P.2
	C.2	Maintaining and improving customer loyalty	-	N/A	-
	C.3	Enhancing new customer acquisition	-	N/A	-
Internal Business Process	IBP.1	Improving productivity	○	Improving productivity	PBI.1
	IBP.2	Improving end product quality	○	Improving end product quality	P.1
	IBP.3	Implementing SHE mandatory	○	Implementing SHE mandatory	PBI.2
	IBP.4	Implementing food safety program	●	Implementing food safety program	PBI.3
	IBP.5	Improving internal IT service quality	-	N/A	-
	IBP.6	Improving distribution and logistics services	-	N/A	-
	IBP.7	Improving accuracy and product analysis service quality	-	N/A	-
	IBP.8	Improving equipment and machine reliability and performancy	-	N/A	-
Learning and Growth	LG.1	Improving employees commitment	○	Memperbaiki komitmen karyawan	PP.1
	LG.2	Developing employees competence	Δ	Mengembangkan kompetensi karyawan	PP.2
	LG.3	Improving employees discipline	○	Meningkatkan kedisiplinan karyawan	PP.3

Table 10. Strategic Objectives Cascading Description Symbol

Symbol	Description
●	Fully Cascaded
○	Partially Cascaded
Δ	Contributing

From table 9 there are 1 strategic objectives is fully cascaded from corporate to department, 6 strategic objectives partially cascaded from corporate to department and 1 strategic objectives give contributing cascade from corporate to department. Next step is to arrange production operation department performance measurement system hierarchy which described on figure 9.

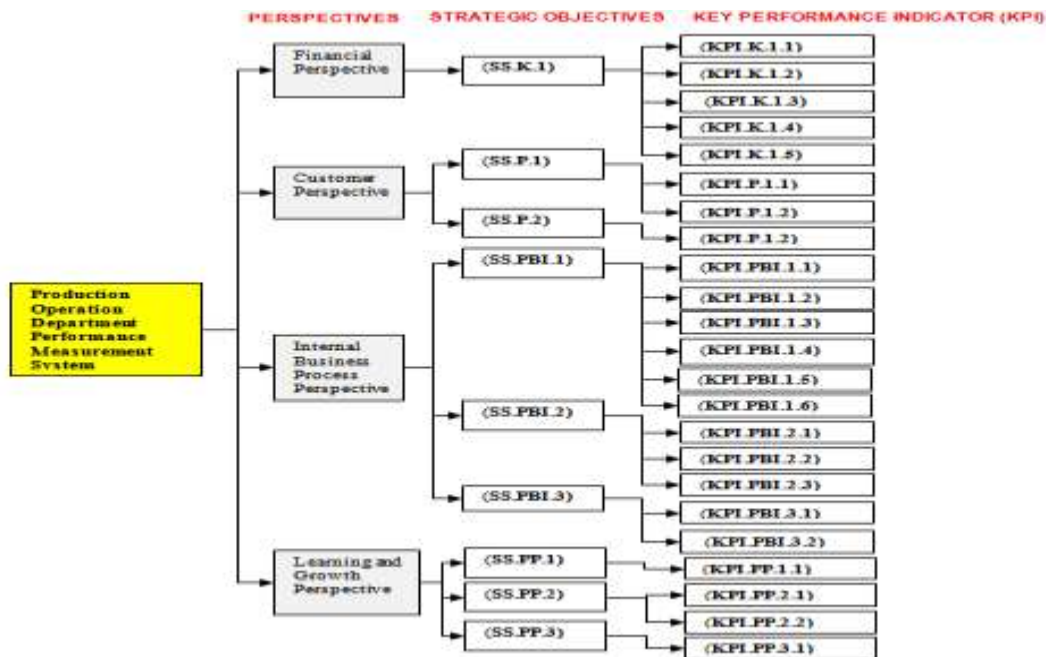


Figure 9. Production Operation Department Performance Measurement System Hierarchy

A hierarchy can also be used to decompose a complex problem so that the problem becomes structured and systematic. There are 9 strategic objectives and 23 key performance indicators on production operation department performance measurement system. Afterwards the next step is preparation strategy map which can be seen in Figure 10. The main objective of arranging the strategic map is to understand the relation between each strategic objectives or key performance indicators. The difference between the company's strategy map and department production operations lies in the preparation of perspectives. On the company's strategic map perspective financial is at the top, but in the department production operations which is the supporting division, the financial perspective persisted above (remains the main objective) but the customer perspective rises parallel equal to financial perspective.

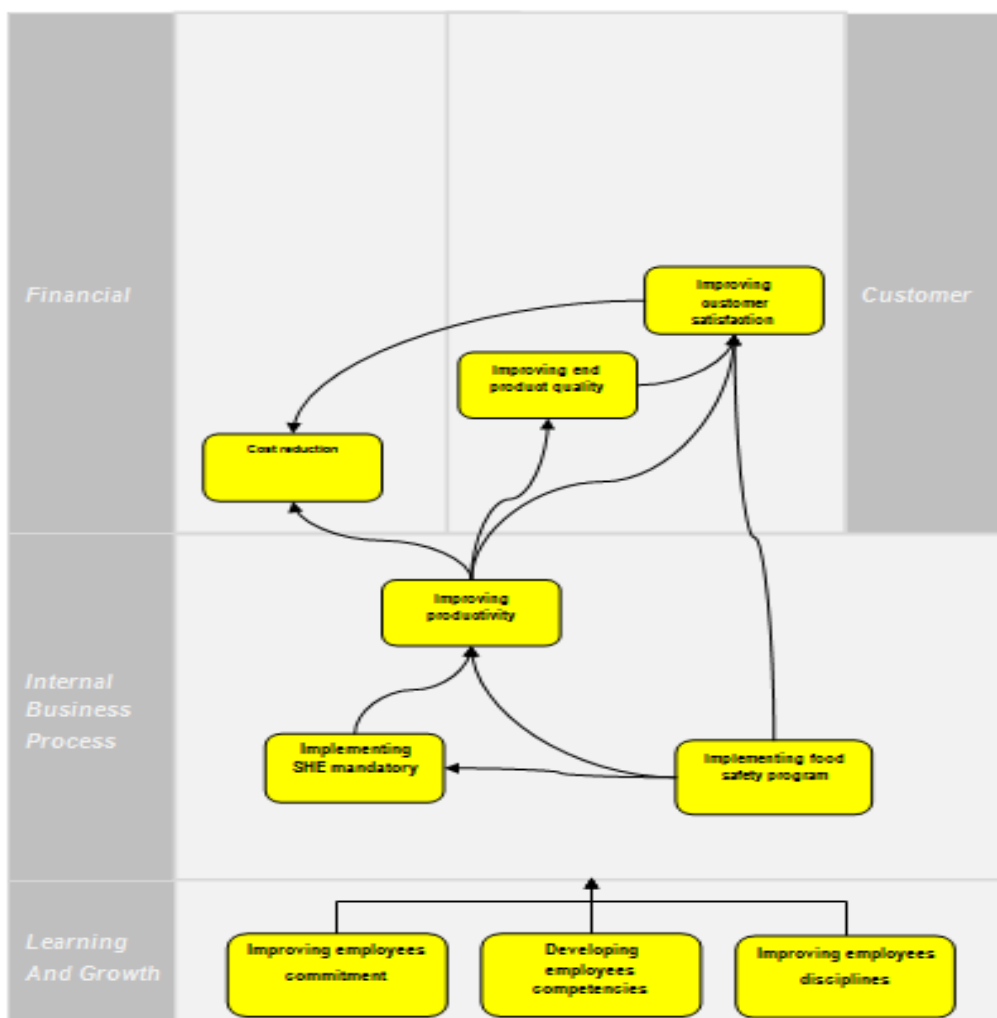


Figure 10. Production Operation Department Strategic Map

After the arrange of corporate strategic map, all the respondents have to fill in others questionnaires which are department strategic objectives weighting questionnaires and department key performance indicators weighting questionnaires. This weighting uses Analytical Hierarchy Process method (AHP) with the help of Expert Choice software. Determining the importance or priority of each strategic objective is done by pairwise comparison using AHP (Expert Choice). The principle of this weighting is the higher the priority of a variable then the value of the weight will be higher. A pairwise comparison matrix will be an input in weighting with Expert Choice software. Interpretation the results of the weight which the highest value is 100% or equal to 1. Weight is considered valid if the value of inconsistency is worth ≤ 0.10 (10%). The result of weighting of each perspective and between strategic objectives can be seen in table 11. For weighting for each key performance indicator (KPI) can be seen in table 12.

Perspective	Perspective Weight	Perspective Inconsistency Ratio	Strategic Objective Variable Code	Strategic Objective	Strategic Objective Weight	Strategic Objective Total Weight
Financial	0,327	0.02	SS.K.1	Cost reduction	1,000	0,327
Customer	0,350		SS.P.1	Improving end product quality	0,500	0,175
			SS.P.2	Improving customer satisfaction	0,500	0,175
Internal Business Process	0,229		SS.PBL1	Improving productivity	0,580	0,133
			SS.PBL2	Implementing SHE mandatory	0,117	0,027
			SS.PBL3	Implementing food safety program	0,303	0,069
Learning and Growth	0,095		SS.PP.1	Improving employees commitment	0,541	0,051
			SS.PP.2	Developing employees competence	0,301	0,029
			SS.PP.3	Improving employees discipline	0,158	0,015
TOTAL	1					1

Table 11. Weighting Result of Department Inter-Perspective And Department Inter-Strategic Objective

Kode Variabel S. Strategis	Bobot S. Strategis	Total Bobot S. Strategis	Kode Variabel KPI	Bobot KPI	R. Inkonsistensi	Total Bobot KPI
SS.K.1	1,000	0,327	KPI.K.1.1	0,101	0,010	0,033
			KPI.K.1.2	0,293		0,096
			KPI.K.1.3	0,191		0,062
			KPI.K.1.4	0,282		0,092
			KPI.K.1.5	0,134		0,044
SS.P.1	0,500	0,175	KPI.P.1.1	0,500	0,000	0,087
			KPI.P.1.2	0,500		0,087
SS.P.2	0,500	0,175	KPI.P.2.1	1,000	0,000	0,175
SS.PBL1	0,580	0,133	KPI.PBL1.1	0,063	0,030	0,008
			KPI.PBL1.2	0,178		0,024
			KPI.PBL1.3	0,133		0,018
			KPI.PBL1.4	0,090		0,012
			KPI.PBL1.5	0,295		0,039
			KPI.PBL1.6	0,240		0,032
SS.PBL2	0,117	0,027	KPI.PBL2.1	0,608	0,010	0,016
			KPI.PBL2.2	0,126		0,003
			KPI.PBL2.3	0,266		0,007
SS.PBL3	0,303	0,069	KPI.PBL3.1	0,734	0,000	0,051
			KPI.PBL3.2	0,266		0,018
SS.PP.1	0,541	0,051	KPI.PP.1.1	1,000	0,000	0,051
SS.PP.2	0,301	0,029	KPI.PP.2.1	0,451	0,000	0,013
			KPI.PP.2.2	0,549		0,016
SS.PP.3	0,158	0,015	KPI.PP.3.1	1,000	0,000	0,015
TOTAL		1	TOTAL			1

Table 11. Weighting Result of Department Inter-KPI's

The next stage after performing weighting in order to get weighted values for perspectives, strategic objectives and KPI's of the department are to establish a scoring system. This scoring system uses OMAX (Objective Matrix) model. The OMAX scoring system is used to assess the performance either corporate or department. Then use traffic light system method as a sign whether the KPI has reached the target or not. This research comparing data between 2016 department achievement and 2017 department achievement as seen on table 12 and table 13

Table 12. Calculation Result of Department Performance Measurement Data On 2016

Key Performance Indicator	Score	Weight	Value
KPL.K.1.1	8	0,033	0,264
KPL.K.1.2	7	0,096	0,672
KPL.K.1.3	7	0,062	0,434
KPL.K.1.4	10	0,092	0,92
KPL.K.1.5	10	0,044	0,44
KPL.C.1.1	9	0,087	0,783
KPL.C.1.2	10	0,087	0,87
KPL.C.2.1	10	0,175	1,75
KPL.PBI.1.1	7	0,008	0,056
KPL.PBI.1.2	6	0,024	0,144
KPL.PBI.1.3	9	0,018	0,162
KPL.PBI.1.4	7	0,012	0,084
KPL.PBI.1.5	4	0,039	0,156
KPL.PBI.1.6	9	0,032	0,288
KPL.PBI.2.1	10	0,016	0,16
KPL.PBI.2.2	10	0,003	0,03
KPL.PBI.2.3	10	0,007	0,07
KPL.PBI.3.1	7	0,051	0,357
KPL.PBI.3.2	9	0,018	0,162
KPL.PP.1.1	9	0,051	0,459
KPL.PP.2.1	6	0,013	0,078
KPL.PP.2.2	10	0,016	0,16
KPL.PP.3.1	7	0,015	0,105

According to table 12, there are 23 KPI's in department performance measurement system on 2016. There are 14 KPI's in green color category (range 8-10) which means the achievement has reached the target or close to the target. Then there are 9 KPI's in the yellow color category (range 4-7) which means the achievement of the company has not reached the target and this indicator indicates that the company must be cautious. It is recommended for the company management to to conduct evaluation for future precaution.

Table 13. Calculation Result of Department Performance Measurement Data On 2017

Key Performance Indicator	Score	Weight	Value
KPL.K.1.1	6	0,033	0,198
KPL.K.1.2	4	0,096	0,384
KPL.K.1.3	7	0,062	0,434
KPL.K.1.4	6	0,092	0,552
KPL.K.1.5	6	0,044	0,264
KPL.C.1.1	9	0,087	0,783
KPL.C.1.2	10	0,087	0,87
KPL.C.2.1	8	0,175	1,4
KPL.PBI.1.1	4	0,008	0,032
KPL.PBI.1.2	4	0,024	0,096
KPL.PBI.1.3	8	0,018	0,144
KPL.PBI.1.4	6	0,012	0,072
KPL.PBI.1.5	4	0,039	0,156
KPL.PBI.1.6	7	0,032	0,224
KPL.PBI.2.1	10	0,016	0,16
KPL.PBI.2.2	10	0,003	0,03
KPL.PBI.2.3	10	0,007	0,07
KPL.PBI.3.1	7	0,051	0,357
KPL.PBI.3.2	4	0,018	0,072
KPL.PP.1.1	9	0,051	0,459
KPL.PP.2.1	6	0,013	0,078
KPL.PP.2.2	10	0,016	0,16
KPL.PP.3.1	5	0,015	0,075

According to table 13, there are 23 KPI's in corporate performance measurement system on 2017. There are 9 KPI's in green color category (range 8-10) which means the achievement has reached the target or close to the target. Then there are 14 KPI's in the yellow color category (range 4-7) which means the achievement of the company has not reached the target and this indicator indicates that the company must be cautious. It is recommended for the company management conduct evaluation for future precaution.

Table 14 describes the achievement value of each perspective that contributes to current performance indicator in 2016 and 2017. The overall achievement value of the year 2016 is 8.604 and the overall achievement value of the year 2017 is 6.968. Corporate's overall achievement score in 2016 is already on green

category (Good) that means department performance was meet with the target. But in 2017, department performance was declining to the yellow color category. It means that department performance did not meet the target and need to evaluate overall achievement.

Table 14. The Result of Department Performance Measurement (Inter-Perspectives) in 2016-2017

PERSPECTIVE	PERSPECTIVE WEIGHT	ACHIEVEMENT	
		2016	2017
FINANCIAL	0,327	2,730	1,832
CUSTOMER	0,350	3,403	3,053
INTERNAL BUSINESS PROCESS	0,229	1,669	1,413
LEARNING AND GROWTH	0,095	0,802	0,670
TOTAL	1	8,604	6,968

IV. CONCLUSION

This research has purpose to design corporate (PT AMM) performance measurement system and production operation department. The result of weighting between perspectives on company performance measurement system shows that the highest weight is achieved by financial perspective 0,534. Then followed by a customer perspective of 0,222. Then the third is the learning and growth perspective with the weight of 0,132 and the last is the perspective of internal business process with a value of 0,111. The results of the company performance measurement using OMAX scoring system shows that the value of Current Performance Indicator in 2016 amounted to 7,391 and reached yellow color category. While the value of company Current Performance Indicator in 2017 amounted to 5,197 and also entered in yellow color category. It can be concluded that the performance of the company (PT AMM) is in mediocre category or in other words the company's performance (PT AMM) has not reached the target and still needs evaluation and improvement in reaching the expected target. Figure 11 shown the 2016 and 2017 corporate performance result.

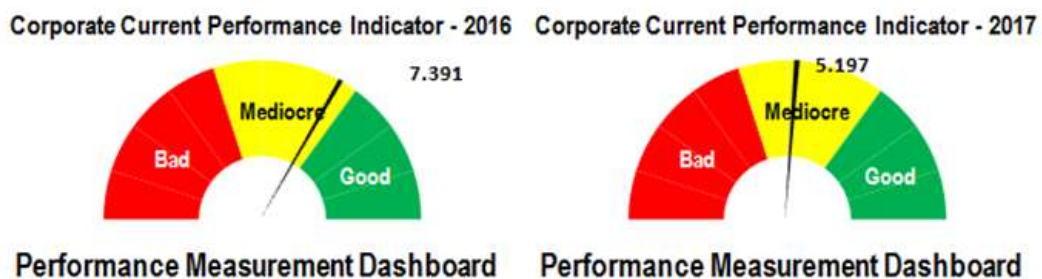


Figure 11. Corporate Current Performance Indicator (2016 -2017)

The result of weighting between perspectives on production operation department performance measurement system shows that the highest weight is achieved by customer perspective 0,350. Then followed by a financial perspective of 0,327. Then the third is the internal business process perspective with the weight of 0,229 and the last is the perspective of internal business process with a value of 0,095. The results of the production operation department performance measurement using OMAX scoring system shows that the value of Current Performance Indicator in 2016 amounted to 8,604 and reached green color category. While the value of company Current Performance Indicator in 2017 amounted to 6,986 and entered in yellow color category. It can be concluded that in the 2016, performance of the production operation department is in good category or in other words the company's performance (PT AMM) has slightly reached the target. But in 2017, production operation department performance has not reached the target and still needs evaluation and improvement in reaching the expected target. Figure 12 shown the 2016 and 2017 production operation department performance result.

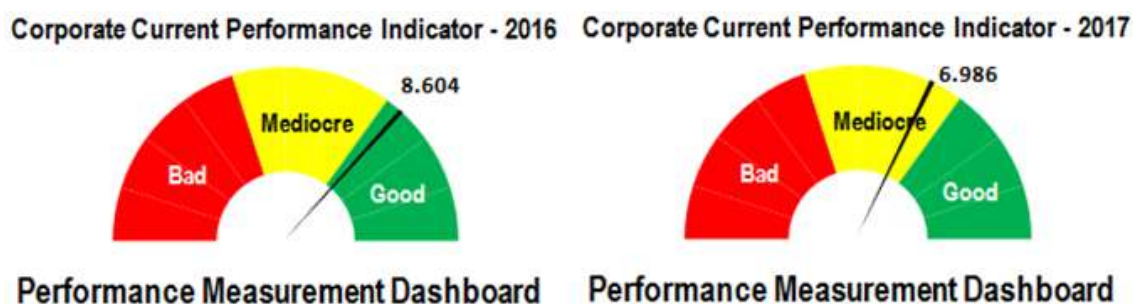


Figure 12. Production Operation Department Current Performance Indicator (2016 -2017)

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