FINAL PROJECT—TI14501

DESIGNING PERFORMANCE MEASUREMENT SYSTEM USING BALANCED SCORECARD IN "BALAI RISET DAN STANDARDISASI" (BARISTAND) SURABAYA

HAFIZH
NRP 02411440000054

Supervisor:
Dr.Ir. Sri Gunani Partiwi M.T.
NIP 196605311990022001

Industrial Engineering Department
Institut Teknologi Sepuluh Nopember
Surabaya 2018

This page is intentionally left blank.

APPROVAL SHEETS

DESIGNING PERFORMANCE MEASUREMENT SYSTEM USING BALANCED SCORECARD IN "BALAI RISET DAN STANDARDISASI" (BARISTAND) SURABAYA

FINAL PROJECT

Proposed as a Requisite to Graduate in Industrial Engineering Major and to Achieve a Bachelor Degree in Department Industrial Engineering
Faculty Technology of Industry
Institut Teknologi Sepuluh Nopember
Surabaya, Indonesia

Written By:

HAFIZH
NRP 02411440000054

Acknowledge and approved by:

Supervisor

Dr.Ir. Sri Gunani Partiwi M.T.
NIP 196605311990022001

SURABAYA, JUNE 2018

PERANCANGAN SISTEM PENGUKURAN KINERJA MENGGUNAKAN FRAMEWORK BALANCED SCORECARD (BSC) PADA BALAI RISET DAN STANDARDISASI (BARISTAND) INDUSTRI SURABAYA

Nama: Hafizh

NRP: 2514100054

Dosen Pembimbing: Dr.Ir. Sri Gunani Partiwi M.T.

ABSTRAK

BARISTAND Surabaya merupakan suatu organisasi yang berada dibawah dan bertanggung jawab kepada Balai Penelitian dan Pengembangan Industri (BPPI).BARISTAND Surabaya bergerak dalam bidang riset, standardisasi, dan sertifikasi. Dalam menjalankan perannya, pengukuran kinerja BARISTAND Surabaya seharusnya bersinergi dengan BPPI dan kementerian perindustrian. Pada kondisi saat ini, terdapat beberapa masalah yang terjadi pada sistem pengukuran kinerja BARISTAND Surabaya yaitu: visi dan misi tidak sejalan dengan indikator kinerja yang diberikan kepada BARISTAND dan tidak adanya sistem pengukuran kinerja organisasi yang terstruktur. Selain itu BARISTAND Surabaya merupakan salah satu instansi yang direkemondasikan untuk menjadi Badan Layanan Umum (BLU). Untuk menjadi BLU, terdapat beberapa syarat yang harus dipenuhi namun belum dimiliki oleh BARISTAND Surabaya, salah satunya adalah rancangan strategi bisnis. Salah satu *framework* yang direkomendasikan oleh dinas adalah *Balanced scorecard* (BSC). *Framework* BSC tidak hanya mengukur aspek finansial, namun aspek non finansial juga diperhatikan. Dalam penelitian ini, *framework* BSC digunakan untuk menenukan strategi objektif, dan KPI dari balai. Pembobotan dilakukan dengan metode *Analytical Network Process* (ANP). Setelah itu dibentuk *dashboard* untuk memudahkan pihak BARISTAND dalam menggunakan sistem yang telah dibuat. Hasil dari penelitian ini adalah terdapat 9 strategi objektif dan 20 KPI yang digunakan untuk mengukur ketercapaian dari organisasi. Dengan adanya penelitian ini, diharapkan persyaratan untuk menjadi BLU dapat dipenuhi dan juga pengukuran kinerja organisasi menjadi lebih terintegrasi.

Kata kunci: Strategi objektif, *Balanced Scorecard* (BSC), KPI, ANP.

DESIGNING PERFORMANCE MEASUREMENT SYSTEM USING BALANCED SCORECARD IN "BALAI RISET DAN STANDARDISASI" (BARISTAND) SURABAYA

Name: Hafizh

Id Number: 2514100054

Supervisor: Dr.Ir. Sri Gunani Partiwi M.T.

ABSTRACT

BARISTAND Surabaya is an organization under and responsible to Balai Penelitian dan Pengembangan Industri (BPPI) .BARISTAND Surabaya is engaged in research, standardization, and certification. In performing its role, the performance measurement of BARISTAND Surabaya should be in synergy with BPPI and the ministry of industry. In the current condition, there are several problems that occur in the performance measurement system BARISTAND Surabaya such as: vision and mission is not in line with performance indicators given to BARISTAND and the absence of a structured organizational performance measurement system. In addition BARISTAND Surabaya is one of the recommended organizations to become a Public Service Agency (BLU). To become BLU, there are some requirements that must be fulfilled but not yet owned by BARISTAND Surabaya, which is a business strategy design. One of the frameworks recommended by the government is the Balanced Scorecard (BSC). The BSC framework not only measures the financial aspect, but the non-financial aspect is also considered. In this research, BSC framework is used to identify Strategic objectives and KPI from organization. Weighting is done by Analytical Network Process (ANP) method. After that, the dashboard is designed to facilitate the BARISTAND users in using the system that has been created. The results of this study are 9 objective strategies and 20 KPIs used to measure the achievement of the organization. With this research, it is expected that the requirements to become BLU can be fulfilled and also the measurement of organizational performance becomes more integrated.

Keywords: Strategic Objectives, Key Performance Indicator (KPI), Balanced Scorecard (BSC), Analytical Network Process (ANP).

This page is intentionally left blank.

ACKNOWLEDGMENTS

Praise to the Almighty, Allah SWT, for all grace, guidance, and blessing the author can finish this research entitled "Designing Performance Measurement System Using Balanced Scorecard in Balai Riset dan Standardisasi Industri (BARISTAND) Surabaya" in Industrial Engineering Department, ITS.

During the completion of this research, author receives countless support, motivation, inspiration, and help from various people. Hence, in this opportunity, the author would like to express the biggest appreciation and gratitude sincerely to those who contribute most and play important part during the completion of this research, namely:

1. Dr. Ir. Sri Gunani Partiwi, M.T. as the supervisor who gives great guidance, inspiration, and wise advises in tutoring along the completion of this research.
2. Ir. Siti Rohmah Siregar, MM. as the head of BARISTAND Surabaya and the entire stakeholders in BARISTAND Surabaya. Thank you for all knowledge, support, and help during the time of research
3. Arief Rahman S.T., M.Sc. and Ratna Sari Dewi, S.T., M.T. Ph.D as the assessors. Thank you for the constructive suggestions and feedback for the completion of this research
4. Nurhadi Siswanto, S.T., MSIE, Ph.D, as the head of Industrial Engineering Department
5. Family, Friends, and Everyone else whom author cannot mention one by one. The most sincere and deepest gratitude is expressed towards you all.

Lastly, author realizes that this research requires further development. Therefore, the positive suggestions and constructive critics is required to enhance this research. May this research contributes to the academics scope, practical world, and improvement to get better future.

Surabaya, June 2018

Hafizh

This page is intentionally left blank.

TABLE OF CONTENTS

ABSTRAK i

ABSTRACT iii

ACKNOWLEDGMENTS v

TABLE OF CONTENTS vii

LIST OF FIGURES xi

LIST OF TABLES xii

CHAPTER 1 1

1.1 Background 1

1.2 Problem Formulation 6

1.3 Research Objectives 6

1.4 Research Benefits 6

1.5 Research Scope 7

1.5.1 Limitations 7

1.5.2 Assumptions 7

1.6 Writing Systematic 7

CHAPTER 2 9

2.1 Performance Measurement 9

2.2 Balanced Scorecard 12

2.2.1 Advantages of Balanced Scorecard 17

2.2.2 Disadvantages of Balanced Scorecard 18

2.3 Key Performance Indicator 19

2.4 Analytic Networking Process (ANP) 20

2.5 Scoring System 23

2.6 Traffic Light System 23

2.7 Sensitivity Analysis 23

CHAPTER 3 25
3.1 Identification Stage 26
3.1.1 Problem Identification 26
3.1.2 Research Objectives, Benefits, and Scope 26
3.1.3 Literature Study and Field Study 26
3.2 Data Collecting Stage 27
3.3 Data Processing Stage 27
3.3.1 Evaluation of Existing Performance Measurement System 27
3.3.2 Define Strategic Objective and Developing Strategy Map 27
3.3.3 Developing KPIs and Weighting KPIs 27
3.3.4 Designing Dashboard for Performance Measurement System 28
3.4 Data Analysis and Interpretation Stage 28
3.5 Conclusion and Suggestion 28
CHAPTER 4 29
4.1 Data collection 29
4.1.1 Company Overview and Business Process 29
4.1.2 Company Vision and Mission 31
4.1.3 Company Organization Structure 32
4.2 Data Processing 33
4.2.1 Designing strategic objectives 33
4.2.2 Designing strategy map 34
4.2.3 Determining Key Performance Indicator (KPI) 35
4.2.4 Determining KPI Properties 37
4.2.5 Weighting KPI 47
4.2.6 Validation of the strategic objectives and KPI 56
4.2.7 Scoring System 56

4.2.8 Traffic Light System 60
4.2.9 Dashboard of the System 61
CHAPTER 5 67
5.1 Analysis of Existing Condition 67
5.2 Analysis of Strategic Objectives 67
5.2.1 Analysis of Strategic Objectives Financial Perspectives 68
5.2.2 Analysis of Strategic Objectives Customer Perspectives 68
5.2.3 Analysis of Strategic Objectives Internal Business Process Perspectives 69
5.2.4 Analysis of Strategic Objectives Learning and Growth Perspectives 69
5.3 Analysis of Strategy Map 70
5.4 Analysis of KPI 71
5.4.1 Analysis of KPI Financial Perspectives 72
5.4.2 Analysis of KPI Customer Perspectives 72
5.4.3 Analysis of KPI Internal Business Process Perspectives 73
5.4.4 Analysis of KPI Learning and Growth 74
5.5 Analysis of KPI Properties 74
5.6 Analysis of Weighting Process 75
5.7 Analysis of Scoring System 78
5.7.1 Analysis of scoring system 78
5.7.2 Analysis of Traffic Light System 79
5.8 Analysis of the Dashboard of the System 80
CHAPTER 6 81
6.1 Conclusion 81
6.2 Suggestion 82

Attachment 1. ANP Questionnaire 85
Attachment 2. Customer Satisfaction Questionnaire 89
Attachment 3. The result of weighing process from super decision software ... 91
REFERENCES 95
BIOGRAPHY 97

LIST OF FIGURES

Figure 1.1 graphic of research produced from 2005-1016 2
Figure 2.1 closed-loop performance management process 10
Figure 2.2 Performance measurement cycle 11
Figure 2.3 Balanced Scorecard (BSC) framework 13
Figure 2.4 example of a strategy map 14
Figure 3.1 Research flowchart 25
Figure 4.1 Logo of BARISTAND Surabaya 29
Figure 4.2 organization structure 32
Figure 4.3 Strategy map 34
Figure 4.4 Design of initial model 49
Figure 4.5 example of scoring system in super decision software 50
Figure 4.6 inconsistency level that between element in the learning and growth perspective 51
Figure 4.7 Example of comparison between cluster 51
Figure 4.8 Cluster matrix 51
Figure 4.9 Unweighted supermatrix 52
Figure 4.10 Calculation of weighted supermatrix 53
Figure 4.11 Result of limit supermatrix 53
Figure 4.12 Interface of the home menu 62
Figure 4.13 Interface Menu 62
Figure 4.14 Interface of strategic objective 63
Figure 4.15 Strategy map interface 63
Figure 4.16 KPI interface 64
Figure 4.17 Interface of KPI properties 64
Figure 4.18 Interface of the scoring system 65
Figure 4.19 interface of department scoring system 65
Figure 4.20 Interface of the report 65
Figure 4.21Interface of comparison each year 66

LIST OF TABLES

Table 1.1 Example of indicator and target in BARISTAND Surabaya 2014-20173
Table 1.2 Example of indicator and target in BARISTAND Surabaya 2014-2017 3
Table 4.1 Strategic Objectives of BARISTAND Surabaya 33
Table 4.2 KPI of BARISTAND Surabaya 35
Table 4.3 KPI with the units and targets 36
Table 4.4 KPI properties 38
Table 4.5 KPI Properties (Cont'd) 39
Table 4.6 KPI Properties (Cont'd) 40
Table 4.7 KPI Properties (cont'd) 41
Table 4.8 KPI Properties (cont'd) 42
Table 4.9 KPI Properties (cont'd) 43
Table 4.10 relationship between each element 48
Table 4.11 explanation of the relationship between element 48
Table 4.12 explanation of the relationship between element (cont'd) 49
Table 4.13 Normalization of the strategic objectives weight 54
Table 4.14 Perspective and strategic objectives weight 54
Table 4.15 Weight for KPI 55
Table 4.16 Scoring system 57
Table 4.17 Scoring System (cont'd) 58
Table 4.18 Scoring System (cont'd) 59
Table 4.19 Traffic light system indicator 60
Table 4.20 Traffic light system in BARISTAND Surabaya 60
Table 4.21 Traffic light system in BARISTAND Surabaya (cont'd) 61
Table 5.1 Explanation of the relationship in the strategy map 70
Table 5.2 Explanation of the relationship in the strategy map (cont'd) 71

CHAPTER 1
INTRODUCTION

In this chapter, there will be an explanation of the background, problem formulation, and objectives of this research.

1.1 Background

Industrial sector becomes one of the most important aspects of Indonesia. Based on the constitution (UU no. 3 the. 2014) about the industry, it has been stated as government regulation no.14 (2015) which explained about the master plan for national industrial development from 2015-2035. Ministry of industry is responsible to execute the master plan. Vision, mission, and strategies have been stated for industrial development in Indonesia. The national industrial development vision is Indonesia becomes a strong industrialized country. There are three characteristics that have been stated as a strong industrialized country, which are:

1. Strong, deep, healthy, and fair national industrial structure.
2. Highly competitive industries at a global level
3. Industry-based innovation and technology.

Inside the Ministry of Industry, there are many different sectors which also have different roles in order to make the master plan successful. One of the sectors is “Badan Penelitian dan Pengembangan Industri” (BPPI). Based on Presidential Regulation no. 29 (2015), it has been stated that BPPI is one of the working units with the level of echelon 1 which have the main function to execute industrial research and development in Indonesia. BPPI is also divided into many sectors, which are: eleven sectored organization with the level of echelon II, and “Balai Riset dan Standardisasi Industri” (BARISTAND) with the level of echelon III which spread in 11 cities. One of BARISTAND is located in Surabaya.

Based on "Peraturan Menteri Perindustrian tentang Organisasi dan Tata Kerja Balai Besar, Balai Riset dan Standardisasi Industri Baristand Industri Surabaya" Nomor 49/M-IND/PER/6/2006, BARISTAND is work unit under and responsible to the head of BPPI. BARISTAND Surabaya has the main job which is: conducting research, standardization, and certification in the field of industry.

Based on its job description, if it is related to the characteristics of the strong industrialized country, the work of BARISTAND Surabaya will give a contribution to achieving characteristic no. 3: "Industry based innovation and technology".

According to the strategic planning of BARISTAND Surabaya 2015-2019, BARISTAND Surabaya has a vision which is "Becoming the leading research and standards institute which partnered with national electronics and telematics industry in a production base that serves national and world needs in 2025. BARISTAND Surabaya is an organization that has the main job to conduct research and standardization. Below is the data that shows how many researches that are conducted by this organization from 2005-2016.

From the table above, it can be seen that the amount of the research which is produced by BARISTAND Surabaya fluctuates. There is an improvement in some years but also there is degradation in the other years. Those data make BARISTAND Surabaya need to do the evaluation in order to maintain the improvement. Below is the graphic that shows the data more clearly.

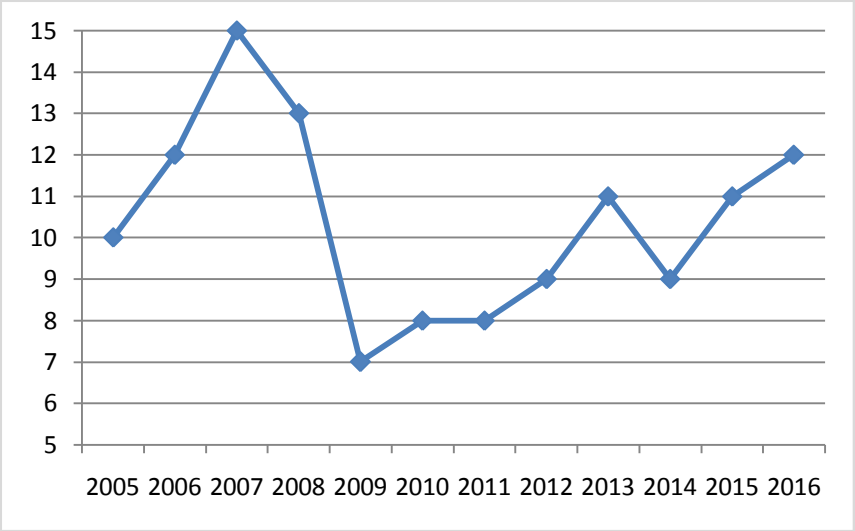


Figure 1.1 graphic of research produced from 2005-1016
(source: company data)

From the figure above, it can be seen that the amount of the research which is produced by BARISTAND Surabaya fluctuates. There is an improvement in some years but also there is degradation in the other years. Those data make BARISTAND Surabaya need to do the evaluation in order to maintain the improvement. Below is the graphic that shows the data more clearly.

The other condition that becomes a problem in BARISTAND Surabaya is there is no improvement of the target for each performance indicator. Based on the historical data, the target for each performance indicator remains the same from the year 2014-2017, although some of the targets already achieved beyond the targets. Below are some examples that show the achievement of the performance indicators.

Table 1.1 Example of indicator and target in BARISTAND Surabaya 2014-2017

Indicators	Target	Achievement			
		2014	2015	2016	2017
Published certificate and ISO 9001	100 certificate	132 certificate	164 certificate	179 certificate	122 certificate

Source: a Field study in BARISTAND Surabaya

Table 1.2 Example of indicator and target in BARISTAND Surabaya 2014-2017

Indicator	Target	Achievement			
		2014	2015	2016	2017
Tested sample	5500 sample	5.136 l	7.030	7.266	7.906 l

Source: a Field study in BARISTAND Surabaya

Based on table 1.2 and 1.3, it can be seen that the target still remains the same from 2014-2017 although the achievement always beyond the target. Actually in table 1.2, in 2017, the performance is decreasing compared to the last three year but still achieves the target. This phenomenon actually could be a problem for BARISTAND Surabaya, but because the target does not change and can be achieved so that the company has the possibility to ignore it. The level of the target becomes one of the important aspects of the organization. If the targets are too hard, it makes the organization or the company will give up. If the target is too low, the organization will have low motivation and not excel at its best. The right amounts of the challenge based on the organization skill level are the key to the development of the organization(Turkay, 2014).

Company or organizations need to make innovations to achieve competitive advantage. The sources of the competitive advantages consist of physical resources, financial resources, structure, production systems, and human resources. One of the efforts that can be done by the organization is making performance measurement system (Wayan, 2007). When implementing the

strategies of a company or an organization, performance measurement system is very important. If the performance measurement system doesn't exist, organization or companies actually doesn't know how well their strategies run and also the completion of their vision. Performance measurement is used for evaluation and consideration to decide the next action.

Actually, many organizations already implemented performance measurement system, but many of them still using the traditional way that only considering their internal business process and financial perspectives. It can work in some cases, but in many cases, the problems are more complex. There are many types of performance measurement system; one of them is balanced scorecard (BSC). Balanced scorecard (BSC) is a performance measurement tools that considering 4 perspectives, which are financial perspective, customer perspective, internal business process perspective and learning and growth perspective (Kaplan & Norton, 1996b). This framework considers both financial and nonfinancial perspectives, so that, it will give better effect rather than using traditional performance measurement system which only considers financial perspective.

BARISTAND Surabaya already implemented performance measurement system, but in the implementation, there are many things that need to be evaluated. It is known that this organization is under and responsible to BPPI. This condition makes BARISTAND Surabaya need to design performance system that suitable for BPPI and Ministry of Industry strategic directions. There are many problems in the existing performance measurement system. The first problem is there is no aligning between the strategic directions with the vision of BARISTAND Surabaya. The vision focuses on the electronic and telematics sector, but in the strategic direction, there are no strategies that focus on the electronic and telematics. The second problem is there are no priorities for each strategy. Each performance indicator has the same weight. This condition makes the organization doesn't have priorities when doing their business process. Besides, there are many activities which are not covered in the strategic directions which make the existing performance measurement system is still not comprehensive and need improvement.

Besides those entire problems that showed in the existing performance measurement system in BARISTAND Surabaya, it is also known that this organization is proposing to become "Badan Layanan Umum (BLU)". There are some requirements that must be completed in order to transform into BLU which are :

1. A statement of ability to improve the performance of service, finance, and benefit for the society
2. Pattern of governance
3. Business plan strategy
4. Financial report
5. Minimum service standard
6. Statement of willingness to be audited

From those requirements, it can be seen that one of the requirement is designing strategy business plan. The existing performance measurement system still doesn't have a framework and also it is still not comprehensive. Balanced scorecard (BSC) is one of the frameworks that is recommended by the ministry of finance for BLU.

In order to fix the problem of the existing performance measurement system in BARISTAND Surabaya, This research has the aim to redesign the performance measurement system for BARISTAND Surabaya that is suitable with BPPI and Ministry of Industry strategic directions. Balanced scorecard framework will be used as a framework for the performance measurement system; because this framework has some advantages which are; comprehensive, coherent, balanced and measurable (Mulyadi, 2001). The strategic objective of the organization will be cascaded from strategic directions from BPPI so that there are no misleading between BPPI and BARISTAND Surabaya. Then, from those strategies, key performance indicator will be designed so that there will be indicators for each strategy that make BARISTAND Surabaya easier to evaluate the performance of the organization. The KPI will be weighted using Analytical Network Process (ANP) so that the organization can prioritize their activities. It is expected with this performance measurement system, later, BARISTAND Surabaya can run their business process based on their vision, mission, and

strategies which also suitable for BPPI and Ministry of Industry strategic directions. This performance measurement system can also become a guide for evaluation to do the improvement.

1.2 Problem Formulation

Problem formulation that is going to be solved in this research is redesigning the performance measurement system that is suitable for "Balai Riset dan Standardisasi" (BARISTAND) Surabaya which is aligned with strategic directions from "Badan Penelitian dan Pengembangan Industri" (BPPI).

1.3 Research Objectives

The objectives that are going to be achieved in this research are as follows:

1. Evaluate the existing performance measurement system in BARISTAND Surabaya
2. Designing the performance measurement system using Balanced Scorecard Framework for BARISTAND Surabaya which is aligned with strategic direction from BPPI
3. Determining key performance indicator (KPI) that is suitable for BARISTAND Surabaya by considering BPPI strategic directions.
4. Designing dashboard for performance measurement system in BARISTAND Surabaya

1.4 Research Benefits

The benefits that can be achieved for BARISTAND Surabaya from this research are:

1. BARISTAND Surabaya knows the shortcomings of the existing performance measurement system
2. To provide performance measurement system using Balanced scorecard (BSC) framework that is aligned with BPPI strategic directions.
3. To provide appropriate KPIs which is aligned with BPPI Strategic directions
4. To provide a dashboard for performance measurement system in BARISTAND Surabaya.

1.5 Research Scope

The research scopes of this research are divided into two sections which are limitations and assumptions

1.5.1 Limitations

The limitations that used in this research are:

1. The system that will be developed in this research is organization performance measurement system
2. This research is limited to cascade strategic directions from BPPI to the corporate KPI for BARISTAND Surabaya
3. Performance agreement between BARISTAND Surabaya and BPPI that is used in this research is performance agreement for the year 2018.

1.5.2 Assumptions

The assumptions that used in this research are:

1. There is no change in the business process when the research is conducted
2. There is no change in organization structure when the research is conducted.

1.6 Writing Systematic

In this subchapter, there will be an explanation about writing system that used in this research.

CHAPTER 1 INTRODUCTION

This chapter consist of the background of this research, problem formulation, research objectives, research benefits and the writing systematic

CHAPTER 2 LITERATURE REVIEW

This chapter consists of a theoretical concept that used as guidance for the researcher in order to decide the appropriate methods that fitted with the research problem.

CHAPTER 3 RESEARCH METHODOLOGY

This chapter consists of every step that needs to do by the researcher in order to make the research well structured, organized and systematic.

CHAPTER 4 DATA COLLECTING AND PROCESSING

This chapter explains data required in this research, how data is collected and how data is processed according to the method that already determined in research methodology.

CHAPTER 5 DATA ANALYSIS AND INTERPRETATIONS

This chapter explains the analysis and interpretation of the result of data which are already collected and processed in the previous chapter.

CHAPTER 6 CONCLUSION AND RECOMMENDATION

This chapter explains the conclusion of the research and also the recommendation as the suggestions for improvement in further research.

CHAPTER 2

LITERATURE REVIEW

In this chapter, there will be an explanation of theoretical concept and literature study that related to the research.

2.1 Performance Measurement

Performance is a common term that used to represent activities in an organization for one or some periods (Mulyadi, 2001). Performance is a full view of the company over a period of time, is a result or achievement that is influenced by the company's operational activities in utilizing resources owned (Helfert, 1996). Based on those definitions of performance, it can be concluded that performance measurement is an action to measure every activity that includes the business process of the company. The result of the measurement used as feedback for the company to evaluate their business process and make improvement in the near future.

Before going through to the performance measurement, it is important to know the hierarchy or the process of performance management. The Performance Management Process is the process by which the company manages its performance in line with its corporate and functional strategies and objectives. The objective of this process is to provide a proactive closed loop control system, where the corporate and functional strategies are deployed to all business processes, activities, tasks and personnel, and feedback is obtained through the performance measurement system to enable appropriate management decisions. Below is the figure that shows the process which included in performance management (Bititci, Carrie, & McDevitt, 1997).

From the figure 2.1, it can be seen that the process of performance management begins with the defining the vision, then it will be deployed to the business objectives, strategic goals, critical success factors, and action plan. Then, in the last stage, there will be performance measurement to give feedback on the activities and strategies that have been implemented. Performance measurement becomes one of the most important aspects of the performance management process because, from the measurement, it will give feedback whether the

objectives have been achieved or not. Below is some explanation of performance measurement benefits (Mulyadi, 2001), which are:

1. Manage organizational operations effectively and efficiently through maximum employee motivation.
2. Assist the decision-making concerned with employees such as promotion, dismissal, and mutation.
3. Identify training and employee development needs and to provide criteria for selection and evaluation of employee training programs.
4. Provide feedback to employees on how their bosses assess their performance.
5. Provide a basis for award distribution.

Figure 2.1 closed-loop performance management process

Source : (Bititci et al., 1997)

Performance measurement is a concise set of quantitative and qualitative data, which provides a clear picture of your organization's progress in achieving its mission and goals (Wolk, Dholakia, & Kreitz, 2009). Performance measurement system is looping cycles that include six major components. The diagram below will explain about performance measurement key components (Wolk et al., 2009).

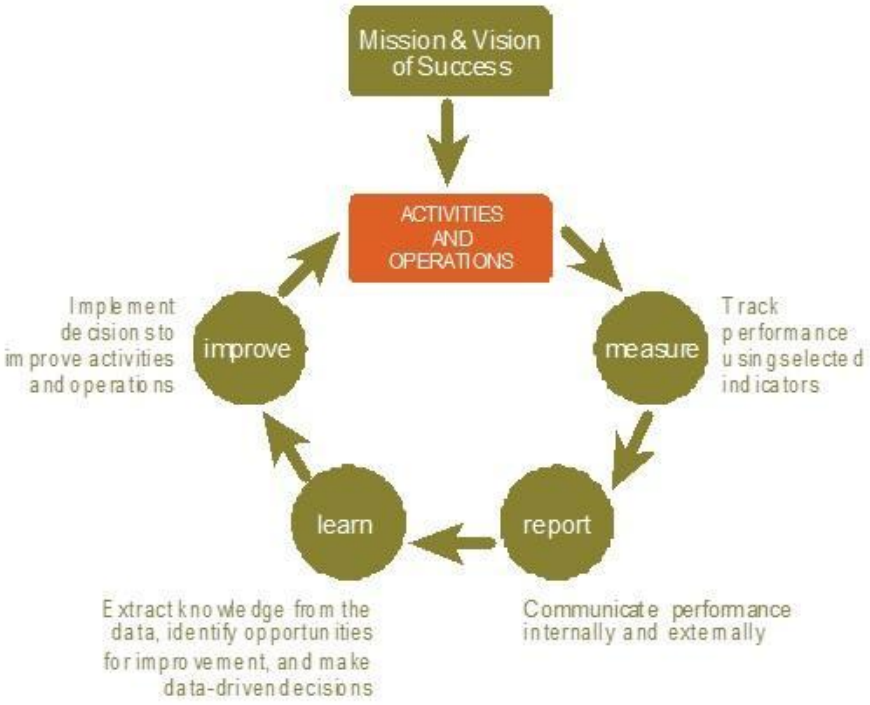


Figure 2.2 Performance measurement cycle
Source: (Wolk et al., 2009)

From the figure above, there are 6 major components in the performance measurement cycle, which are:

- Vision and Missions: Vision concerns a firm future business path; it is spelled out where the company wants to go. A mission statement focuses on current business activities; it spells out who the company is and what the company does. Vision and missions will become guidance for business activities and operations.
- Activities and Operations: Activities is any programs, services that run the company or organization. While operations are the infrastructure that supports the activities including human resource, technology, financial.
- Measure: Measure is the indicators, metrics that are tracked regularly, in order to assess the activities and operations
- Report: to communicate performance internally and externally. This phase is to compile the performance measurement system data in one information system so that it can inform both internal and external stakeholder easily.

- Learn: evaluate the performance based on reported data, then find improvement opportunities and decide the action for improvement
- Improve: the organization implements the improvement decision to their activities and operations so that the cycle begins again.

2.2 Balanced Scorecard

Balance Scorecard (BSC) is a performance measurement tools that considering 4 perspectives, which are financial perspective, customer perspective, internal business process perspective and learning and growth perspective. With those 4 perspectives, this framework can evaluate the performance of the company from both financial and nonfinancial point of view(Kaplan & Norton, 1996a). This approach is used to answer several basic questions(Kaplan & Norton, 1996a):

1. How the company performance in the point of view of the shareholders? (financial perspective)
2. How are the customer responses about the company? (customer perspective)
3. What is the competitive advantage of the company? (internal business process perspective)
4. Does the company need to make a continuous improvement? (learning and growth perspective)

Moreover, the Balance Scorecard also provides a framework for thinking of the company's strategy into operational terms. Companies use scorecard measurement focus to produce various management processes(Kaplan & Norton, 1996a), including:

1. Clarify and translate vision and strategy
2. Communicating and linking strategic objectives and measures
3. Plan, set goals and align strategic initiatives
4. Improve feedback and strategic learning

Below is the figure of the balanced scorecard framework that consists of 4 perspectives which are financial perspectives, customer perspectives, internal business process perspectives, and learning and growth perspectives.

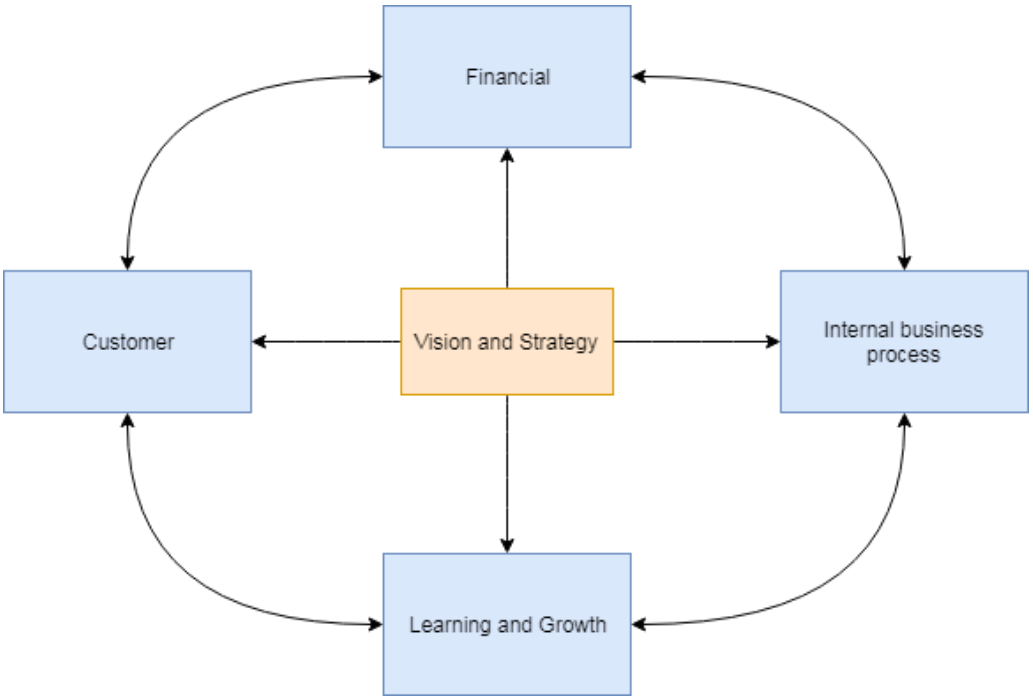


Figure 2.3 Balanced Scorecard (BSC) framework
Source: (Kaplan & Norton, 1996a)

After balanced scorecard framework has been designed, then, the next step is designing the strategy map. A strategy map is a group of strategies that have been assigned to each perspective that include in balance scorecard. Below is the example of the strategic map.

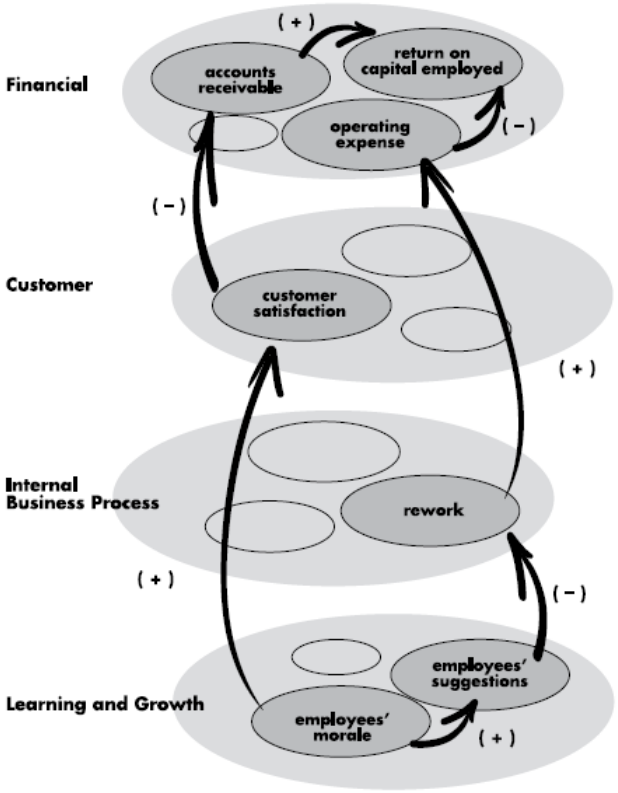


Figure 2.4 example of a strategy map
Source: (Kaplan & Norton, 1996b)

After the explanation of the framework and strategy map below is the explanation for each perspective.

1. Financial perspectives: this perspective is used to shows how well the plan and the execution of the company profit. Financial measurement using business life cycle as consideration. There are 3 stages of business which are growth, sustain, and harvest(Kaplan & Norton, 1996a). Each stage is having different goals so that the measures will be different too.
    - Growth: is the early stage of the life cycle of a company where a company has a product or service that has significant growth potential. Here management is committed to developing a new product or service, building and developing a product/service and production facility, adding operational capabilities, developing systems, infrastructure and distribution networks that will support global relationships, fostering and developing customer relationships.

- Sustain: is the second stage in which the company is still investing and reinvesting by implying the best rate of return. At this stage, the company tries to maintain its existing market share, even expand it, if possible. Investments are generally directed at removing bottlenecks, developing capacity, and improving operational improvements consistently. Financial targets at this stage are directed at the level of return on the investment made. Benchmarks are often used at this stage, such as ROI, profit margins, and operating ratios
- Harvest: is the third stage in which the company actually harvests investment returns in the previous stages. No more large investments, either expansion or new capacity building, excluding expenses for maintenance and repair of facilities. Financial targets are the main thing at this stage, so taken as a benchmark, namely maximizing cash inflows and reduction of working capital.

2. Customer perspectives: There are 2 types of measures for customer perspective which are: customer core measurement and customer value prepositions(Kaplan & Norton, 1996a). Customer core measurement is having some measurement component which are:
    - Market share: this measurement shows how many parts of the market that belongs to our company.
    - Customer retention: measure how well the relationship between a company with the customer
    - Customer acquisition: is when the company is able to have a new customer or having a new business
    - Customer satisfaction: measure the satisfaction level of the customer with some specific criteria from a value proposition
    - Customer profitability: measure the profit of the company from selling product or service to the customer

While, customer value proposition is a trigger for performance based on 3 attributes which are: product/service attributes, relationship, and image. First, product/ service attributes consist of product function, quality, price, etc. each customer has their own preferences for prioritizing those attributes. The company needs to identify the customer preferences, then, the measure will consider those things. The second attribute is a relationship between companies with the customer. It is about customer feelings that related to the commitment and responsiveness of the company. The last attribute is an image of the company. This factor is intangible but having a strong effect on the customer.

3. Internal business process perspectives

This perspective defined into three stages which are innovation process, operation process, and after-sale service process(Kaplan & Norton, 1996a).

- Innovation Process: In the process of creating added value for customers, the innovation process is one of the critical processes, where the efficiency and effectiveness and timeliness of this innovation process will lead to cost efficiency in the process of creating added value for customers. In this process, business units explore an understanding of the needs of customers and create the products and services they need. Innovation process in the company is usually done by the marketing department so that every decision of expenditure of a product to the market has met the requirements of marketing and can be commercialized (based on market needs).
- Operation process: is about making and selling the product. The measure is about time, quality and cost
- After sale services process: this process is an after-sale service for the customer. The company can measure how effective the activities of this process using same criteria as operation process which is quality, time and cost.

4. Learning and growth perspectives: this process identifies the supporting system for the company in order to improve and growth for a long term. The supporting system includes human resource, system, and SOP. There are several factors that need to be considered (Kaplan & Norton, 1996a), which are :
    - Workers capability
    - Information system capability
    - Motivation and alignment.

2.2.1 Advantages of Balanced Scorecard

The balanced scorecard is the framework for performance measurement system that uses 4 perspectives which are financial, customer, internal business process, and learning and growth perspectives. With those perspectives, balanced scorecard has significant advantages rather than traditional performance measurement system (Mulyadi, 2001). The advantages of the balanced scorecard in performance measurement system are the capability of creating strategic planning that has characteristics (Mulyadi, 2001) as follow:

1. Comprehensive

   Balance scorecard adds more perspectives rather than just financial perspective. With the addition of those perspectives, which are a customer, internal business process and learning and growth, there are some benefits that can be gained, which are:
    - Promising financial performance that is multiplied and long term.
    - Enable companies to enter complex business environments.
2. Coherent

   The Balance Scorecard requires personnel to establish causal relationships among the various strategic goals generated in strategy planning. Every strategy which includes in nonfinancial perspectives must have a causal relationship with the strategies which include in financial perspectives, whether the relationship direct or indirect relationship.

3. Balance

   Since balanced scorecard is using 4 perspectives, the strategies will be balanced based on those 4 perspectives. The balance of the strategies is needed in order to achieve long-term financial performance.

4. Measurable

   In balanced scorecard, the target is not only in term of financial, but the measure for the other nonfinancial perspectives will be determined. There will be a clear measure of each strategy so that the company or the organization easy to determine the action to achieve the target.

2.2.2 Disadvantages of Balanced Scorecard

Balanced scorecard as performance measurement system framework has some disadvantages (Anthony & Govindarajan, 2005) as follow:

1. There is a bad correlation between financial perspectives with the nonfinancial perspectives. There is no guarantee that the achievement of nonfinancial perspectives will give future profit.
2. Fixation on financial result. The manager is responsible for the financial performance. It makes the manager will prioritize financial perspective rather than the other perspectives.
3. There is no mechanism for improvement.
4. Measures are not up to date. There is no formal mechanism for updating the measures and adjust with the new strategies.
5. Measurement overload. There is no exact measure about how many measurements that manager can measure at the same time without losing focus. If the measures are too few, then there is the possibility of losing important factor. But if the measures are too many, the manager will be less focus and try to do many things at the same time.
6. Difficult in establishing trade-off. The balanced scorecard doesn't give clear weight for each perspective. It makes the manager hard to combine financial and nonfinancial perspectives.

2.3 Key Performance Indicator

The key performance indicator is a measurement indicator that is used for measures the level of performance achievement based on determined strategies. KPIs represent a set of measures focusing on those aspects of organizational performance that are the most critical for the current and future success of the organization (Parmenter, 2007). (Parmenter, 2007) also defined 7 characteristics of KPIs that covered every type of public/ private sector, which are:

1. Nonfinancial measures (not expressed in dollars, yen, pounds, euros, etc.)
2. Measured frequently (e.g., daily or 24/7)
3. Acted on by the CEO and senior management team
4. Understanding of the measure and the corrective action required by all staff
5. Ties responsibility to the individual or team
6. Significant impact (e.g., affects most of the core critical success factors [CSFs] and more than one BSC perspective)
7. Positive impact (e.g., affects all other performance measures in a positive way)

A KPI should tell you what action needs to take place. A good KPI will affect most of the core critical success factor (CSF) and BSC perspective. It means, when the organization focuses on the KPI, the organization will achieve the goal in all directions. KPI need to become focus consideration for all stakeholders, including CEO, management team, staffs and workers(Parmenter, 2007).

The success of change strategy depends on how it is introduced and implemented rather than on the merit of the strategy itself. There are four foundation stones that need to be considered (Parmenter, 2007), which are:

1. Partnership with the staff, unions, key suppliers, and key customers.
2. Transfer of power to the front line
3. Integration of measurement, reporting, and improvement of performance
4. Linkage of performance measures to strategy

The first foundation tells about how the KPIs need to be considered by all stakeholders in the organization including management team, employees, suppliers, and customers. It needs a commitment from the stakeholders to

implement the changes in the organization. The second foundation is about the way to communicate the KPIs either it is top down or bottoms up. It also requires giving empowerment to the employees to take action immediately in a situation which might be having a negative impact on the KPI. The third foundation is about the integration of the performance measurement system. It includes measurement, reporting, and the action based on the measurement. All those activities need to be integrated because those activities are work iteratively. The last foundation is about the linkage of KPI with the organization strategy. KPI is the indicator whether the strategy is successful or not so that each KPI need to related to the strategy of the organization. So that, before the organization determining the KPIs, the organization must determine the following in advance:

1. Vision, mission, goals of the organization
2. Strategic objectives of the organization
3. A business process that is clearly defined

The key performance indicator is the indicator that determines whether the organization successful or not, based on their determined strategy. In order to define comprehensive and reliable KPI, there are some characteristics of KPI that need to be fulfilled. Those are SMART characteristics. SMART stands for Specific, Measurable, Achievable, Realistic and Time-Based (Gradeless, 2003).

2.4 Analytic Networking Process (ANP)

Analytic Hierarchy Process (AHP). The Analytic Hierarchy Process (AHP) is a theory of relative measurement with absolute scales of both tangible and intangible criteria based on the judgment of knowledgeable and expert people. The Analytic Network Process (ANP) is a generalization of the Analytic Hierarchy Process (AHP), by considering the dependence between the elements of the hierarchy (Vargas & Saaty, 2006). Many decision problems cannot be structured hierarchically because they involve the interaction and dependence of higher-level elements in a hierarchy on lower level elements. Therefore, ANP is represented by a network, rather than a hierarchy.

In ANP methodology, there are two kinds of control, which are: hierarchy and network. A hierarchy is comprised of a goal, levels of elements and connections between the elements. These connections are oriented only to

elements in lower levels. A network has clusters of elements, with the elements in one cluster being connected to elements in another cluster (outer dependence) or the same cluster (inner dependence) (Vargas & Saaty, 2006). Saaty also said that there are two kinds of influence; outer and inner. Outer dependence compares the influence of elements in a cluster of elements in another cluster with respect to a control criterion. In inner dependence influence, one compares the influence of elements in a group on each one.

According to (Vargas & Saaty, 2006), below are the stage of Analytic Network Process (ANP) methodology:

1. Describe the decision problem in detail including its objectives, criteria and sub-criteria, actors and their objectives and the possible outcomes of that decision. Give details of influences that determine how that decision may come out.
2. Determine the control criteria and sub-criteria in the four control hierarchies one each for the benefits, opportunities, costs, and risks of that decision and obtain their priorities from paired comparisons matrices.
3. Determine the most general network of clusters (or components) and their elements that apply to all the control criteria. To better organize the development of the model as well as you can, number and arrange the clusters and their elements in a convenient way (perhaps in a column). Use the identical label to represent the same cluster and the same elements for all the control criteria.
4. For each control criterion or sub-criterion, determine the clusters of the general feedback system with their elements and connect them according to their outer and inner dependence influences. An arrow is drawn from a cluster to any cluster whose elements influence it.
5. Determine the approach you want to follow in the analysis of each cluster or element, influencing (the preferred approach) other clusters and elements with respect to a criterion, or being influenced by other clusters and elements. The sense (being influenced or influencing) must apply to all the criteria for the four control hierarchies for the entire decision.

6. For each control criterion, construct the supermatrix by laying out the clusters in the order they are numbered and all the elements in each cluster both vertically on the left and horizontally at the top. Enter in the appropriate position the priorities derived from the paired comparisons as sub-columns of the corresponding column of the supermatrix.
7. Perform paired comparisons on the elements within the clusters themselves according to their influence on each element in another cluster they are connected to (outer dependence) or on elements in their own cluster (inner dependence). In making comparisons, you must always have a criterion in mind. Comparisons of elements according to which element influences a given element more and how strongly more than another element it is compared with are made with a control criterion or sub-criterion of the control hierarchy in mind.
8. Perform paired comparisons on the clusters as they influence each cluster to which they are connected with respect to the given control criterion. The derived weights are used to weight the elements of the corresponding column blocks of the supermatrix. Assign a zero when there is no influence. Thus obtain the weighted column stochastic supermatrix.
9. Compute the limit priorities of the stochastic supermatrix according to whether it is irreducible (primitive or imprimitive cyclic) or it is reducible with one being a simple or a multiple roots and whether the system is cyclic or not.
10. Synthesize the limiting priorities by weighting each idealized limit vector by the weight of its control criterion and adding the resulting vectors for each of the four merits: Benefits (B), Opportunities (O), Costs (C) and Risks (R). An answer involving marginal values of the merits is obtained by forming the ratio BO/ CR for each alternative from the four vectors. The alternative with the largest ratio is chosen for some decisions. Companies and individuals with limited resources often prefer this type of synthesis

To implement this method (ANP), there is software called Super Decisions that can be downloaded for free.

2.5 Scoring System

the next stage after weighing the KPIs using ANP or AHP. Scoring system measures each KPI with the same dimension which is a percentage. There are three types of the scoring system which are: higher is better, lower is better, and zero-one. Higher is better, shows that higher score of the KPI contributes better condition for the organization. Lower is better, shows that lower score of the KPI is better for the organization. Zero-one, shows that there are only two possibilities of a condition which are 1/0; exist or not exist; good or bad (Putri & Handayani, 2014).

2.6 Traffic Light System

Traffic light system is the next stages of the scoring system. This system used to categorize the KPI based on its score. This system is used to give the signal, whether improvement for KPI is needed or not. There are 3 colors used in this system which are green, yellow, and red. A green indicator shows that the target of the KPI has been achieved. The yellow indicator shows that the KPI still need improvement. The red indicator shows that the result of the KPI is below the target. The range of the score for each color can be different for each case (Bambang Syairuddin, Patdono Suwignjo, & I Made Suartika, 2007).

2.7 Sensitivity Analysis

Sensitivity analysis is a process of varying input parameters of a model within the allowed area and observing the resulting changes in the model solution. It explores how changes in the model output can be qualitatively and quantitatively attributed to different change sources (Briš & Econ, 2007). Sensitivity analysis can be used to determine the following:

1. The similarity of the model with the observed process,
2. Quality of the model definition,
3. Factors contributing the most to output variables,
4. Areas in the input factor space for which there is maximum variation,
5. The optimum area in the space of factors, which are used in the subsequent exploration of adjustments,
6. The interaction between factors.

Sensitivity analysis can be used to determine the factor that contributes the most to the organization, in this case, the KPI. This analysis will simulate some scenarios of the KPI result of the organization so that it can determine what KPI that has a significant effect and also the KPI that has an insignificant effect (Briš & Econ, 2007).

CHAPTER 3

RESEARCH METHODOLOGY

In this chapter, there will be an explanation of research methodology through flowchart below.

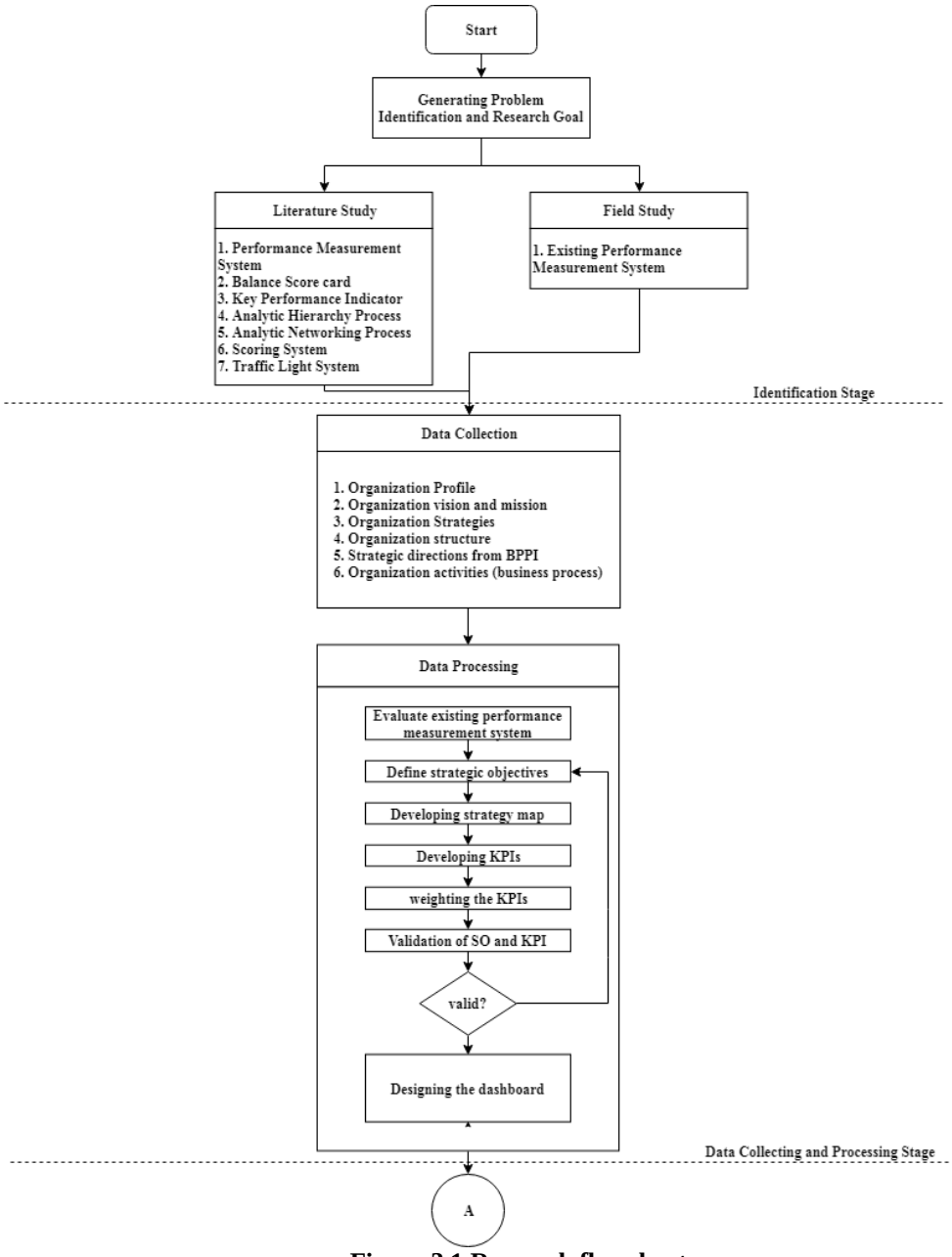


Figure 3.1 Research flowchart

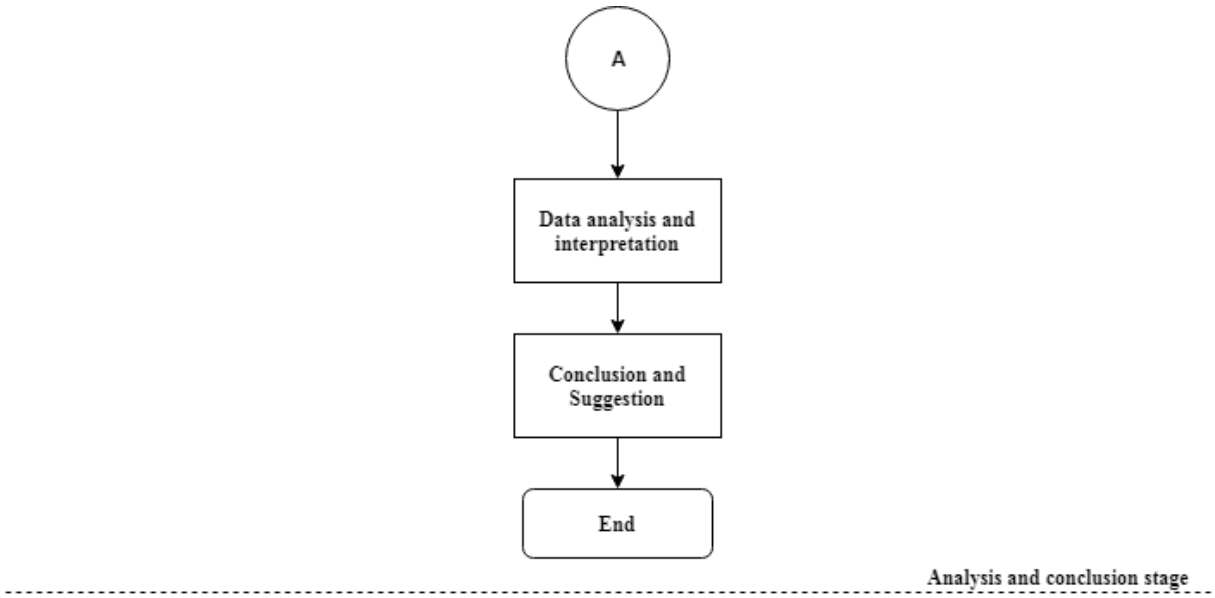


Figure 3.2 Research flowchart (cont'd)

3.1 Identification Stage

In this stage, there are three phases that will be done, which are: problem identification, define research objective benefit and scope, and the last is literature study and field study. There will be more explanation about those phases below.

3.1.1 Problem Identification

This stage is conducted by doing the discussion and brainstorming with the head of BARISTAND Surabaya and some staffs. The discussion is about the existing condition of the performance measurement system. Then, from the discussion, the problem can be identified based on the organization condition.

3.1.2 Research Objectives, Benefits, and Scope

After the problem has been identified, it will be generated as the research objectives that have to be achieved and the result will become the benefit of the research.

3.1.3 Literature Study and Field Study

In this stage, the researcher has to find related theories as references and guide to do the research. The sources of literature study can be journals, books, or recent research that relate to the problem. Literature studies that will be used are performance measurement system, Balanced scorecard (BSC), Key Performance

Indicator (KPI), Analytical Network Process (ANP), Scoring system and Traffic Light System.

3.2 Data Collecting Stage

This stage is conducted by collecting any data that needed to do this research. The data will become input in designing the performance measurement system in BARISTAND Surabaya. Those data's are organization profile, existing performance measurement system, organization vision and mission, organization business process, organization structure, and strategic directions from BPPI.

3.3 Data Processing Stage

In this stage, the data that already gathered in the previous stage will be further processed at this stage. The steps of data processing are an evaluation of existing performance measurement system; define the strategic objective and strategy map; developing key performance indicator; weighting key performance indicator; doing simulation, and designing the dashboard. Each step will be further explained below.

3.3.1 Evaluation of Existing Performance Measurement System

In this stage, the existing performance measurement system of BARISTAND Surabaya will be evaluated based on the vision, mission and strategic direction from BPPI. This evaluation will become guidance to determine appropriate strategies.

3.3.2 Define Strategic Objective and Developing Strategy Map

From the evaluation, strategic objectives will be determined. The strategic objective is an overview of the action that should be done by the organization or company. Then, a strategy map is designed which consist of cause and effect relationship between each strategic objectives. The strategic objectives will be grouped based on the perspectives in Balanced scorecard (BSC). This stage is done by doing a discussion with the head of BARISTAND Surabaya.

3.3.3 Developing KPIs and Weighting KPIs

In this stage, Key Performance Indicator is developed as a measure of the achievement of strategic objectives. Then, each KPI will be weighted using ANP methodology. There will be a questionnaire for management to know the

importance level of each element. Then, the weighting process will be using Super decision software. Then, the result will be validated by the management.

3.3.4 Designing Dashboard for Performance Measurement System

After the performance measurement system is well designed, then, the next step is designing the dashboard. It is designed using Microsoft Excel which consists of strategic objective, strategy map, BSC perspectives, Weighted KPI and the result of the scoring system. This dashboard will become the interface for the performance measurement system so that, it is easier to update the performance of the organization.

3.4 Data Analysis and Interpretation Stage

This stage is conducted by doing data analysis and interpretation for the whole activities in data collecting and processing.

3.5 Conclusion and Suggestion

This stage is the last stage of the research. The conclusion will answer the research objectives, while the suggestion is the recommendation for the research object and for further research

CHAPTER 4

DATA COLLECTING AND PROCESSING

This chapter described the data collected and the steps that are taken to process the data.

4.1 Data collection

In this subchapter, there will be data that is required as the input to design the performance measurement system

4.1.1 Company Overview and Business Process

BARISTAND Surabaya is one of the work units inside the ministry of industry. Based on "Peraturan Menteri Perindustrian tentang Organisasi dan Tata Kerja Balai Besar, Balai Riset dan Standardisasi Industri Baristand Industri Surabaya" Nomor 49/M-IND/PER/6/2006, BARISTAND is work unit under and responsible to the head of BPPI. BARISTAND Surabaya has the main job which is: conducting research, standardization, and certification in the field of industry. Below is the logo of BARISTAND Surabaya.

Figure 4.1 Logo of BARISTAND Surabaya
(Source: baristandsurabaya.kemenperin.go.id)

In carrying out its duties, BARISTAND Surabaya performs the functions:

1. Implementation of research and development of industrial technology in the field of raw materials, auxiliary materials, processes, equipment/machinery and product results as well as the prevention of industrial pollution.
2. Arrange the program and competence development in research / R & D services

3. Formulation and application of standards, testing and certification in the field of raw materials, auxiliaries, processes, equipment/machinery, and product results.
4. Marketing, cooperation, promotion, information services, dissemination and utilization of research and development results.
5. Implementation of personnel affairs, finance, accounting, equipment, filing, household, coordination preparation of materials plans and programs, preparation of materials evaluation and reporting industry.

Based on the main job and the function of BARISTAND Surabaya, it is answered with several services and business process, which are:

1. Material and goods testing

   BARISTAND Surabaya provides testing for material and goods through some laboratories. There are 5 laboratories which are: chemistry laboratory, physics laboratory, environmental laboratory, and electronics and telematics laboratory.
2. Machine and equipment calibration

   BARISTAND Surabaya has calibration laboratory that has been accredited. There are some types of calibration services which are :
   a. Length calibration (vernier caliper, outside micrometer, dial indicator)
   b. Mass calibration (scale, electronic balance)
   c. Volumetric calibration (volumetric glassware, volumetric measures)
   d. Temperature calibration
   e. Pressure calibration
   f. Force calibration
   g. Electricity calibration
3. Consultation and training guidance

   BARISTAND Surabaya provides some training for small and medium enterprises (SMEs). There are some types of training which are:
   a. Consultation on SNI Implementation
   b. Calibration training

c. Quality system training
d. Commodity testing training
e. Research implementation training

4. Product and quality system certification

   BARISTAND Surabaya provide product certification and quality system certification through 2 institutions; “Lembaga sertifikasi produk” (LSPro) and “Lembaga sertifikasi sistem mutu” (LSSM). Those certifications is provided for third parties institution that needs those certification for their business process.

4.1.2 Company Vision and Mission

BARISTAND Surabaya has vision and mission in order to achieve the organization goals. Vision is the long-term goals of the organization while the mission is the step taken in order to achieve the vision. Below is the vision and mission of BARISTAND Surabaya.

Vision:

Becoming the leading research and standards institute which partnered with national electronics and telematics industry in a production base that serves national and world needs in 2025.

Mission:

1. Produce research and engineering design of electronics and telematics industry
2. Produce conformity services (testing, calibration, and certification) of electronics and telematics industry products
3. Developing human resource competence in electronics and telematics industry

Strategy:

Enhancing aggressive market share which is supported by the growth of market segments, product specialization, selective investment and strengthening internal capabilities.

4.1.3 Company Organization Structure

In this subchapter, there will be an explanation about organization structure in BARISTAND Surabaya. Below is the figure of the organization structure in BARISTAND Surabaya.

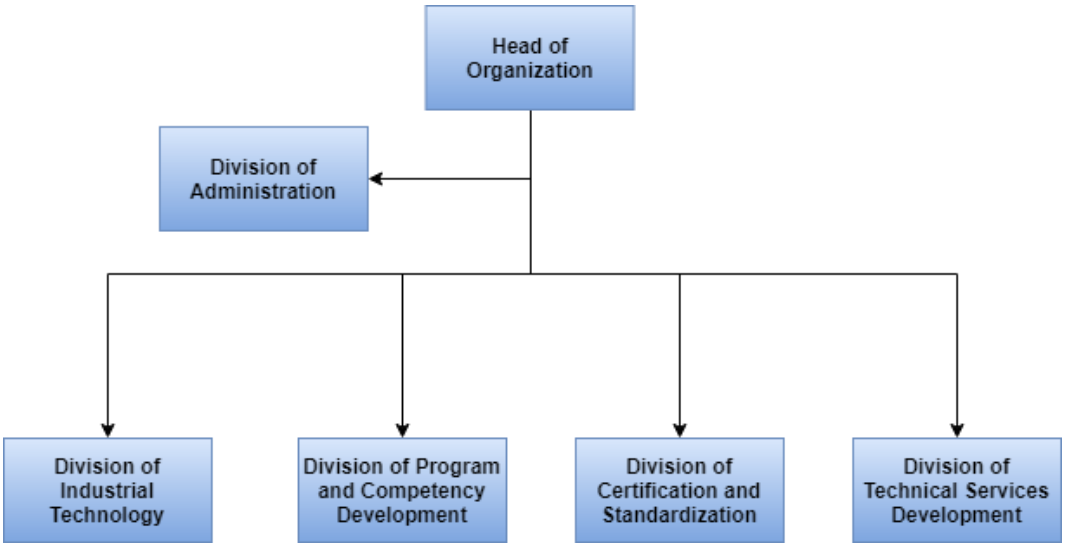


Figure 4.2 organization structure
Source: baristandsurabaya.kemenperin.go.id

Below are the explanations of the job description for each subdivision.

1. Division of Administration

   Has the task of doing personnel, financial affairs, inventory of state property, ordering, equipment, filing, household, coordination of the preparation of plan and program materials, preparation of evaluation and reporting material of BARISTAND Industri, and library management.

2. Division of Industrial Technology

   Has the task of preparing materials research and development of industrial technology raw materials, auxiliary materials, processes, equipment/machinery, and product results, as well as the prevention of industrial pollution.

3. Division of Program and Competency Development

   Has the task of preparing the material preparation program and development of competence in the field of research / R & D services.

4. Division of Standardization and Certification

   Has the task of preparing materials for the formulation and application of standards, testing and certification in the field of raw materials, auxiliaries, processes, equipment/machinery and product results.

5. Division of Technical Services Development

   Has the task of preparing marketing materials, cooperation, promotion, information services, dissemination and utilization of research and development results.

4.2 Data Processing

In this subchapter, there will be data processing from the data that has been collected in the previous subchapter. There are some steps in data processing, which are: designing strategic objectives, determining key performance indicator (KPI), weighing the KPI, scoring system, traffic light system, simulation of the system, and designing the dashboard for the performance measurement system.

4.2.1 Designing strategic objectives

The first step of data processing is designing the strategic objectives of the organization. The strategic objectives of the organization must be relevant to the vision and mission of the organization. In this case, the framework that will be used is balanced scorecard (BSC), so that the strategic objectives will be classified based on 4 perspectives.

The strategic objectives are designed by doing the discussion with the head of the organization. Below is the table that explained the strategic objectives for BARISTAND Surabaya.

Table 4.1 Strategic Objectives of BARISTAND Surabaya

Perspectives	Index	Strategic Objectives
Financial	**F1**	Increase the effectiveness of the use of APBN
Customer	**C1**	Increase customer satisfaction
	C2	Increase new customer
Internal Business Process	**I1**	Improve the result of prioritized research and development that can be used by industry
	I2	Increase the research publication
	I3	Improve the technical services for industry
learning and growth	**L1**	Improve employees quality
	L2	Increase organization facilities
	L3	Improve the implementation of bureaucratic reform (SPIP)

From the table 4.1, it can be seen that there are 9 strategic objectives for BARISTAND Surabaya. it is divided into 4 perspectives which are 1 for financial perspective, 2 for customer perspectives, 3 for internal business process perspectives, and 3 for learning and growth perspectives. Each of strategic objectives will be weighted later using ANP method. After strategic objectives already designed, the next step is building the strategy map.

4.2.2 Designing strategy map

After the strategic objectives have been determined, the next step is designing strategy map. The strategy map is a map that shows the relationship between strategic objectives. The relationship between strategic objectives is intended with the achievement of strategic objectives can affect the achievement of other strategic objectives. The strategy map is built based on the hierarchy of balanced scorecard perspectives. The hierarchy from down to top in balance scorecard is learning and growth perspectives, internal business process perspectives, customer perspectives and financial perspectives respectively.

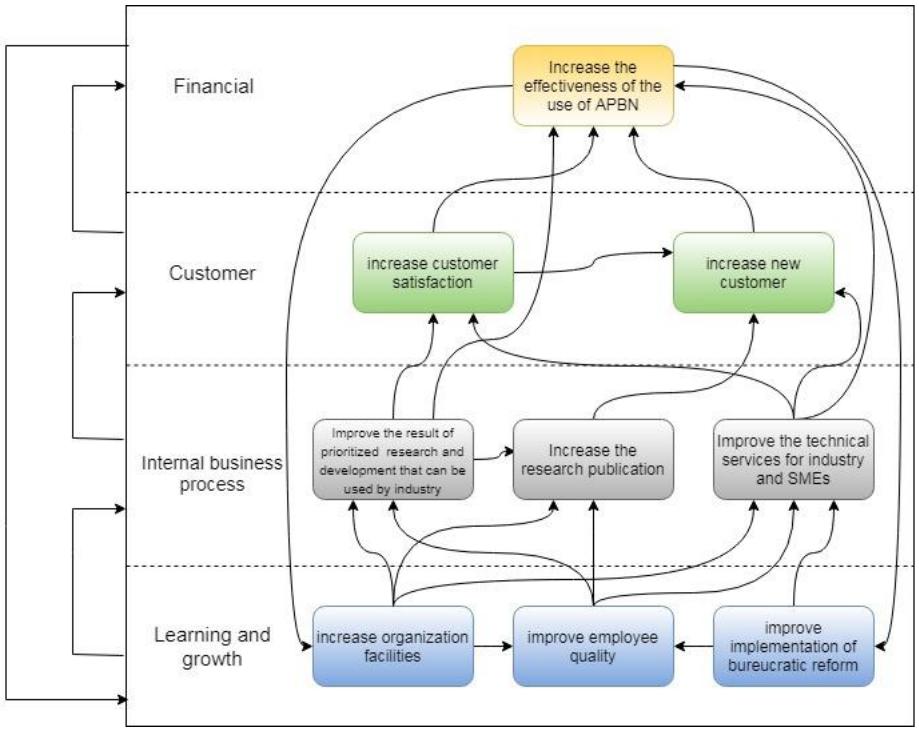


Figure 4.3 Strategy map

From the figure 4.3, it can be seen the relationship between each strategic objectives. The relationship between each strategic objective will become a consideration for determining the weight of each strategy.

4.2.3 Determining Key Performance Indicator (KPI)

After the strategy map has been designed, the next step is determining the key performance indicator (KPI). KPI is an indicator that uses to measure how well the strategy is achieved. Determined KPI must be relevant to the strategic objectives. In order to make good indicator, KPI should follow SMART rules which are specific, measurable, achievable, realistic, and time-bound.

Below is the table that shows the key performance indicator of BARISTAND Surabaya.

Table 4.2 KPI of BARISTAND Surabaya

Perspective	Index	KPI
Financial	**F1-A**	Revenue
	F1-B	Absorption of APBN budget
Customer	**C1-A**	Customer satisfaction level
	C1-B	The amount of customer complain
	C2-A	The amount of new customer
Internal Business Process	**I1-A**	The amount of research that can be implemented
	I1-B	The amount of technology or research that can be solved an industry problem
	I1-C	The amount of partnership with industry
	I2-A	The amount of research that published in a national journal
	I2-B	The amount of research that published in the international journal
	I3-A	The number of people/ industry that has been trained
	I3-B	The amount of sample testing (electronic and telematic sector)
	I3-C	The amount of sample testing (nonelectronic sample)
	I3-D	The amount of certificate published
	I3-E	The amount of calibration test (electronic tools)
	I3-F	The amount of calibration test (nonelectronic tools)
Learning and growth	**L1-A**	The amount of training that followed by employee
	L2-A	The amount of added facilities
	L3-A	SPIP maturity level

From Table 4.2, it can be seen that each strategic objectives have at least 1 key performance indicator. From 9 strategic objectives, it can be seen that there

are 20 key performance indicators that have been determined. The next step is determining the unit and the target for each KPI. The target of KPI must be relevant to the existing condition of the organization. Below is the table that shows the KPIs alongside with the units and targets.

Table 4.3 KPI with the units and targets

Perspective	Index	KPI	Unit	Target
Financial	**F1-A**	Revenue	Rp	13,092,111,600
	F1-B	Absorption of APBN budget	%	95%
Customer	**C1-A**	Customer satisfaction level	scale	3.6
	C1-B	The amount of customer complain	%	3%
	C2-A	The amount of new customer	Amount	
Internal Business Process	**I1-A**	The amount of research that can be developed	Amount	1
	I1-B	The amount of research that can be implemented	Amount	1
	I1-C	The amount of technology or research that can be solved an industry problem	Amount	1
	I1-D	The amount of partnership with industry	Amount	1
	I2-A	The amount of research that published in a national journal	Amount	3
	I2-B	The amount of research that published in the international journal	Amount	2
	I3-A	The number of people/ industry that has been trained	Amount	60
	I3-B	The amount of sample testing (electronic and telematics sector)	Amount	1300
	I3-C	The amount of sample testing (non-electronic sample)	Amount	5200
	I3-D	The amount of certificate published	Amount	100
	I3-E	The amount of calibration test (electronic tools)	Amount	100
	I3-F	The amount of calibration test (non- electronic tools)	Amount	550
learning and growth	**L1-A**	The amount of training that followed by the employee	Amount	20
	L2-A	The amount of added facilities	Package	3
	L3-A	SPIP maturity level	Scale	3.2

4.2.4 Determining KPI Properties

After the strategic objectives and the KPI have been identified, the next step is determining the properties for each KPI. KPI properties are the explanation for each KPI in detail. KPI properties consist of several elements which are: KPI index, unit, target, formulation, description, measurement and review frequency, PIC, and KPI owner. Below is the table that shows the KPI properties for BARISTAND Surabaya.

Table 4.4 KPI properties

Perspective	Index	Strategic Objectives	Index	KPI	Unit	Characteristic	Formula	Target	Description	Measurement Freq	Review Freq	PIC	Data source	KPI owner
Financial	**F1**	Increase the effectiveness of the use of APBN	**F1-A**	Revenue (PNBP)	Rp	higher is better	the total amount of money from services	13,092,111,600	revenue means PNBP (penerimaan negara bukan pajak). From the services	1 year	3 month	head of administration	financial report	Administration Division
			F1-B	Absorption of APBN budget	%	higher is better	(absorption of APBN/ total APBN budget) x 100%	95%	absorption from the given budget from the government	1 year	3 month	head of administration	financial report	Administration Division
Customer	**C1**	Increase customer satisfaction	**C1-A**	Customer satisfaction level	scale	higher is better	questionnaire of customer satisfaction (scale 1-4)	3.6	the level of customer satisfaction	1 year	3 month	head of technical services	questionnaire result	Technical Services Division
			C1-B	The amount of customer complain	%	lower is better	(total complain/total customer)x100%	3%	the amount of complaints from customer	1 year	3 month	head of technical services	complain report	Technical Services Division

Table 4.5 KPI Properties (Cont'd)

Perspective	Index	Strategic Objectives	Index	KPI	Unit	Characteristic	Formula	Target	Description	Measurement Freq	Review Freq	PIC	Data source	KPI owner
Internal Business Process	**I1**	Improve the result of prioritized research and development that can be used by industry	**I1-A**	the amount of research that can be developed	amount	higher is better	amount of research	1	amount of prioritized research based on RIPIN that can be developed	1 year	3 month	head of industrial technology	annual report	industrial technology division
			I1-B	The amount of research that can be implemented	Amount	Higher is better	amount of research	1	amount of research from the previous year that can be implemented	1 year	3 month	head of industrial technology	annual report	industrial technology division
			I1-C	The amount of technology or research that can be solved an industry problem	Amount	Higher is better	amount of tech/ research	1	amount of tech/ research that can solve an industry problem	1 year	3 month	head of industrial technology	annual report	industrial technology division

Table 4.6 KPI Properties (Cont'd)

Perspective	Index	Strategic Objectives	Index	KPI	Unit	Characteristic	Formula	Target	Description	Measurement Freq	Review Freq	PIC	Data source	KPI owner
			I1-D	The amount of partnership with industry	Amount	Higher is better	amount of partnership	1	amount of partnership with industry	1 year	3 month	head of industrial technology	annual report	industrial technology division
	I2	Increase the research publication	**I2-A**	The amount of research that published in a national journal	Amount	Higher is better	amount of research	3	amount of research that accreditated by a national institution	1 year	3 month	head of industrial technology	annual report	industrial technology division
			I2-B	The amount of research that published in the international journal	Amount	Higher is better	amount of research	2	amount of research that accredited by a global institution	1 year	3 month	head of industrial technology	annual report	industrial technology division

Table 4.7 KPI Properties (cont'd)

Perspective	Index	Strategic Objectives	Index	KPI	Unit	Characteristic	Formula	Target	Description	Measurement Freq	Review Freq	PIC	Data source	KPI owner
	I3	Improve the technical services for industry and SMEs	**I3-A**	the number of people/ industry that has been trained	Amount	Higher is better	amount of people/industry	60	the number of people/industry trained by Baristand	1 year	3 month	head of program and competency development	annual report	program and competency development division
			I3-B	the amount of sample testing (electronic and telematic sector)	Amount	Higher is better	amount of electronic sample	1300	the amount of sample that tested in the electronic lab	1 year	3 month	head of certification and standardization	annual report	certification and standardization division
			I3-C	the amount of sample testing (nonelectronic sample)	Amount	Higher is better	amount of nonelectronic sample	5200	the amount of sample that tested in another lab	1 year	3 month	head of certification and standardization	annual report	certification and standardization division

Table 4.8 KPI Properties (cont'd)

Perspective	Index	Strategic Objectives	Index	KPI	Unit	Characteristic	Formula	Target	Description	Measurement Freq	Review Freq	PIC	Data source	KPI owner
			I3-D	the amount of certificate published	Amount	Higher is better	amount of certificate	100	the amount of product certificate and ISO certificate that produced	1 year	3 month	head of certification and standardization	annual report	certification and standardization division
			I3-E	the amount of calibration test (electronic tools)	Amount	Higher is better	amount of test (electronic)	100	the amount of electronic tools that calibrated by Baristand	1 year	3 month	head of certification and standardization	annual report	certification and standardization division
			I3-F	the amount of calibration test (nonelectronic tools)	Amount	Higher is better	amount of test (non electronic)	550	the number of nonelectronic tools that calibrated by Baristand	1 year	3 month	head of certification and standardization	annual report	certification and standardization division

Table 4.9 KPI Properties (cont'd)

Perspective	Index	Strategic Objectives	Index	KPI	Unit	Characteristic	Formula	Target	Description	Measurement Freq	Review Freq	PIC	Data source	KPI owner
Learning and Growth	L1	Improve employees competency	L1-A	the amount of training that followed by employee	Amount	higher is better	amount of training	20	amount of training from internal and external	1 year	3 month	head of administration	administration report	Administration Division
	L2	Increase organization facilities	L2-A	the amount of added facilities	Package	higher is better	amount of facilities	3	facilities that support business process	1 year	3 month	head of administration	annual report	Administration Division
	L3	Improve the implementation of bureaucratic reform (SPIP)	L3-A	SPIP maturity level	Scale	higher is better	questionnaire of SPIP implementation (scale : 1-5)	3.2	questionnaire about bureaucratic reform	1 year	3 month	head of administration	annual report	Administration Division

Below is the further explanation about each KPI that is used in BARISTAND Surabaya.

4.2.4.1 Revenue (PNBP)

The first KPI is revenue. Revenue is the income for the organization that gets from the services. It is also known as "Penerimaan Negara Bukan Pajak"(PNBP). This KPI is one of the indicators for measure the first strategic objective, increase the effectiveness of the use of APBN. The formula for this KPI is the total amount of money that is gotten from the services. The target for this KPI is increasing 20% every year from the year before.

4.2.4.2 Absorption of APBN budget

Since BARISTAND Surabaya is one of the organizations below government, so that, every year, the organization gets funding from the government in the form of APBN. The absorption of the budget must be used effectively based on the planning at the beginning of the year. For example, if the budget is Rp 10.000.000.000,-, at the end of the year, all of that money must be used and can be accounted for.

Formula: (Absorption of APBN) / (total budget of APBN) × 100%

4.2.4.3 Customer satisfaction level

Customer satisfaction level is the feedback from the customer after using services in BARISTAND Surabaya. in order to know the satisfaction level of the customer, there will be survey through a questionnaire that is given to the customer after using the services. The questionnaire is available in the attachment. The scoring system for the questionnaire is using a scale from 1-4. 1 stands for very bad and 4 stands for very good.

4.2.4.4 Customer complain

Customer complains is the feedback from the customer because of bad services from the BARISTAND Surabaya. The organization must give the effort to minimize complain from the customer. The characteristics of this KPI is lower is better.

$$Formula = \frac{The\ amount\ of\ complain}{The\ amounf\ of\ transaction} \times 100\%$$

4.2.4.5 New Customer

KPI of a new customer is used to know how many new customer/ industry that uses BARISTAND Surabaya services. This KPI will shows the growth of the market.

Formula: total customer year n – total customer year (n-1)

4.2.4.6 The amount of research that can be developed

Research that can be developed is research that is made in the current year that supports a prioritized industry based on "Rencana Induk Pembangunan Industri Nasional" (RIPIN). It is counted as successful research when meeting the criteria from the BPPI.

4.2.4.7 The amount of research that can be implemented

Research that can be implemented is research from last 5 years that can be used by industry in the current year. There must be contract/.statement from the industry as approval that the research is useful.

4.2.4.8 The amount of technology/research that can solve an industry problem

Technology that can solve industry problem is the result of research that can solve industry problem based on a request from the industry. There must be a statement that explains the problem has been solved.

4.2.4.9 The amount of partnership with industry

This KPI is the partnership with industry that made in the current year. The partnership must have resulted in the form of technology package or development.

4.2.4.10 The amount of research that published in the national journal.

This KPI measures the amount of research that accredited by a national institution such as LIPI and DIKTI.

4.2.4.11 The amount of research that published in the international journal

This KPI measures the amount or research that accredited by the global institution (Scopus).

4.2.4.12 The number of people/ industry that has been trained.

This KPI measures the number of people/industry that follow the training that is conducted by BARISTAND Surabaya. training is one of the services that is provided.

4.2.4.13 The amount of sample testing (electronic and telematic sector)

This KPI measures the amount of sample that is tested in the electrical laboratory. Since the vision of BARISTAND Surabaya focus on electronic and telematics so that electronic and telematic sample must be separated from the other samples.

4.2.4.14 The amount of sample testing (nonelectronic and telematic sector)

This KPI measures the amount of sample that is tested in laboratory except electrical laboratory.

4.2.4.15 The amount of published certificate

This KPI measures the amount of product certificate and ISO certificate that is published in 1 year.

4.2.4.16 The amount of calibration testing (electronic tools)

This KPI measures the amount of calibration testing for electronic tools. There are some kinds of tools that can be calibrated in BARISTAND Surabaya such as length, mass, volumetric, temperature, pressure force, and electricity. The vision of BARISTAND Surabaya focused on the electronic sector so that electricity tools must be separated with the other tools.

4.2.4.17 The amount of calibration testing (nonelectronic tools)\

This KPI measures the amount of calibration testing for all tools except electricity tools.

4.2.4.18 The amount of training that followed by the employee

This KPI measures the amount of training that followed by the employee in 1 year. The training can be both from internal and external.

4.2.4.19 The amount of added facilities

This KPI measures the amount of added facilities that support the business process of the organization

4.2.4.20 SPIP maturity level

This KPI measures the maturity level of SPIP implementation in order to improve the implementation of bureaucratic reform. There will be survey through a questionnaire to know the maturity level. The questionnaire is made by the government and there is a special team that will assess the organization. There are some criteria that need to follow.

4.2.5 Weighting KPI

After the KPI is determined, the next step is weighing the KPI. The process of weighting is done by using analytical network process (ANP). ANP is using for weighting the perspective and the strategic objectives of the organization. The process of weighting using ANP is using super decision software. The weighting of the KPI is using expert judgments from the head of the organization.

The data that is needed to do the weighting process is a relationship between each element and the result of the questionnaire that shows the priorities of each element. There will be some subchapter that explains the step of weighing process which is designing initial model, designing pairwise comparison matrix, designing supermatrix and identification of final priorities of each element.

4.2.5.1 Designing initial model

In this subchapter, there will be the identification of the relationship between each element and cluster. The strategic objective is the element while the perspective is the cluster. Every cluster consists of some elements. After the cluster and the element have been decided in the previous subchapter, the next step if identify the relationship between element from the strategy map. Below is the table that shows the relationship between each element.

Table 4.10 relationship between each element

The element that gives effect to others	Elements that are affected by others								
	Index	**F1**	**C1**	**C2**	**I1**	**I2**	**I3**	**L1**	**L2**	**L3**
	F1								√	√
	C1	√		√						
	C2	√								
	I1	√	√			√				
	I2			√						
	I3	√	√	√						
	L1				√	√	√			
	L2				√	√	√	√		
	L3						√	√		

From the table 4.5, it can be seen that there are 21 relations between elements. There are 2 types of relationship which is the relationship between elements in the same cluster and the relationship between elements in the different cluster. For a better explanation, below is the table that explains each relationship between each element.

Table 4.11 explanation of the relationship between element

Index	Affected By	Explanation
F1	**C1**	customer satisfaction will give good impact to increase the revenue of the organization
	C2	the new customer will increase the revenue
	I1	doing research will optimize the use of APBN
	I3	doing technical services will optimize the use of APBN and also getting revenue from the services
C1	**I1**	the process of partnership or problem solving that is done by the organization will affect the satisfaction of the customer
	I3	the process of technical services that are done by the organization will affect the satisfaction of the customer
C2	**C1**	customer satisfaction will give good impact to the possibility of getting a new customer
	I2	the publication of the journal will draw the attention of industry to become the customer
	I3	technical services including doing training in many industries will draw the attention to the industry/ SMEs/people to become a new customer
I1	**L1**	the competency of the employee will significant to the implementation of the research
	L2	the facilities of the organization will support the research and development activities

Table 4.12 explanation of the relationship between element (cont'd)

Index	Affected By	Explanation
I2	**L1**	the competency of the employee will significant to the amount of published journal/research
	L2	the facilities of the organization will support the publication activities
I3	**L1**	the competency of the employee will support the activities of technical services
	L2	the facilities of the organization will give significant impact to the activities of technical services
	L3	implementation of "SPIP" will support the activities of technical services
L1	**L2**	facilities of the organization will support the effort to improve the employee's competency
	L3	implementation of "SPIP " will describe how good the employee competency
L2	**F1**	the amount of the budget will support the improvement of facilities
L3	**F1**	the amount of the budget will support the implementation of SPIP

After the relationship between each element has been identified, the next step is to do the weighting process using super decision software Ver 3.0. The first step is designing initial model. Below is the figure that shows the initial model.

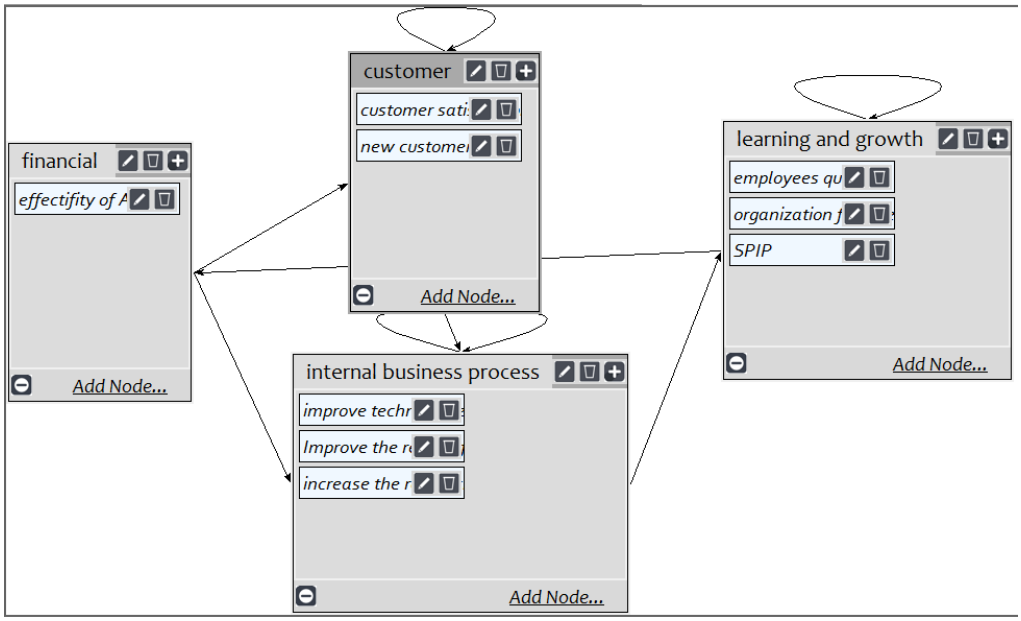


Figure 4.4 Design of initial model

From the figure above, it can be seen that there are 4 clusters in which follow balanced scorecard perspectives and there are 9 elements which represent

the strategic objectives of the organization. The next step is determining pairwise comparison matrix.

4.2.5.2 Determining pairwise comparison matrix

In this step, the pairwise comparison is done in order to know the relationship between elements and between clusters. There will be a questionnaire that filled by the head of BARISTAND Surabaya. The questionnaire consists of question about the pairwise comparison between element and cluster. There are 4 questions about the comparison between the cluster and 7 questions about the comparison between elements. The question is obtained from software super decisions based on the initial model that has been made in the previous subchapter. The questionnaire is available in the attachment.

Then the next step is processing the data through super decision software. Below is the example of the scoring system in software super decision.

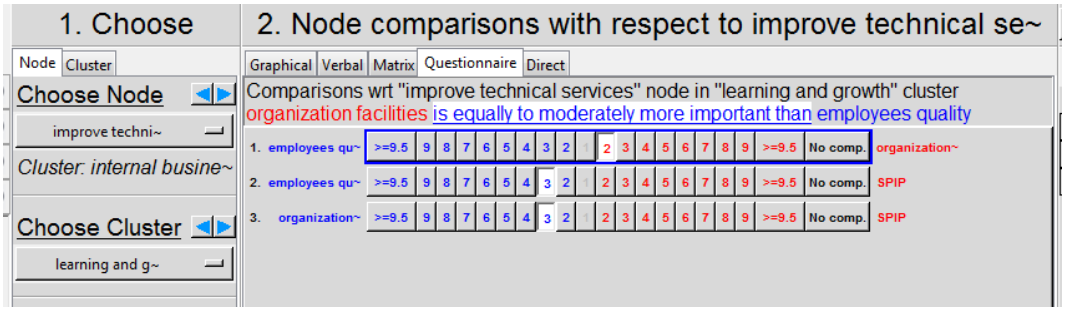


Figure 4.5 example of scoring system in super decision software

From the figure above, it can be seen the step to give the score using ANP. The figure above is one of the examples of the question that given to the head of BARISTAND Surabaya. the recapitulation of the input is available in the attachment.

After all the question about priorities has been filled, software super decision will calculate automatically about eigenvector and inconsistency value. Below is the figure that shows the eigenvector and inconsistency value of pairwise comparison that influences technical services element.

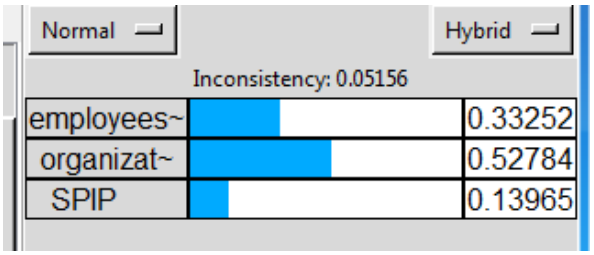


Figure 4.6 inconsistency level that between element in the learning and growth perspective

From the figure above it can be seen the eigenvector and also the inconsistency level of the cluster. The other value of the pairwise comparison is available in the attachment.

Then, the next step is calculating pairwise comparison between clusters. Below is the example of a question for cluster comparison.

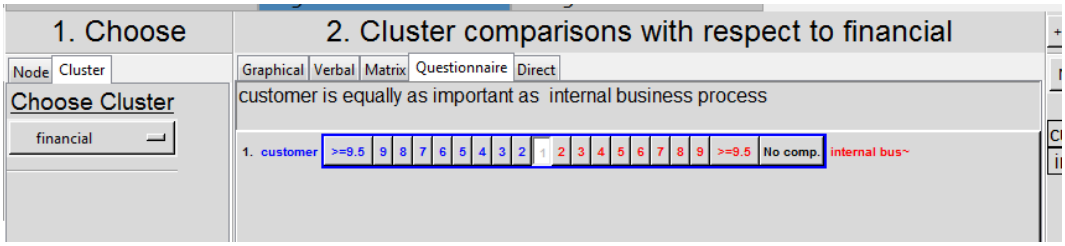
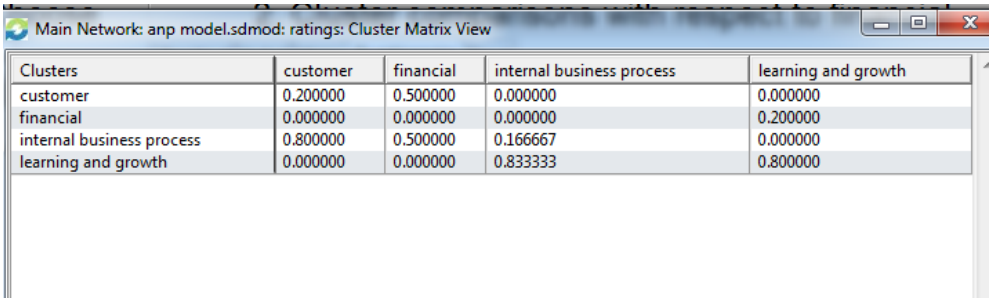


Figure 4.7 Example of comparison between cluster

The figure above explains the scoring system between cluster. It can be seen that financial perspective is affected by customer perspectives and internal business process perspectives. The relationship between customer and the internal business process is equally important related to financial perspectives. All the relationship between clusters is available in the attachment. Software super decision calculates automatically the relationship between cluster. It can be seen in the cluster matrix. Below is the figure that shows the cluster matrix.



Clusters	customer	financial	internal business process	learning and growth
customer	0.200000	0.500000	0.000000	0.000000
financial	0.000000	0.000000	0.000000	0.200000
internal business process	0.800000	0.500000	0.166667	0.000000
learning and growth	0.000000	0.000000	0.833333	0.800000

Figure 4.8 Cluster matrix

From the figure above it can be seen the value for each cluster matrix. If the value is 0, it means that there is no relationship between those clusters. for

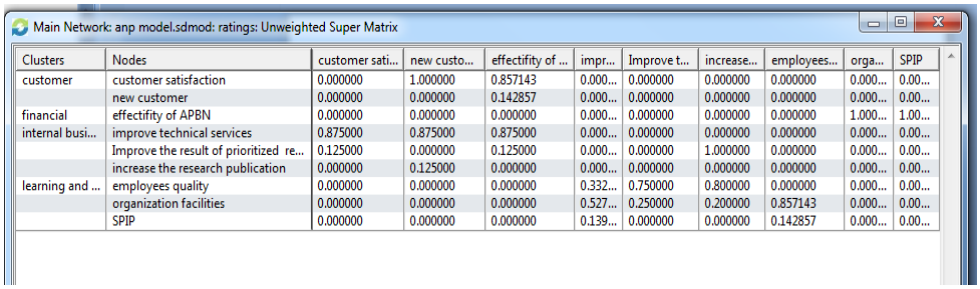
example cluster learning and growth is not affected by cluster customer, so that the value is 0.

4.2.5.3 Determining supermatrix

The next step is determining the supermatrix. There are 3 processes in order to design supermatrix, the first is designing unweighted supermatrix, the second is weighted supermatrix, and the last is limit supermatrix.

a. Designing Unweighted supermatrix

Unweighted supermatrix shows the relationship between each element alongside with the value of how strong the relationship is. The value is obtained from the pairwise comparison in the previous subchapter. Below is the figure that shows unweighted supermatrix from super decision software.



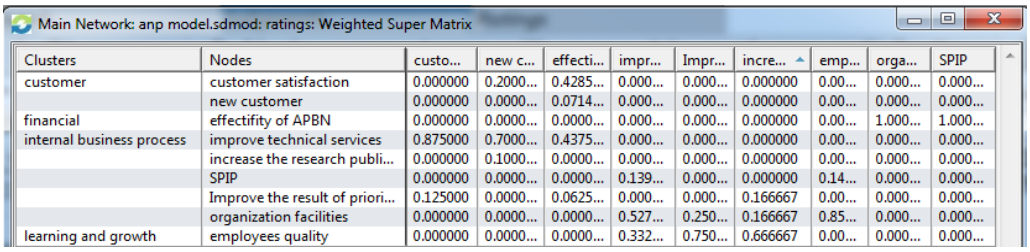
Clusters	Nodes	customer sati...	new custo...	effectifity of ...	impr...	Improve t...	increase...	employees...	orga...	SPIP
customer	customer satisfaction	0.000000	1.000000	0.857143	0.000...	0.000000	0.000000	0.000000	0.000...	0.00...
	new customer	0.000000	0.000000	0.142857	0.000...	0.000000	0.000000	0.000000	0.000...	0.00...
financial	effectifity of APBN	0.000000	0.000000	0.000000	0.000...	0.000000	0.000000	0.000000	1.000...	1.00...
internal busi...	improve technical services	0.875000	0.875000	0.875000	0.000...	0.000000	0.000000	0.000000	0.000...	0.00...
	Improve the result of prioritized re...	0.125000	0.000000	0.125000	0.000...	0.000000	1.000000	0.000000	0.000...	0.00...
	increase the research publication	0.000000	0.125000	0.000000	0.000...	0.000000	0.000000	0.000000	0.000...	0.00...
learning and ...	employees quality	0.000000	0.000000	0.000000	0.332...	0.750000	0.800000	0.000000	0.000...	0.00...
	organization facilities	0.000000	0.000000	0.000000	0.527...	0.250000	0.200000	0.857143	0.000...	0.00...
	SPIP	0.000000	0.000000	0.000000	0.139...	0.000000	0.000000	0.142857	0.000...	0.00...

Figure 4.9 Unweighted supermatrix

From the figure above, it can be seen the existence of a relationship between each element. After unweighted supermatrix has been designed, the next step is designing weighted supermatrix.

b. Weighted Supermatrix

Weighted supermatrix is obtained by multiplying every element in unweighted supermatrix with the value in the clustered weighted matrix so that the value in weighted supermatrix is 1. Below is the table that shows the calculation of weighted supermatrix through super decision software


Main Network: anp model.sdmod: ratings: Weighted Super Matrix

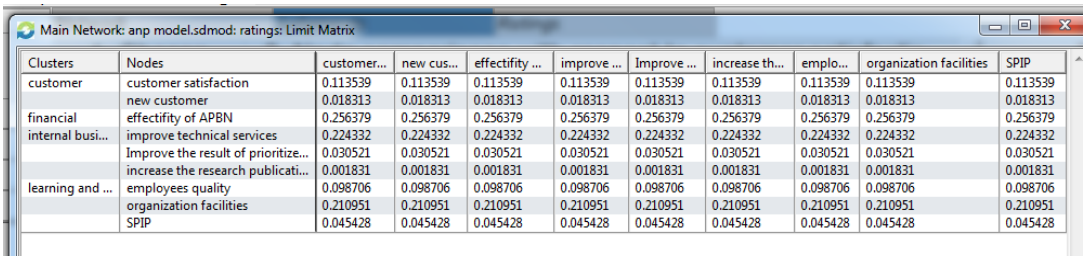
Clusters	Nodes	custo...	new c...	effecti...	impr...	Impr...	incre...	emp...	orga...	SPIP
customer	customer satisfaction	0.000000	0.2000...	0.4285...	0.000...	0.000...	0.000000	0.00...	0.000...	0.000...
	new customer	0.000000	0.0000...	0.0714...	0.000...	0.000...	0.000000	0.00...	0.000...	0.000...
financial	effectifity of APBN	0.000000	0.0000...	0.0000...	0.000...	0.000...	0.000000	0.00...	1.000...	1.000...
internal business process	improve technical services	0.875000	0.7000...	0.4375...	0.000...	0.000...	0.000000	0.00...	0.000...	0.000...
	increase the research publi...	0.000000	0.1000...	0.0000...	0.000...	0.000...	0.000000	0.00...	0.000...	0.000...
	SPIP	0.000000	0.0000...	0.0000...	0.139...	0.000...	0.000000	0.14...	0.000...	0.000...
	Improve the result of priori...	0.125000	0.0000...	0.0625...	0.000...	0.000...	0.166667	0.00...	0.000...	0.000...
	organization facilities	0.000000	0.0000...	0.0000...	0.527...	0.250...	0.166667	0.85...	0.000...	0.000...
learning and growth	employees quality	0.000000	0.0000...	0.0000...	0.332...	0.750...	0.666667	0.00...	0.000...	0.000...

Figure 4.10 Calculation of weighted supermatrix

From the figure above, it can be seen the value of influence between each element. After weighted supermatrix has been designed, the next step is designing limit supermatrix.

c. Limit Supermatrix.

In this step, there will be a judgment about limited weight value for each element. The calculation will be done automatically through software super decisions. Below is the figure that shows the result of limit supermatrix calculation through super decision software.


Main Network: anp model.sdmod: ratings: Limit Matrix

Clusters	Nodes	customer...	new cus...	effectifity ...	improve ...	Improve ...	increase th...	emplo...	organization facilities	SPIP
customer	customer satisfaction	0.113539	0.113539	0.113539	0.113539	0.113539	0.113539	0.113539	0.113539	0.113539
	new customer	0.018313	0.018313	0.018313	0.018313	0.018313	0.018313	0.018313	0.018313	0.018313
financial	effectifity of APBN	0.256379	0.256379	0.256379	0.256379	0.256379	0.256379	0.256379	0.256379	0.256379
internal busi...	improve technical services	0.224332	0.224332	0.224332	0.224332	0.224332	0.224332	0.224332	0.224332	0.224332
	Improve the result of prioritize...	0.030521	0.030521	0.030521	0.030521	0.030521	0.030521	0.030521	0.030521	0.030521
	increase the research publicati...	0.001831	0.001831	0.001831	0.001831	0.001831	0.001831	0.001831	0.001831	0.001831
learning and ...	employees quality	0.098706	0.098706	0.098706	0.098706	0.098706	0.098706	0.098706	0.098706	0.098706
	organization facilities	0.210951	0.210951	0.210951	0.210951	0.210951	0.210951	0.210951	0.210951	0.210951
	SPIP	0.045428	0.045428	0.045428	0.045428	0.045428	0.045428	0.045428	0.045428	0.045428

Figure 4.11 Result of limit supermatrix

From the figure above, it can be seen that the value in each row already same, it means that the calculation is already stable. After the value of limit supermatrix already stable, the next step is determining final priorities of each element.

4.2.5.4 Identification of final priorities of each element

In this subchapter, there will be an explanation about how to get the final weight for each element. It is done by doing normalization. Normalization is done by multiplying the value of limit matrix with the total of matrix value in each cluster. The value of the limit matrix obtained from the previous subchapter. The next step is doing the addition of the limit matrix value which in the same cluster. Table 4.7 shows the calculation of the weight normalization.

Table 4.13 Normalization of the strategic objectives weight

Perspective	Strategic Objectives	Limit matrix	Cluster matrix	Weight normalization
Financial	Increase the effectiveness of the use of APBN	0.256379	0.256379	1
Customer	Increase customer satisfaction	0.113539	0.131852	0.861109426
	Increase new customer	0.018313		0.138890574
Internal Business Process	Improve the result of prioritized research and development that can be used by industry	0.030521	0.256684	0.118904957
	Increase the research publication	0.001831		0.007133285
	Improve the technical services for industry and SMEs	0.224332		0.873961758
learning and growth	Improve employees quality	0.098706	0.355085	0.277978512
	Increase organziation facilities	0.210951		0.594085923
	Improve the implementation of bureaucratic reform (SPIP)	0.045428		0.127935565

From the table above, it can be seen the weight for each perspective and each element. The perspective that has the highest weight is learning and growth with 35.5% and customer perspective is having the lowest weight of 13.2%. Below is the table that shows the weight of each perspective and element

Table 4.14 Perspective and strategic objectives weight

Perspective	Weight	Strategic Objectives	Weight
Financial	0.256379	Increase the effectiveness of the use of APBN	1
Customer	0.131852	Increase customer satisfaction	0.86110943
		Increase new customer	0.13889057
Internal Business Process	0.256684	Improve the result of prioritized research and development that can be used by industry	0.11890496
		Increase the research publication	0.00713328
		Improve the technical services for industry and SMEs	0.87396176
Learning and Growth	0.355085	Improve employees quality	0.27797851
		Increase organization facilities	0.59408592
		Improve the implementation of bureaucratic reform (SPIP)	0.12793556

After the weighting process of the perspectives and the KPI is done, the next step is weighing the KPI using expert judgments. In this case, expert judgments are done by doing brainstorming with the head of the organization, head of administrative division and staff of the administrative division.

Table 4.15 Weight for KPI

Perspective	Strategic Objectives	KPI	weight
Financial	Increase the effectiveness of the use of APBN	Revenue	0.5
		Absorption of APBN budget	0.5
Customer	Increase customer satisfaction	Customer satisfaction level	0.7
		The amount of customer complain	0.3
	Increase new customer	The amount of new customer	1
Internal Business Process	Improve the result of prioritized research and development that can be used by industry	the amount of research that can be developed	0.25
		The amount of research that can be implemented	0.25
		The amount of technology or research that can be solved an industry problem	0.25
		The amount of partnership with industry	0.25
	Increase the research publication	The amount of research that published in a national journal	0.5
		The amount of research that published in the international journal	0.5
	Improve the technical services for industry and SMEs	the number of people/ industry that has been trained	0.167
		the amount of sample testing (electronic and telematic sector)	0.167
		the amount of sample testing (nonelectronic sample)	0.167
		the amount of certificate published	0.167
		the amount of calibration test (electronic tools)	0.167
		the amount of calibration test (non electronic tools)	0.167
learning and growth	Improve employees quality	the amount of training conducted based on the program	1
	Increase organisation facilities	the amount of added facilities	1
	Improve the implementation of bureaucratic reform (SPIP)	SPIP maturity level	1

From the table above, it can be seen that each KPI has its weight. The total of weight in 1 strategic objective must be 1. For example, the strategic objective

of increasing customer satisfaction has 2 KPIs. The first KPI, customer satisfaction level has weight 0.7, while the second KPI, the amount of customer complaint has weight 0.3. so the total weight in 1 strategic objective will be 1.

4.2.6 Validation of the strategic objectives and KPI

After all the strategic objectives and the KPI alongside with the weighting process have been determined, the next step is doing validation. The validation process is done by doing a discussion with the head of the organization. The strategic objective and the KPI must be suitable for the need and the condition of the organization. The result of the validation is the whole design of the strategic objectives and KPI including the weighting process is valid.

4.2.7 Scoring System

After the weighting process and the validation is done, the performance measurement system is completed. It consists of perspective, strategic objective, and KPI. The next step is doing the scoring system. Scoring system is the simulation of the system by using the actual value of the KPI. In the scoring system, there are 2 kinds of characteristics, which are higher is better and lower is better. Higher is better means high achievement is good, while lower is better means low achievement is good.

The scoring system consists of the perspective, strategic objectives, and KPI alongside with the weight, actual score of KPI, and the score for the organization as a whole. KPI score obtained from the comparison between the actual value to the target then multiplied by the weight of perspective, the weight of SO and the weight of KPI. Below is the table that shows the scoring system for BARISTAND Surabaya

Table 4.16 Scoring system

Perspective	Perspective weight	SO index	SO weight	KPI index	KPI	Unit	Characteristic	KPI weight	Global weight	Actual condition (2017)	Target	KPI Score	*Weighted Score*	Perspective score	Final score
Financial	0.256379	**F1**	1	**F1-A**	Revenue	Rp	max	0.5	0.12819	10,910,093,000	13,092,111,600	0.833333	0.106825	0.916667	0.821641
				F1-B	Absorption of APBN budget	%	max	0.5	0.12819	99.28%	95%	1	0.12819		
Customer	0.131852	**C1**	0.8611094	**C1-A**	Customer satisfaction level	scale	max	0.7	0.079477	3.54	3.6	0.983333	0.078153	0.851063	
				C1-B	The amount of customer complain	%	min	0.3	0.034062	0%	3%	1	0.034062		
		C2	0.1388906	**C2-A**	The amount of new customer	Amount	max	1	0.018313	0	140	0	0		
Internal Business Process	0.256684	**I1**	0.118905	**I1-A**	The amount of research that can be developed	Amount	max	0.25	0.00763	1	1	1	0.00763	0.757223	
				I1-B	The amount of research that can be implemented	Amount	max	0.25	0.00763	1	1	1	0.00763		

Table 4.17 Scoring System (cont'd)

Perspective	Perspective weight	SO index	SO weight	KPI index	KPI	Unit	Characteristic	KPI weight	Global weight	Actual condition (2017)	Target	KPI Score	*Weighted Score*	Perspective score	Final score
				I1-D	The amount of partnership with industry	Amount	max	0.25	0.00763	1	1	1	0.00763		
		I2	0.0071333	**I2-A**	The amount of research that published in national journal	Amount	max	0.5	0.000916	13	3	1	0.000916		
				I2-B	The amount of research that published in international journal	Amount	max	0.5	0.000916	13	2	1	0.000916		
		I3	0.8739618	**I3-A**	The amount of people/ industry that has been trained	Amount	max	0.167	0.037463	89	60	1	0.037463		
				I3-B	The amount of sample testing (electronic and telematic sector)	Amount	max	0.167	0.037463	422	1300	0.324615	0.012161		

Table 4.18 Scoring System (cont'd)

Perspective	Perspective weight	SO index	SO weight	KPI index	KPI	Unit	Characteristic	KPI weight	Global weight	Actual condition (2017)	Target	KPI Score	*Weighted Score*	Perspective score	Final score
				I3-C	The amount of sample testing (non electronic sample)	Amount	max	0.167	0.037463	7490	5200	1	0.037463		
				I3-D	The amount of certificate published	Amount	max	0.167	0.037463	110	100	1	0.037463		
				I3-E	The amount of calibration test (electronic tools)	Amount	max	0.167	0.037463	0	100	0	0		
				I3-F	The amount of calibration test (non electronic tools)	Amount	max	0.167	0.037463	999	550	1	0.037463		
learning and growth	0.355085	**L1**	0.2779785	**L1-A**	The amount of training that followed by the employee	Amount	max	1	0.098706	21	30	0.7	0.069094	0.788671	
		L2	0.5940859	**L2-A**	The amount of added facilities	Package	max	1	0.210951	12	3	1	0.210951		
		L3	0.1279356	**L3-A**	SPIP maturity level	Scale	max	1	0.045428	0	3.2	0	0		

Table above is using data from 2017, there are some new KPI like a new customer, SPIP implementation, separation of calibration and sample test, so that, some of the data are not available. In this system, when the data is not available, it will be assumed as 0. After the scoring system has been designed, the score of the KPI will be categorized using traffic light system.

4.2.8 Traffic Light System

After the scoring system has been determined, the next step is determining the traffic light system. Traffic light system gives the sign for the actual condition of the KPI. There are three indicators which are red, yellow, and green. Below is the table that gives an explanation about traffic light system.

Table 4.19 Traffic light system indicator

Traffic light system		
Indicator	**Explanation**	**Score**
Red	Need to be prioritized	0-0.59
Yellow	Need to be improved	0.6-0.99
Green	Need to be maintained	1

From the table above, it can be seen that each indicator has its own score. The indicator is obtained from the discussion with the organization. Below is the table that shows the traffic light system for performance measurement system in BARISTAND Surabaya.

Table 4.20 Traffic light system in BARISTAND Surabaya

KPI index	KPI	Score KPI
F1-A	Revenue	0.8333333
F1-B	Absorption of APBN budget	1
C1-A	Customer satisfaction level	0.9833333
C1-B	The amount of customer complain	1
C2-A	The amount of new customer	0
I1-A	The amount of research that can be developed	1
I1-B	The amount of research that can be implemented	1
I1-C	The amount of technology or research that can be solved an industry problem	1
I1-D	The amount of partnership with industry	1
I2-A	The amount of research that published in a national journal	1
I2-B	The amount of research that published in the international journal	1
I3-A	The number of people/ industry that has been trained	1
I3-B	The amount of sample testing (electronic and telematic sector)	0.3246154
I3-C	The amount of sample testing (non electronic sample)	1
I3-D	The amount of certificate published	1

Table 4.21 Traffic light system in BARISTAND Surabaya (cont'd)

KPI index	KPI	Score KPI
I3-E	The amount of calibration test (electronic tools)	0
I3-F	The amount of calibration test (non electronic tools)	1
L1-A	The amount of training that followed by the employee	0.7
L2-A	The amount of added facilities	1
L3-A	SPIP maturity level	0

From the table above, it can be seen there are some KPI that is in the red zone. Some of the data for those KPIs are not available so that it assumes 0. Most of the KPI already successful, there are 13 KPI that is in the green zone. After traffic light system already designed, the last step is designing the dashboard for the performance measurement system.

4.2.9 Dashboard of the System

After all the system from strategic objectives until the scoring system has been determined, then the last step in the data processing is designing the dashboard of the system. The dashboard is used to visualize the performance measurement system. It is expected that the dashboard will make the user easier to both see and update the data.

The dashboard is built by using macro excel and VBA software. The dashboard consists of strategic objectives, strategy map, KPI, KPI properties, and scoring system. Below is the figure of the dashboard of the performance measurement system in BARISTAND Surabaya.

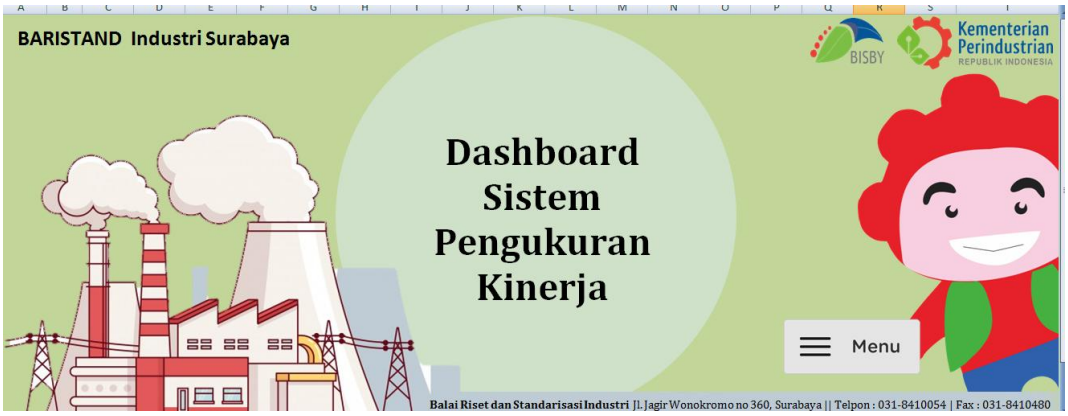
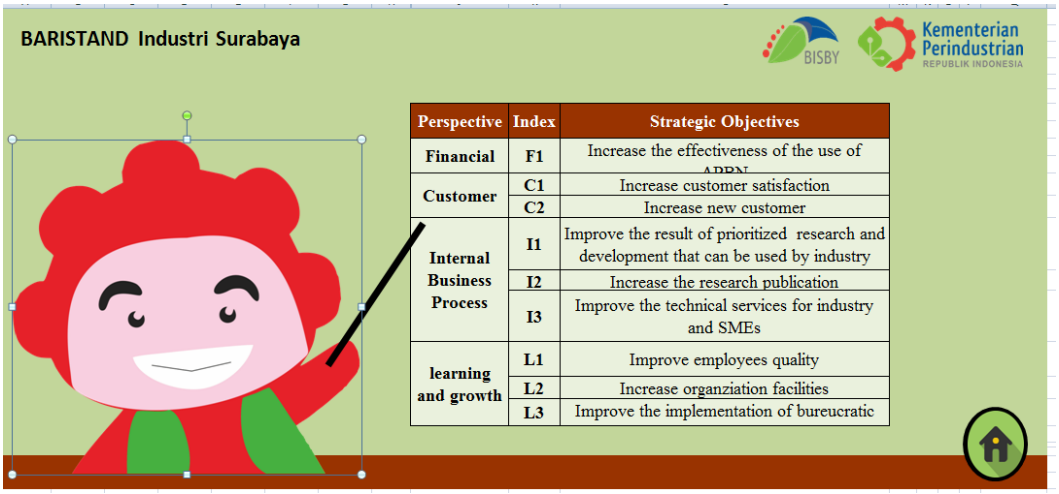


Figure 4.12 Interface of the home menu

From the figure 4.12, it can be seen the home page of the dashboard of the performance measurement system. There is the button for the menu to go to the next part.

Figure 4.13 Interface Menu

From the figure 4.13, it can be seen the interface of the menu. There are 5 menus which are: strategic objectives, strategy map, KPI, KPI properties, the scoring system.



Perspective	Index	Strategic Objectives
Financial	F1	Increase the effectiveness of the use of APBN
Customer	C1	Increase customer satisfaction
	C2	Increase new customer
Internal Business Process	I1	Improve the result of prioritized research and development that can be used by industry
	I2	Increase the research publication
	I3	Improve the technical services for industry and SMEs
learning and growth	L1	Improve employees quality
	L2	Increase organziation facilities
	L3	Improve the implementation of bureucratic

Figure 4.14 Interface of strategic objective

From Figure 4.14, it can be seen the interface of strategic objectives page. The next is the figure of strategy map interface.

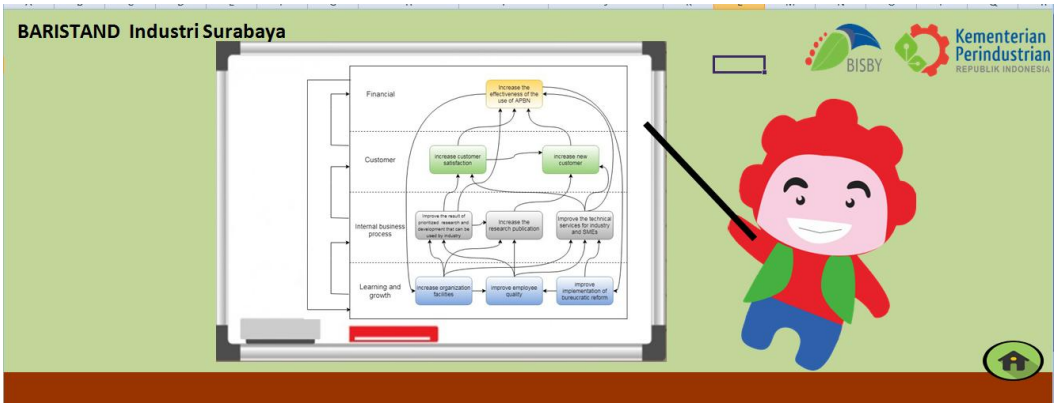
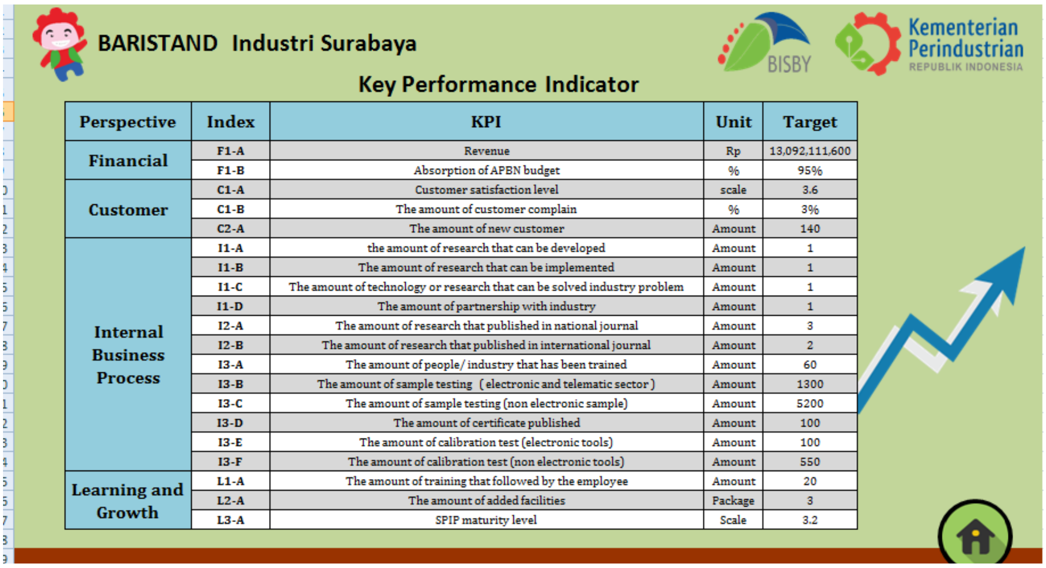


Figure 4.15 Strategy map interface

From the figure 4.15, it can be seen the interface of the strategy map. The next is the interface for key performance indicator.



Perspective	Index	KPI	Unit	Target
Financial	F1-A	Revenue	Rp	13,092,111,600
	F1-B	Absorption of APBN budget	%	95%
Customer	C1-A	Customer satisfaction level	scale	3.6
	C1-B	The amount of customer complain	%	3%
	C2-A	The amount of new customer	Amount	140
Internal Business Process	I1-A	the amount of research that can be developed	Amount	1
	I1-B	The amount of research that can be implemented	Amount	1
	I1-C	The amount of technology or research that can be solved industry problem	Amount	1
	I1-D	The amount of partnership with industry	Amount	1
	I2-A	The amount of research that published in national journal	Amount	3
	I2-B	The amount of research that published in international journal	Amount	2
	I3-A	The amount of people/ industry that has been trained	Amount	60
	I3-B	The amount of sample testing (electronic and telematic sector)	Amount	1300
	I3-C	The amount of sample testing (non electronic sample)	Amount	5200
	I3-D	The amount of certificate published	Amount	100
	I3-E	The amount of calibration test (electronic tools)	Amount	100
	I3-F	The amount of calibration test (non electronic tools)	Amount	550
Learning and Growth	L1-A	The amount of training that followed by the employee	Amount	20
	L2-A	The amount of added facilities	Package	3
	L3-A	SPIP maturity level	Scale	3.2

Figure 4.16 KPI interface

From Figure 4.16, it can be seen the interface of KPI. The next is the interface of KPI properties.

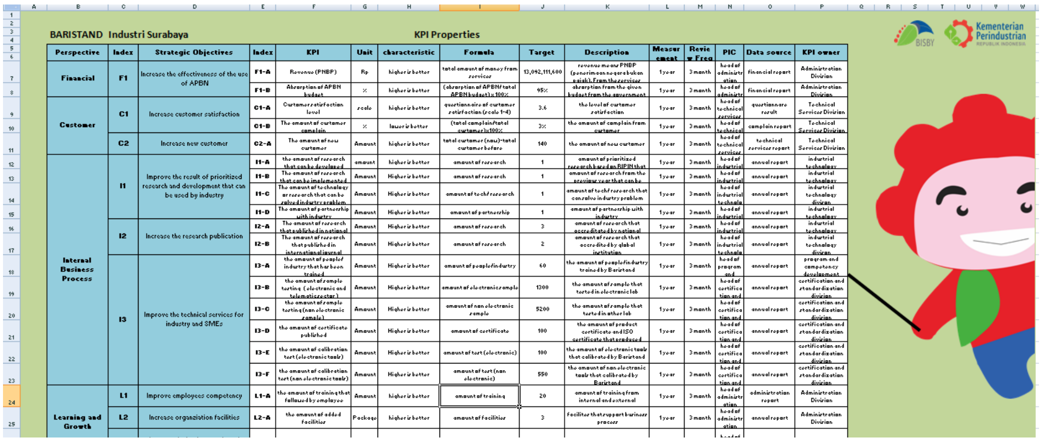


Figure 4.17 Interface of KPI properties

From Figure 4.17, it can be seen the interface of KPI properties. The next is the interface of the scoring system.

Figure 4.18 Interface of the scoring system

From Figure 4.18, it can be seen the interface of the scoring system. In the scoring system, the user can choose the department to input the KPI based on the department. Below is one of the examples of interface in the department.

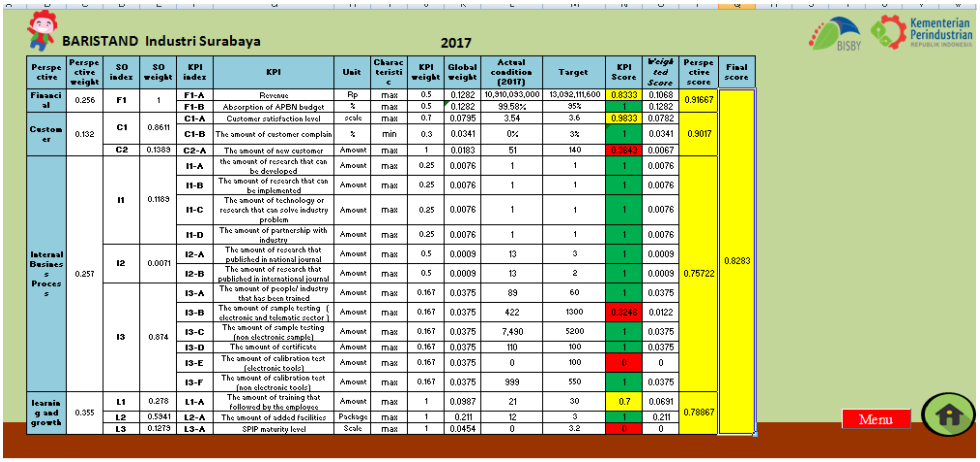
KPI C1-A	Tingkat Kepuasan Pelanggan				
Bulan	2016	2017	2018	2019	2020
Triwulan I	3.63	3.54	0	0	0
Triwulan II	3.63	3.54	0	0	0
Triwulan III	3.63	3.54	0	0	0
Triwulan IV	3.63	3.54	0	0	0
Total	3.63	3.54	0	0	0

KPI C1-B	Jumlah Komplain Pelanggan				
Bulan	2016	2017	2018	2019	2020
Januari		0			
Februari		0			
Maret		0			
April		0			
Mei		0			
Juni		0			
Juli		0			
Agustus		0			
September		0			
Oktober		0			
November		0			
Desember		0			
Total	0	0	0	0	0
Total Pelanggan	1200	1396	1	1	1
Achievement	0.00%	0.00%	0.00%	0.00%	0.00%

KPI C1-B	Jumlah Pelanggan Baru				
Bulan	2016	2017	2018	2019	2020
Januari		116			
Februari		116			
Maret		117			
April		116			
Mei		116			
Juni		116			
Juli		117			
Agustus		116			
September		116			
Oktober		117			
November		117			
Desember		116			
Total Pelanggan	1,345	1,396	0	0	0
Pelanggan Baru	0	51	-1,396	0	0

Figure 4.19 interface of department scoring system

From figure 4.19, it can be seen one of the example of the department scoring system. The user will input the achievement each month, then, it will link to the report. Below is the figure of the example of the report



Perspective	Perspective weight	SO index	SO weight	KPI index	KPI	Unit	Characteristic	KPI weight	Global weight	Actual condition (2017)	Target	KPI Score	Weighted Score	Perspective score	Final score
Financial	0.256	F1	1	F1-A	Revenue	Rp	max	0.5	0.1282	10,340,033,000	13,032,111,600	0.8333	0.1068	0.91667	0.8283
				F1-B	Absorption of APBN budget	%	max	0.5	0.1282	99.58%	95%	1	0.1282		
Customer	0.132	C1	0.8611	C1-A	Customer satisfaction level	scale	max	0.7	0.0795	3.54	3.6	0.9833	0.0782	0.9017	
				C1-B	The amount of customer complain	%	min	0.3	0.0341	0%	3%	1	0.0341		
		C2	0.1389	C2-A	The amount of new customer	Amount	max	1	0.0183	51	140	0.3643	0.0067		
Internal Business Process	0.257	I1	0.1183	I1-A	the amount of research that can be developed	Amount	max	0.25	0.0076	1	1	1	0.0076	0.75722	
				I1-B	The amount of research that can be implemented	Amount	max	0.25	0.0076	1	1	1	0.0076		
				I1-C	The amount of technology or research that can solve industry problem	Amount	max	0.25	0.0076	1	1	1	0.0076		
				I1-D	The amount of partnership with industry	Amount	max	0.25	0.0076	1	1	1	0.0076		
		I2	0.0071	I2-A	The amount of research that published in national journal	Amount	max	0.5	0.0009	13	3	1	0.0009		
				I2-B	The amount of research that published in international journal	Amount	max	0.5	0.0009	13	2	1	0.0009		
		I3	0.874	I3-A	The amount of people/ industry that has been trained	Amount	max	0.167	0.0375	89	60	1	0.0375		
				I3-B	The amount of sample testing (electronic and telematic sector)	Amount	max	0.167	0.0375	422	1300	0.3246	0.0122		
				I3-C	The amount of sample testing (non electronic sample)	Amount	max	0.167	0.0375	7,490	5200	1	0.0375		
				I3-D	The amount of certificate	Amount	max	0.167	0.0375	110	100	1	0.0375		
				I3-E	The amount of calibration test (electronic tools)	Amount	max	0.167	0.0375	0	100	0	0		
				I3-F	The amount of calibration test (non electronic tools)	Amount	max	0.167	0.0375	999	550	1	0.0375		
learning and growth	0.355	L1	0.278	L1-A	The amount of training that followed by the employee	Amount	max	1	0.0987	21	30	0.7	0.0691	0.78867	
		L2	0.5941	L2-A	The amount of added facilities	Package	max	1	0.211	12	3	1	0.211		
		L3	0.1279	L3-A	SPIP maturity level	Scale	max	1	0.0454	0	3.2	0	0		

Figure 4.20 Interface of the report

Figure 4.20 shows the report from 2017. The report shows the conclusion based on the score that already inputted in each department. The system is

available for 5 years from 2016-2020. Below is the figure that shows the comparison between each year.

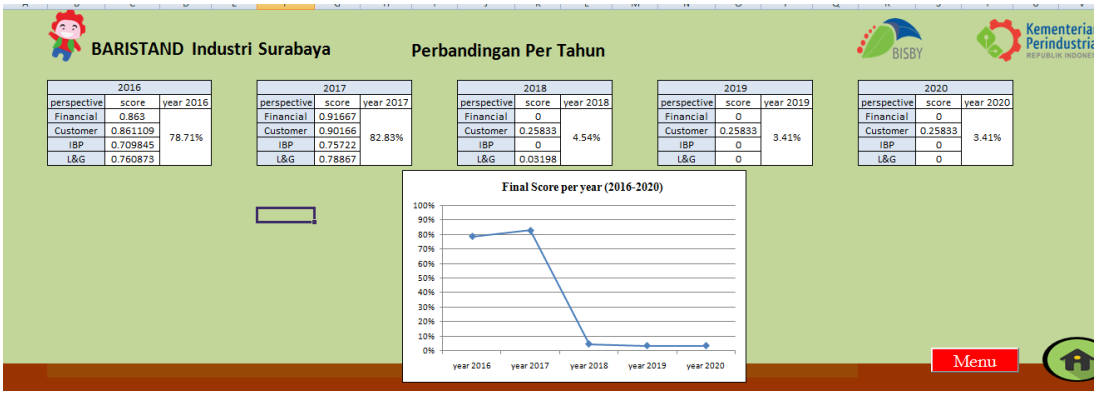


Figure 4.21Interface of comparison each year

Figure 4.21 shows the interface of comparison performance score from year 2016-2020. There are many dummies data to complete the scoring system, but the most important thing is the scoring system itself.

CHAPTER 5
DATA ANALYSIS AND INTERPRETATION

In this chapter, there will be data analysis and interpretation based on the data collection and processing that has been done in the previous chapter.

5.1 Analysis of Existing Condition

In this subchapter, there will be an analysis of the existing condition of the BARISTAND Surabaya. It is already explained in the previous chapter about vision, mission and the business process of BARISTAND Surabaya. From the explanation, it can be seen that there are several problems that becomes the background of this research.

The first problem is there is no alignment between the vision and mission with the performance agreement from BPPI. The vision and mission are focused on the electronic and telematic sector, but in the performance agreement from BPPI, there is no indicator that related to electronic and telematic sectors. After doing the discussion with the head of the organization, it can be said that the vision and mission still not become the organization focus. The organization is more focuses to achieve the performance agreement. Besides, the vision and mission are not realistic because the demand of this sector is very low.

The second problem is BARISTAND Surabaya wants to become public services institution (Badan Layanan Umum). One of the requirements to become BLU is having business plan strategy. To date, this organization depends only on the performance agreement of BPPI. The other requirements are having a financial target. BARISTAND Surabaya financial target is still separated from the performance measurement system, therefore balanced scorecard becomes one of the frameworks that recommended designing the business plan strategy.

5.2 Analysis of Strategic Objectives

In this subchapter, there will be an analysis of strategic objectives. Strategic objectives are determined by doing a discussion with the head of BARISTAND Surabaya. The inputs for determining strategic objectives are vision, mission and performance agreement with BPPI.

From the discussion, it is obtained that there are 9 strategic objectives that clustered into 4 BSC perspectives. The spread of strategic objectives is: 1 in financial perspectives, 2 in customer perspectives, 3 in internal business process perspectives and 3 in learning and growth perspectives.

5.2.1 Analysis of Strategic Objectives Financial Perspectives

In this subchapter, there will be an explanation about strategic objectives in financial perspectives. There is only 1 strategic objective in this perspective which is: increase the effectiveness of the use of APBN. Since BARISTAND Surabaya is part of a government institution, "Anggaran Pendapatan dan Belanja Negara" (APBN) is one of the resources that can be used for running the business.

Although BARISTAND Surabaya is a government institution, this organization can make some revenue from the services as a part of its business process. The use of APBN budget is to support the business process in the organization. From the business process, BARISTAND Surabaya will get revenue in the form of PNBP ("Penerimaan Negara Bukan Pajak").

The effectiveness of the use of APBN is not just how well the organization use the budget, but also the feedback from the usage must be great too. There are 2 indicators to measure the effectiveness which are: the absorption of the budget and the revenue that is obtained from the business process, there will be further explanation in the analysis of KPI.

5.2.2 Analysis of Strategic Objectives Customer Perspectives

In this subchapter, there will be an explanation about strategic objectives in customer perspectives. There are 2 strategic objectives in this perspective which are: increase customer satisfaction and increase new customer.

BARISTAND Surabaya is one of the institutions that gives services to the public. There are many services provided that already explained in the previous chapter. Industry and SMEs is one of the market segments of BARISTAND Surabaya. Customer satisfaction is very important because the target market of BARISTAND Surabaya is industry and SMEs, so the possibility to use BARISTAND Surabaya services again will be very high.

The other strategic objective is to increase new customer. The market segments of BARISTAND Surabaya are very large, so there are still many

industries that have not become customers in BARISTAND Surabaya. The service sector is also very wide, so the opportunity to get new customers is still very large.

5.2.3 Analysis of Strategic Objectives Internal Business Process Perspectives

In this subchapter, there will be strategic objectives in internal business process perspectives. There are 3 strategic objectives which are: Improve the result of prioritized research and development that can be used by industry, Increase the research publication, Improve the technical services for industry and SMEs. Those 3 strategic objectives are derived from the mission of BARISTAND Surabaya. All of the business processes in the BARISTAND Surabaya is covered with these 3 strategic objectives.

The first strategic objective is improving the result of prioritized research and development that can be used by industry. Prioritized research, in this case, is the research that supports RIPIN that is arranged by the ministry of industry. This strategic objective is derived from the first mission which produces research and engineering design.

The second strategic objective is to increase the research publication. This SO also derived from the first mission. SO aims to publish the results of research and technology that has been designed, so it can be said that this SO is the next step from the first SO.

The third strategic objective is improving the technical services for industry and SMEs. This SO is derived from the second mission which is Produce conformity services. This SO is about delivering services (already explained in the previous chapter) to the customer. This SO is important because the improvement of the services will affect the satisfaction of the customer.

5.2.4 Analysis of Strategic Objectives Learning and Growth Perspectives

In this subchapter, there will be an explanation about strategic objectives in learning and growth perspectives. There are 3 strategic objectives which are: improve employees' quality, increase organization facilities and improve the implementation of bureaucratic reform (SPIP).

The first SO is improving employees' quality. This SO is very important because all the business process is affected by the quality of the employees. If the

quality is good, then the business process activities will run smoothly. But if the employees quality is bad, then the business process activities will run into chaos.

The second SO is increasing organization facilities. This SO is very important because the business process of BARISTAND Surabaya need complete facilities in order to achieve the maximum result. The qualities of the employee will notuseful if there are no complete facilities to run the business.

The third SO is improving the implementation of bureaucratic reform (SPIP). This SO is one of the new requirements that need to be fulfilled based on the performance agreement in BPPI. SPIP is the bureaucratic systems that govern the way the organization so that it can run well and discipline. This system will support the business process activities to be well organized and make the employees more discipline.

5.3 Analysis of Strategy Map

In this subchapter, there will be an analysis about strategy map. The strategy map explains the relationship between each strategic objective and also the hierarchy of the perspectives. The hierarchy of the perspectives from down to top is learning and growth perspectives, internal business process perspectives, customer perspectives and financial perspectives. Although BARISTAND Surabaya is part of a government institution, since the business process is making some profit and also BARISTAND Surabaya wants to become public services institution (BLU), therefore, financial perspective on top is still relevant.

Strategy map aims to explain the relationship between each strategic objective. Below is the table that explains each relationship that exists in the strategy map.

Table 5.1 Explanation of the relationship in the strategy map

Index	Affected By	Explanation
F1	C1	customer satisfaction will give good impact to increase the revenue of the organization
	C2	the new customer will increase the revenue
	I1	doing research will optimize the use of APBN
	I3	doing technical services will optimize the use of APBN and also getting revenue from the services
C1	I1	the process of partnership or problem solving that is done by the organization will affect the satisfaction of the customer

Table 5.2 Explanation of the relationship in the strategy map (cont'd)

Index	Affected By	Explanation
	I3	the process of technical services that are done by the organization will affect the satisfaction of the customer
C2	**C1**	customer satisfaction will give good impact to the possibility of getting a new customer
	I2	the publication of the journal will draw the attention of industry to become the customer
	I3	technical services including doing training in many industries will draw the attention to the industry/ SMEs/people to become a new customer
I1	**L1**	the competency of the employee will significant to the implementation of the research
	L2	the facilities of the organization will support the research and development activities
I2	**L1**	the competency of the employee will significant to the amount of published journal/research
	L2	the facilities of the organization will support the publication activities
I3	**L1**	the competency of the employee will support the activities of technical services
	L2	the facilities of the organization will give significant impact to the activities of technical services
	L3	implementation of "SPIP" will support the activities of technical services
L1	**L2**	facilities of the organization will support the effort to improve the employee's competency
	L3	implementation of "SPIP " will describe how good the employee competency
L2	**F1**	the amount of the budget will support the improvement of facilities
L3	**F1**	the amount of the budget will support the implementation of SPIP

5.4 Analysis of KPI

In this subchapter, there will be an analysis of key performance indicator. KPI is the indicators that use to measure the achievement of the strategic objectives. KPI for BARISTAND Surabaya is obtained from the discussion with the head of the organization alongside with the input from vision, mission, the performance of agreement from BPPI and the strategic objectives that are already determined in the previous chapter. There are 20 KPIs in total that derived from 9 strategic objectives,

5.4.1 Analysis of KPI Financial Perspectives

In the financial perspective, there is 1 strategic objective which increases the effectiveness of the use of APBN. There are 2 KPIs to measure this strategic objective which is: the amount of revenue (PNBP) and the absorption of APBN budget.

The first KPI is the amount of the revenue (PNBP). This KPI is relevant to the strategic objectives because the higher the revenue gives the meaning that the use of APBN is effective. This KPI also become one of the considerations that BARISTAND Surabaya can become BLU or not. One of the requirements to become BLU is the consistencies of the revenue. BARISTAND Surabaya needs to get revenue more than 10 billion each year.

The second KPI is the absorption of the APBN budget. This KPI aims to see how well the plan at the beginning of the year is implemented. The amount of APBN is based on the plan that designed at the beginning of the year. So if the absorption is low, it means that the plan doesn't run well, but if the absorption is optimum, it can be concluded that the plan already implemented well.

5.4.2 Analysis of KPI Customer Perspectives

In the customer perspectives, there are 2 strategic objectives which are: increase customer satisfaction and increase new customer. There are 3 KPIs in total, 2 for the first strategic objective which is: customer satisfaction level and the amount of customer complaints and 1 for the second strategic objectives which are the amount of new customer.

Customer satisfaction level is given through the questionnaire of customer satisfaction. From the result of the questionnaire, the organization will know the feedback from the customer which might become the foundation to do the improvement. In the other side, the amount of complaint also needs to be counted to become the foundation to do the evaluation of business process activities.

The amount of new customer is relevant to the strategic objectives increase new customer. Since the opportunity to get a new customer is still very high, it is expected the amount of customer is increasing every year.

5.4.3 Analysis of KPI Internal Business Process Perspectives

In the internal business process perspectives, there are 3 strategic objectives which are: Improve the result of prioritized research and development that can be used by industry, Increase the research publication, Improve the technical services for industry and SMEs. Each of strategic objectives has more than 1 KPI as the indicators.

The first strategic objectives, improve the result of prioritized research and development that can be used by industry, has 4 KPIs as the indicator. The first KPI is the amount of research that can be developed. Research that can be developed is research that is made in the current year that supports a prioritized industry based on "Rencana Induk Pembangunan Industri Nasional" (RIPIN). It is counted as successful research when meeting the criteria from the BPPI. The second KPI is Research that can be implemented. It is research from last 5 years that can be used by industry in the current year. There must be contract/.statement from the industry as approval that the research is useful. The third KPI is the amount of technology/research that can solve an industry problem. It is the result of research that can solve industry problem based on a request from the industry. There must be a statement that explains the problem has been solved. The last KPI is the amount of partnership with industry. It is the partnership with industry that made in the current year. The partnership must have resulted in the form of technology package or development. All of the KPI is relevant to the strategic objectives because one of the core activities in BARISTAND Surabaya is doing research and implementing it.

The second strategic objectives, increase the research publication, has 2 KPIs as the indicator. The first KPI is the amount of research accredited by the national institution and the second KPI is the amount of research accredited by the international/ global institution. This KPI is relevant to the strategic objectives because the indicator has aims to increase the publication of the research.

The third strategic objectives, improve the technical services for industry and SMEs, has 6 KPIs as the indicator. The first KPI is the number of people/ industry that has been trained. This KPI refers to one of the services that are available in BARISTAND Surabaya which is training. There are many types of

training that has been explained in the previous subchapter. The second and third KPI is about the amount of sample testing. It is separated into two KPIs because one of the KPI is focused on the electronic sample. This separation is based on the vision and mission that focused on electronic and telematic sectors. The fourth KPI is the amount of certificate published. This KPI refers to one of the services that available in BARISTAND Surabaya which is publishing product certificate and ISO 9001. The fifth and sixth KPI is about calibration testing. It is separated into two KPIs because one of the KPI is focused on the electronic tools. The reason behind it is same with the reason of two and third KPIs.

5.4.4 Analysis of KPI Learning and Growth

In the learning and growth perspectives, there are 3 strategic objectives which are: improve employees' quality, increase organization facilities and improve the implementation of bureaucratic reform (SPIP). Each of the strategic objectives has only 1 KPI.

The first KPI is the amount of training that followed by the employee. Since this organization is part of a government institution, there are much training that conducted by the other institution that related to the development of BARISTAND Surabaya. So, the amount of training that followed by the employee will give good impact to the business process activities.

The second KPI is the amount of added organization facilities. Since there are many laboratories in BARISTAND Surabaya, and the technology is always improving, this organization needs to be up to date with the recent technologies, so the services given will be maximal.

The third KPI is SPIP maturity level. This KPI is relevant to the strategic objectives because there are criteria that given from the government institution to measure the maturity level of the SPIP implementation.

5.5 Analysis of KPI Properties

KPI properties aim to give a clear explanation for each KPI that include in the performance measurement system in BARISTAND Surabaya. KPI properties consist of several elements which are: perspective name, strategic objective alongside with the index and KPI with the index. Then there are the units of the KPI, characteristic of the KPI and the formulation of the KPI. Characteristic of

KPI aims to give explanation whether the KPI is maximized or minimized. The formulation of the KPI gives a clear explanation of how to calculate the KPI. Then, there are also the description and the target of the KPI. The target aims to give an explanation about the score that needs to be achieved.

The next properties are the measurement and review frequency. These properties are explained about the frequency of measurement for each KPI. Each KPI is possible to have different measurement frequency. Then the next properties are a data source, KPI owner and the PIC of the KPI. The data source is used to trace the data that is needed to measure the KPI. KPI owner is the department or division that has a direct relationship with the KPI. The PIC of the KPI is the staff or the employee that has responsibilities to measure and input the score of the KPI. All of those properties have a purpose to make the system easier to run and control.

5.6 Analysis of Weighting Process

In this subchapter, there will be an explanation about weighting process of perspectives, strategic objectives, and KPI. The method that is used is analytical network process (ANP) for weighting the perspective and strategic objectives, while for weighting the KPI, expert judgments by doing the brainstorming with some of the representative of the organization has been done. The data is processed using software super decision.

There are several steps when using ANP as a methodology for weighting process which is: designing initial model, determining pairwise comparison, designing supermatrix and identification of final prioritize of each element. The initial model is the model that shows the relationship between each strategic objective. The initial model is designed based on the strategy map that has been analyzed in the previous chapter.

The next step is determining pairwise comparison. Pairwise comparison is the comparison between element or cluster that have a relationship. This comparison is based on the initial model. the comparison will become the question that must be filled by the head of the organization. There is 4 comparisons between the cluster and 7 comparisons between element. The amount of question

is based on the relationship that already explained in the strategy map. Then after the questionnaire has been filled, the next step is designing the supermatrix.

In the super matrix, there are 3 kinds or graphics which are: unweighted supermatrix, weighted supermatrix, and limit matrix. The unweighted supermatrix shows the existence of a relationship between each element. If there is a relation, then the score is 1, otherwise, the score is 0. The next graphic is weighted supermatrix that shows how much influence on each strategic objective. The level of influence is depending on the score that is filled by the head of the organization. The last graphic is the limit matrix that shows the final score of each element.

The last step is the identification of final priorities of each element. In this step, the final weight of each perspective and strategic objectives has been determined. The weight of perspectives is obtained from the addition of the strategic objectives limit matrix. The weight of strategic objectives is obtained from normalization process. The normalization process is done by multiplying the value of limit matrix with the weight of perspectives. The weight of strategic objectives inside the perspective is obtained by dividing the value of limit matrix with the weight of the perspectives.

When doing the weighting process of perspectives and strategic objectives, there are several factors that give important effect to the result. The first aspect is the strategy map. The judgments of the relation between each element will affect the amount of comparison that exists. The second aspect is the knowledge about the scale. It is important to give an explanation to the respondent about the description of the scale because that will affect the result of the weight. The third aspect is the respondent. The one who fills the questionnaire must have enough knowledge about the organization, therefore the head of the organization is chosen as the respondent.

From the result of the weighting process, it can be seen that the value of the weight of each perspective such as financial perspective (0.256379), customer perspective (0.131852), internal business process perspective (0.256684), and learning and growth perspective (0.355085). It can be seen that learning and growth perspective has the biggest weight in the system. This condition happens

because learning and growth perspective is the supporting system for all the business process activities.

The next is the analysis of weighting process for the strategic objective. The weight of each strategic objective already explains in the previous chapter. It can be seen that strategic objectives that have the biggest value are the effectiveness of the use of APBN which having score 1. This condition happens because there is only 1 strategy in the financial perspectives. In the customer perspective, customer satisfaction has the bigger value than a new customer. The score for customer satisfaction is 0.87 while the new customer is 0.13. Customer satisfaction is more important because it is covering entire customer of the organization.

In the internal business process perspectives, technical services have the biggest weight (0.87) followed by the result of the research (0.12) and the last is the publication of the research (0.007). This condition happens because technical services having the biggest contribution to the revenue of the organization. Besides, there are many activities that covered by this SO. In the learning and growth perspective, organization facilities have the biggest weight (0.59), followed by the employee quality (0.27) and the last is bureaucratic reform implementation (0.12). Organization facilities are very important as a supporting aspect of the organization activities. The quality of employee also depends on the facilities that are available.

The next is an analysis about KPI weighting process. The weighting process of KPI is done by doing brainstorming with the head of the organization, head of administrative division and staff of the administrative division. Those people are chosen because they always attend the performance evaluation from the ministry of industry every year. As the result of the discussion, the KPI that involved in internal business process perspective is having the same weight and cannot be prioritized. This is because all the indicator in 1 strategic objectives must be achieved. The KPI that has different weight is only the KPI for customer perspectives. The weight of customer satisfaction level is more important than the amount of complaining. Customer satisfaction level is giving through a questionnaire which covering many aspects of services while the amount of

customer complain is just passive move. It will be counted if there is complain from the customer. The KPI for financial perspective also has the same weight. Based on the brainstorming, it can be concluded that the revenue is equally important with the absorption of the APBN. The KPI for learning and growth perspectives doesn't need to be weighted because each strategic objective only has 1 KPI.

5.7 Analysis of Scoring System

In this subchapter, there will be an analysis of the scoring system. Scoring system is the simulation of the system using the actual condition in 2017. The result of the scoring system will show the score of each KPI, score for each SO, score for each perspective and the final score. This subchapter will divide into two parts which are: analysis of the scoring system and analysis of traffic light system.

5.7.1 Analysis of scoring system

From the scoring system, it can be seen that KPI F1-A, revenue (PNBP), has a score of 0.83. This condition happens because the input is from 2017 data but the target is for 2018. The formula of this KPI is increasing the revenue 20% every year. The next KPI is F1-B. The absorption of the APBN, it has score 1. The achievement is 99.28% while the target is 95% so that the target is already achieved.

The next KPI is C1-A, customer satisfaction level, the actual value is 3.54 while the target is 3.6, so that the score is 0.98. While for the KPI C1-B, the amount of the customer complains, the score is 1 because there are no complaints from the entire customer in 2017.

The next KPIs are I1-A, I1-B, I1-C, and I1-D. The score of all those KPIs are 1. The target in the 2018 is still the same because the achievement in 2017 is still equal with the target, not exceeding the target. Besides, research activities usually take a long time to complete. The next KPI is I2-A and I2-B. The score of all those KPIs is 1 because the amount of publication is exceeding the target. The next KPIs are I3-A, I3-B, I3-C, I3-D, I3-E, and I3-F. Those KPIs measure the services activity that provided in BARISTAND Surabaya. The first KPI is the amount of training, the score is 1. The actual condition is 89 while the target is 60. The next KPI, I3-B and I3-C, is about the amount of sample testing.

Previously, this indicator is not separated, but because of vision and mission considerations, in the new system, the indicators are separated. From this separation it can be seen that although the number of samples tested exceeds the target, the electronics sample still contributes very little. Then the next KPI, the amount of certificate published, is also exceeding the target. The actual condition is 110 while the target is 100. Then the last two KPIs are about calibration testing. The KPI is also separated between electronic tools and non electronic tools. The KPI for an electronic tools is already exceeding the target, while for electronic tools is 0 because the data is not available.

The next KPI is L1-A, it is about the amount of training that followed by the employee, the score of the KPI is 0.7. The target is 30 while the actual condition is only 21. Then the next KPI is L2-A. The score of the KPI is 1 because the actual condition is 12 while the target is only 3. The last KPI is SPIP maturity level, since this is the new KPI so that the data from 2017 is not available.

5.7.2 Analysis of Traffic Light System

Traffic light system is used to categorize the achievement of the KPIs into three groups which are: red zone, yellow zone, and green zone. Each zone has indicators that obtained from the discussion with the head of the organization. In this research, the score for each zone already determined as follows: red zone has scored between 0-0.59; yellow zone has scored between 0.6-0.99, and the score for the green zone is 1. There is some reason that becomes the background to determine the score for each zone. The score for the green zone is 1 because the organization is pushed to achieve the entire indicator exceed the target. So it can be concluded that if the actual condition still below 1, it is still needed to be improved.

In the scoring system, it can be seen that from 20 KPIs, there are 4 KPIs in the red zone, 3 KPI in the yellow zone and 13 KPI in the green zone. 3 out of 4 KPIs that is in the red zone because of the data is not available. The other 1, the amount of electronic sample testing is only achieving 30% from the target. This KPI is determined because of the focus of the vision. From this KPI, it can be seen that the contribution of BARISTAND Surabaya in the electronic sector is still low.

There are 3 KPIs in the yellow zone, which are: the amount of revenue, the amount of training for employee and customer satisfaction level. The amount of revenue is still below 1 because the target that is used is a target for 2018, while the data is from 2017. The formula for the target of this KPI is increasing the revenue 20% from the year before. The achievement of customer satisfaction level is 0.98, so close to achieving the target. The achievement of the amount of training is 0.7 so that it is needed to be improved. The other KPIs has already achieved the target so that it is already in the green zone. The achievements of those KPIs need to be maintained.

5.8 Analysis of the Dashboard of the System

In this subchapter, there will be an analysis about the dashboard of the performance measurement system in BARISTAND Surabaya. the dashboard is built using macro excel and VBA software. Dashboard aims to make the user easier for reviewing and entering the data. There are several benefits from that can be gained from the dashboard. First, the users are easier to input the data that is needed for KPI. After entering the data, the system will calculate the achievement of the organization automatically. Second, there are several pieces of information that are needed for the user in order to know the performance measurement system in BARISTAND Surabaya. That information are available on the dashboard such as strategic objective, KPI, strategy map, KPI properties, and scoring system.

Actually, the dashboard still can be improved. It is expected that the dashboard from this research is incorporated into the existing information system. At this time, BARISTAND Surabaya only has individual performance measurement systems that exist in the information system. So the organization performance measurement system needs to be integrated with the individual performance measurement system.

CHAPTER 6
CONCLUSION AND SUGGESTION

6.1 Conclusion

In this subchapter, there will be the conclusion that can be gained from this final project, which are:

1. The vision and mission of BARISTAND Surabaya are focused on the electronic and telematic sector but in the performance agreement, there are no indicators that measure those sectors. From the discussion with organization representatives, it is known that actually, that sector is not the focus of the organization but only the differentiation between each BARISTAND in Indonesia. Each BARISTAND has their own special sector, but in general, the business process activities are same. Besides, BARISTAND need to do preparation if they want to become BLU. There are some requirements that are not fulfilled yet. One of the requirements is designing business strategy. BARISTAND doesn't have an organization performance measurement system. This organization already has performance measurement system for the individual but for the organization is still manual.
2. The strategic objectives of BARISTAND Surabaya are designed using balanced scorecard (BSC) framework. The inputs of the strategic objectives are a vision, mission, and performance agreement from BPPI. Strategic objectives are determined by doing a discussion with the head of the organization. There are 9 strategic objectives that are classified into 4 perspectives that refer to BSC. There is 1 strategic objective in financial perspective which increases the effectiveness of the use of APBN. There are 2 strategic objectives in customer perspective which are: increase customer satisfaction and increase new customer. There are 3 strategic objectives in the internal business process perspective which are: improve the result of prioritized research and development that can be used by industry, increase the research publication, and improve technical services for industry/SMEs. There are 3 strategic objectives in learning and growth

perspective which are: improve employee quality, increase organization facilities, and improve the implementation of bureaucratic reform. Then, from those strategic objectives, a strategy map is designed. The strategy map is showing the relationship between each strategic objective.

3. KPI is determined by doing a discussion with the head of the organization. There are 20 KPIs that derived from 9 strategic objectives. There are 2 KPIs in the financial perspective which is the amount of revenue (PNBP) and the absorption of APBN budget. There are 3 KPIs in the customer perspective which is customer satisfaction level, the amount of complaining, and the amount of new customer. There are 12 KPIs in the internal business process perspective which covers all the business process activities in BARISTAND Surabaya. There are 3 KPI in the learning and growth perspective which are: the amount of training for employees, the amount of added facilities, and SPIP maturity level. There are some KPI that is a focus on the electronic and telematics sector.
4. The dashboard of the performance measurement system is used to make the user easier to input the data that is needed to measure the achievement of the organization. There are some components that include the dashboard which are: strategic objectives, strategy map, KPI, and the scoring system. In the scoring system, the formula has been determined, so that when the user input the score of the KPI, it will be calculated the performance score automatically.

6.2 Suggestion

In this subchapter, there will be suggestions that can be given from the research that has been done.

1. BARISTAND Surabaya with the ministry of industry needs to redesign the vision and mission so that it can be achievable. If there is a specialization for each BARISTAND in Indonesia, it doesn't need to be mention in the vision, so that it can be more flexible to design the business strategy.
2. For the further research, it is needed to cascade the strategy to the individual level. if the system for the individual already exists, the system

needs to be integrated with the organization performance measurement system

3. The dashboard of the system that is designed in this research can be incorporated into the existing information system in BARISTAND Surabaya.
4. In order to obtain the value of each KPI, a complete record from each PIC of the KPI is required. So it needs a good control system to make sure the data for the KPI is available.

This page is intentionally left blank.

Attachment 1. ANP Questionnaire

Kuesioner Pembobotan KPI dengan Metode *Analytical Network Process*

Nama Responden :

Jabatan :

I. Pendahuluan

Perkenalkan, nama saya Hafizh, mahasiswa semester 8 Departemen Teknik Industri, Institut Teknologi Sepuluh Nopember Surabaya. Saat ini, saya sedang melakukan penelitian Tugas Akhir bertemakan Manajemen Kinerja dengan Judul *"Designing performance measurement system using Balanced Scorecard (BSC) in Balai Riset dan Standardisasi (BARISTAND) Industri Surabaya"*

Tujuan dari kuesioner ini adalah untuk dapat menentukan bobot tiap strategi obyektif, perspektif, dan KPI. Pembobotan dilakukan dengan membandingkan tingkat kepentingan dari strategi obyektif dan perspektif yang terkait. Pada *balanced scorecard*, terdapat empat perspektif yang diperhitungkan yaitu keuangan, pelanggan, proses bisnis internal, serta pembelajaran dan pertumbuhan. Kuesioner ini hanya diisi oleh karyawan BARISTAND Industri Surabaya yang dianggap ahli dan memahami secara keseluruhan terkait kondisi dari kinerja organisasi yang bersangkutan. Sebelum melakukan pengisian kuesioner, dimohon Bapak/Ibu untuk membaca petunjuk pengisian kuesioner terlebih dahulu. Atas perhatian dan waktunya, saya ucapkan terima kasih.

II. Petunjuk Pengisian Kuesioner

Pada skala penilaian, beri tanda lingkaran (O) atau silang (X) yang menurut Anda paling sesuai. Selama pengisian kuesioner, klaster merupakan nama perspektif dari *balanced scorecard* dan elemen merupakan strategi obyektif yang dimiliki oleh perusahaan.

Pada skala penilaian, semakin besar nilai yang diberikan maka kriteria tersebut lebih kuat dari kriteria lain yang sedang diperhitungkan. Selain itu, arah dari penempatan skor nilai mempengaruhi kedudukan dari kriteria. Apabila skor

nilai diberikan pada angka di sebelah kanan angka satu (1) maka kriteria dengan posisi di sebelah kanan angka satu (1) akan memiliki kedudukan lebih penting dari kriteria dengan posisi di sebelah kiri angka satu (1)

Berikut merupakan keterangan dari skala perbandingan berpasangan ANP

Nilai	Definisi	Keterangan
1	Sama (Equal)	Kedua elemen memiliki kepentingan yang sama
2	Nilai antara sama dan sedang (Equal-Moderate)	Nilai antara dua penilaian yang berdekatan
3	Sedang (Moderate)	Satu elemen sedikit lebih penting dibandingkan dengan elemen pasangannya
4	Nilai antara sedang dan kuat (Moderate-Strong)	Nilai antara dua penilaian yang berdekatan
5	Kuat (Strong)	Satu elemen lebih penting dibandingkan dengan elemen pasangannya
6	Nilai antara kuat dan sangat kuat (Strong-Very Strong)	Nilai antara dua penilaian yang berdekatan
7	Sangat kuat (Very Strong)	Satu elemen sangat penting dibandingkan dengan elemen pasangannya
8	Nilai antara sangat kuat dan ekstrim (Very Strong-Extreme)	Nilai antara dua penilaian yang berdekatan
9	Ekstrim (Extreme)	Satu elemen memiliki sifat mutlak sangat penting dari elemen pasangannya

Berikut merupakan contoh pemberian nilai pada kuesioner.

Kriteria A	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Kriteria B

Pada contoh terlihat bahwa nilai diberikan pada angka 6 dengan letak di sebelah kiri angka 1. Maka arti dari nilai tersebut adalah, kriteria A memiliki nilai di antara *strong* dan *very strong* dibandingkan dengan kriteria B.

III. Kuesioner Perbandingan antar Klaster

1. Perbandingan antar klaster sehubungan dengan "Perspektif Keuangan"																		
Pelanggan	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Proses bisnis internal

2. Perbandingan antar klaster sehubungan dengan "Perspektif Pelanggan"																		
Pelanggan	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Proses Bisnis Internal

3. Perbandingan antar klaster sehubungan dengan "Perspektif Proses Bisnis Internal"																		
Proses bisnis internal	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Pembelajaran dan pertumbuhan

4. Perbandingan antar klaster sehubungan dengan "Perspektif Pembelajaran dan Pertumbuhan"																		
Keuangan	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Pembelajaran dan pertumbuhan

IV. Kuesioner Perbandingan antar Elemen

5. Perbandingan antar elemen sehubungan dengan efektifitas penggunaan APBN																		
Kepuasan Pelanggan	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Pelanggan Baru
Jasa pelayanan teknik	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Publikasi jurnal

6. Perbandingan antar elemen sehubungan dengan Kepuasan pelanggan																		
Jasa pelayanan teknik	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Litbang prioritas yang dimanfaatkan industri

7. Perbandingan antar elemen sehubungan dengan Pelanggan Baru																		
Jasa pelayanan teknik	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Publikasi jurnal

8. Perbandingan antar elemen sehubungan dengan Litbang yang dimanfaatkan industri																		
Kualitas Pegawai	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Fasilitas Balai

9. Perbandingan antar elemen sehubungan dengan Publikasi Jurnal																		
Kualitas Pegawai	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Fasilitas Balai

10. Perbandingan antar elemen sehubungan dengan Pelayanan Jasa Teknik																		
Kualitas Pegawai	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Fasilitas Balai
Kualitas Pegawai	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	SPIP
Fasilitas balai	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	SPIP

11. Perbandingan antar elemen sehubungan dengan Publikasi Jurnal																		
Fasilitas Balai	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	SPIP

Attachment 2. Customer Satisfaction Questionnaire

Kementerian Perindustrian
REPUBLIK INDONESIA

BALAI RISET DAN STANDARDISASI INDUSTRI SURABAYA

FM-8.01.01 1/2

Apabila terdapat **pengaduan, saran** dan **masukan** mohon disampaikan melalui surat yang dialamatkan pada alamat Baristand Industri Surabaya Jl. Jagir Wonokromo 360 Surabaya, atau secara langsung diloket maupun lewat email yang dikirim ke baristandsurabaya@kemenperin.go.id

+

KUISIONER KEPUASAN PELANGGAN

BALAI RISET DAN STANDARDISASI INDUSTRI SURABAYA

Keterangan Responden

1. Nama :	5. Pekerjaan/kegiatan utama : ☐ Pelajar/mahasiswa - 1 Pegawai Swasta - 5 Peneliti/dosen - 2 Wiraswasta - 6 PNS/TNI/Polri - 3 Lain-lain - 7 Pegawai BUMN/D - 4
2. Umur : ☐☐	
3. Jenis Kelamin : Laki-laki - 1 Perempuan – 2 ☐	
4. Pendidikan terakhir yang ditamatkan : ☐ ≤SMA atau sederajat - 1 D-4/S-1 - 3 D-1/D-2/D-3 - 2 S-2/S-3 - 4	6. Nama instansi/institusi tempat bekerja/beraktivitas

Jasa Layanan : ☐ **Pengujian** ☐ **Kalibrasi** ☐ **Sampling** ☐ **Penelitian dan Pengembangan** ☐ **Pelatihan** ☐ **Konsultansi**

Jenis Produk : .....

Aspek pelayanan publik (Masyarakat) dan aspek pelaksanaan tugas

Menurut pendapat Bapak/Ibu/Saudara, bagaimana kualitas pelayanan dan harapan pada perincian pernyataan pelayanan berikut:

Beri tanda (✓) sesuai dengan pilihan Bapak/Ibu/Saudara pada kolom kualitas pelayanan dan harapan konsumen

NO.	VARIABEL PELAYANAN	PENILAIAN TERHADAP VARIABEL PELAYANAN			
		1	2	3	4
1	Bagaimana menurut Saudara tentang kemudahan prosedur pelayanan di unit pelayanan ini ?	☐ Tidak Mudah	☐ Kurang Mudah	☐ Mudah	☐ Sangat Mudah
2	Apakah persyaratan pelayanan yang harus dipenuhi, sesuai dengan informasi yang diperoleh ?	☐ Tidak Sesuai	☐ Kurang Sesuai	☐ Sesuai	☐ Sangat Sesuai
3	Bagaimana pendapat Saudara mengenai keberadaan petugas pelayanan di lokasi pelayanan?	☐ Tidak Ada di Tempat	☐ Sering Tidak Ada di Tempat	☐ Sering Ada di Tempat	☐ Selalu Ada di Tempat
4	Bagaimana pendapat Saudara tentang kedisiplinan petugas pelayanan dalam memberikan pelayanan ?	☐ Tidak Disiplin	☐ Kurang Disiplin	☐ Disiplin	☐ Sangat Disiplin
5	Bagaimana pendapat Saudara tentang tanggung jawab petugas pelayanan dalam memberikan pelayanan ?	☐ Tidak Bertanggung Jawab	☐ Kurang Bertanggung Jawab	☐ Bertanggung Jawab	☐ Sangat Bertanggung Jawab
6	Bagaimana pendapat Saudara tentang kemampuan petugas pelayanan dalam memberikan pelayanan ?	☐ Tidak Mampu	☐ Kurang Mampu	☐ Mampu	☐ Sangat Mampu
7	Bagaimana pendapat Saudara tentang ketepatan waktu penyelesaian produk/pelayanan ? (sesuai dengan waktu yang telah ditentukan)	☐ Tidak Tepat	☐ Kurang Tepat	☐ Tepat	☐ Sangat Tepat
8	Apakah petugas pelayanan berlaku adil (tidak pilih kasih) dalam memberikan pelayanan ?	☐ Tidak Adil	☐ Kurang Adil	☐ Adil	☐ Sangat Adil
9	Bagaimana pendapat Saudara tentang kesopanan petugas pelayanan dalam memberikan pelayanan ?	☐ Tidak Sopan	☐ Kurang Sopan	☐ Sopan	☐ Sangat Sopan
10	Bagaimana pendapat Saudara tentang keramahan petugas pelayanan dalam memberikan pelayanan ?	☐ Tidak Ramah	☐ Kurang Ramah	☐ Ramah	☐ Sangat Ramah
11	Bagaimana pendapat Saudara tentang Keterjangkauan biaya untuk mendapatkan pelayanan ?	☐ Tidak Terjangkau	☐ Kurang Terjangkau	☐ Terjangkau	☐ Sangat Terjangkau

Page 1 of 2

MAKLUMAT PELAYANAN

Dengan ini, kami menyatakan sanggup menyelenggarakan pelayanan sesuai standard pelayanan yang telah ditetapkan dan apabila tidak menepati janji ini, kami siap menerima sanksi sesuai peraturan-undangan yang berlaku.

Apabila terdapat **pengaduan, saran** dan **masukan** mohon disampaikan melalui surat yang dialamatkan pada alamat Baristand Industri Surabaya Jl. Jagir Wonokromo 360 Surabaya, atau secara langsung diloket maupun lewat email yang dikirim ke baristandsurabaya@kemenperin.go.id

NO.	VARIABEL PELAYANAN	PENILAIAN TERHADAP VARIABEL PELAYANAN			
		1	2	3	4
12	Bagaimana pendapat Saudara tentang kesesuaian antara biaya yang dibayarkan dengan biaya yang telah ditetapkan ?	☐ Selalu Tidak Sesuai	☐ Kadang-kadang Sesuai	☐ Banyak Sesuainya	☐ Selalu Sesuai
13	Apakah jam buka dan tutup pelayanan sesuai dengan jadwal yang telah ditetapkan/dijanjikan ?	☐ Selalu Tidak Tepat	☐ Kadang-kadang Tepat	☐ Banyak Tepatnya	☐ Selalu Tepat
14	Bagaimana pendapat Saudara tentang kenyamanan di lingkungan Unit Pelayanan ini ?	☐ Tidak Nyaman	☐ Kurang Nyaman	☐ Nyaman	☐ Sangat Nyaman
15	Apakah Saudara mengetahui adanya maklumat/janji pelayanan di Unit Pelayanan ini ?	☐ Tidak Tahu	☐ Kurang Tahu	☐ Tahu	☐ Sangat Tahu
16	Apakah Saudara mengetahui adanya sarana pengaduan/keluhan/saran ?	☐ Tidak Tahu	☐ Kurang Tahu	☐ Tahu	☐ Sangat Tahu

Pelayanan yang bebas dari korupsi

Menurut pendapat Bapak/Ibu/Saudara, bagaimana **kualitas pelayanan** pada perincian pernyataan pelayanan berikut:
Beri tanda (✓) sesuai dengan pilihan Bapak/Ibu/Saudara pada kolom kualitas pelayanan.

No	Perincian Pernyataan	Kualitas Pelayanan			
		Tidak Setuju	Kurang Setuju	Setuju	Sangat Setuju
		1	2	3	4
1	Prosedur pelayanan yang ditetapkan sudah memadai dan tidak berpotensi menimbulkan korupsi, kolusi, dan nepotisme (KKN).				
2	Petugas pelayanan tidak memberikan pelayanan di luar prosedur yang telah ditetapkan dengan imbalan uang/barang.				
3	Tidak terdapat praktik percaloan/perantara yang tidak resmi.				
4	Petugas pelayanan tidak diskriminatif				
5	Tidak terdapat pungutan liar				
6	Petugas pelayanan tidak meminta/ menuntut imbalan uang/barang terkait pelayanan yang diberikan				
7	Petugas pelayanan menolak pemberian uang/barang terkait pelayanan yang diberikan.				
Pertanyaan nomor 8 diperuntukkan bagi yang pernah melakukan pengaduan					
8*	Tidak ada diskriminasi dalam penanganan pengaduan				
9	Produk/jasa layanan yang diterima sesuai dengan daftar produk/jasa layanan yang tersedia				

Saran/komentar :

.....

.....

.....

....., ...

( )

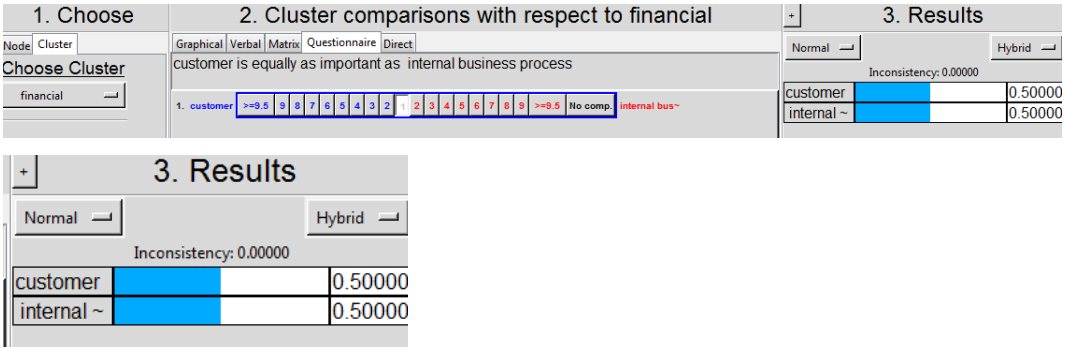
Catatan :
1. *Bila saran/komentar tidak cukup, dapat ditulis di kertas lain*
2. *Jawaban kuisioner ini dirahasiakan dan hanya untuk keperluan tim Pengembangan Jasa Teknis*

MAKLUMAT PELAYANAN

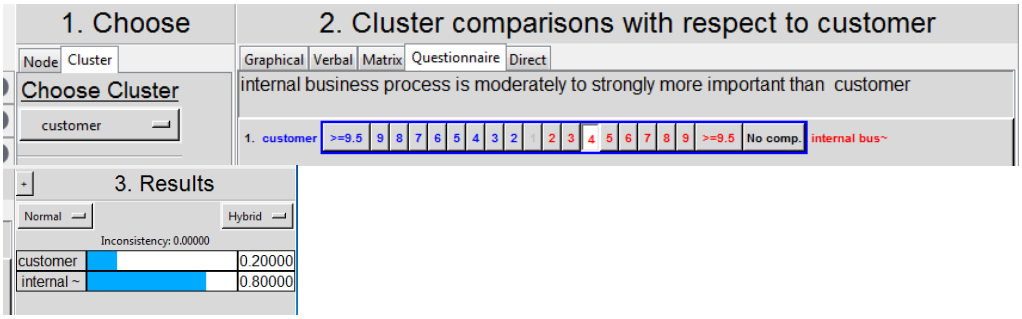
Dengan ini, kami menyatakan sanggup menyelenggarakan pelayanan sesuai standard pelayanan yang telah ditetapkan dan apabila tidak menepati janji ini, kami siap menerima sanksi sesuai peraturan-undangan yang berlaku.

Attachment 3. The result of weighing process from super decision software

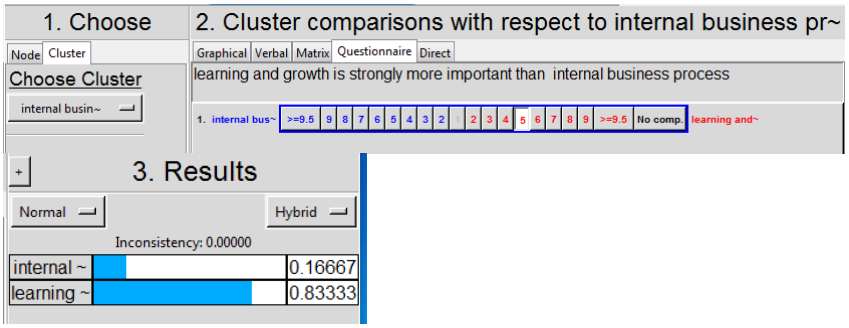
A. Comparison between clusters that affect financial perspective



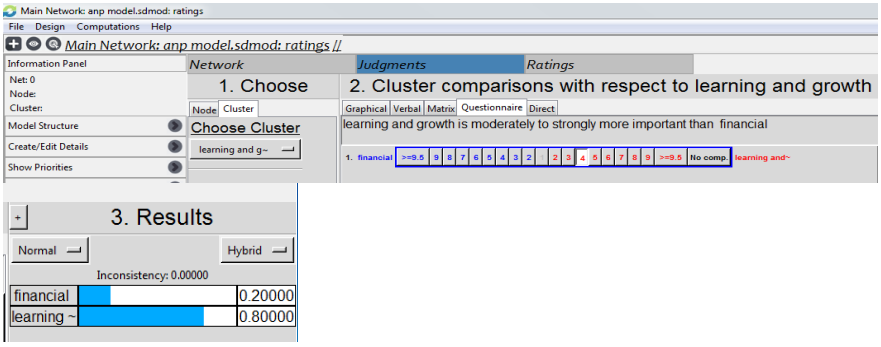
B. Comparison between clusters that affect customer perspective



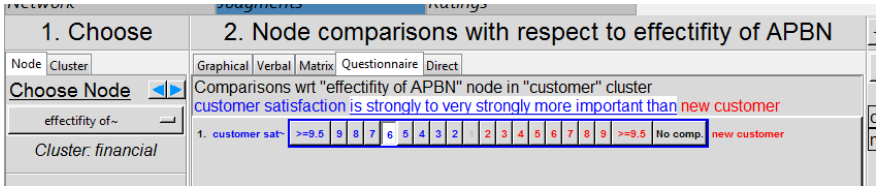
C. Comparison between clusters that affect internal business process perspective

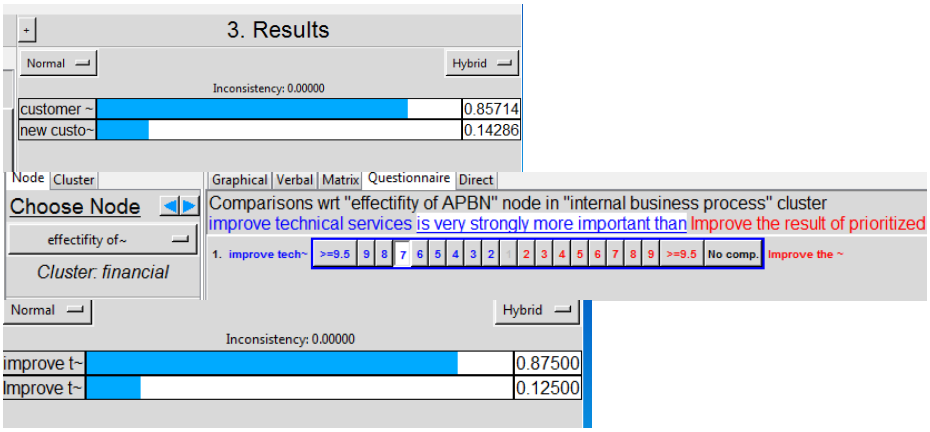


D. Comparison between clusters that affect learning and growth perspective

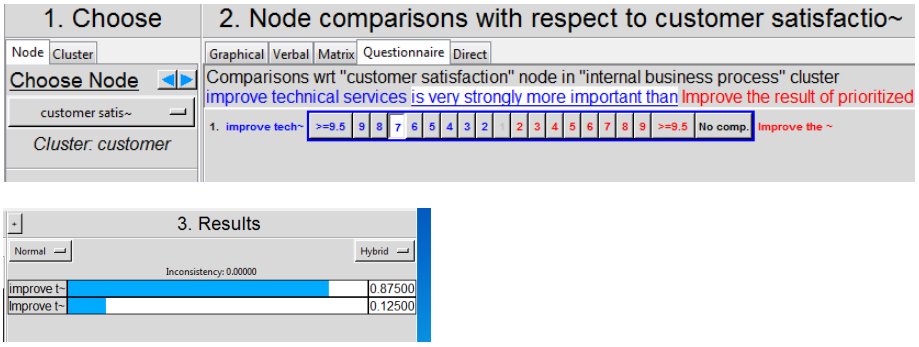


E. Comparison between element that affect effectivity of APBN

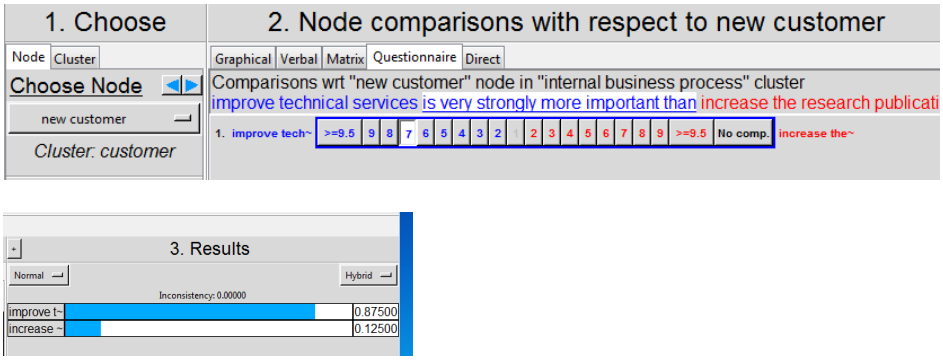




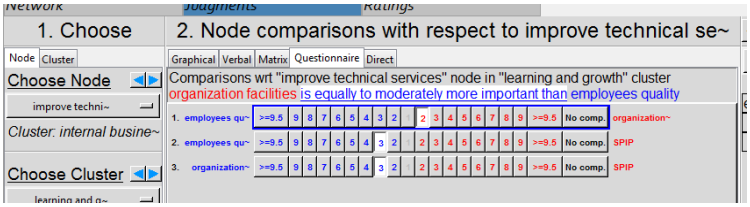
F. Comparison between element that affect customer satisfaction

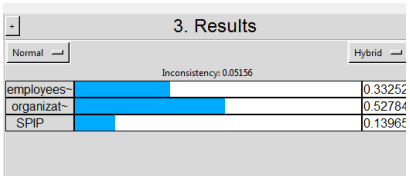


G. Comparison between element that affect new customer

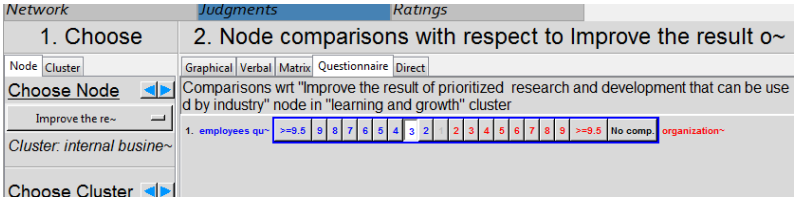


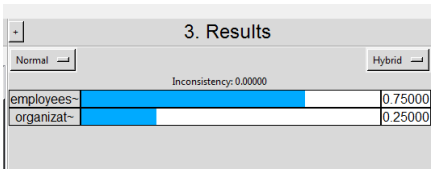
H. Comparison between element that affect technical services



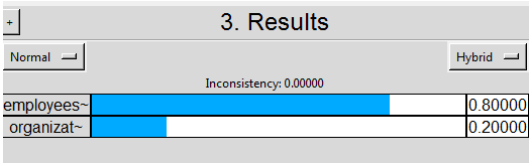


I. Comparison between element that affect result of research

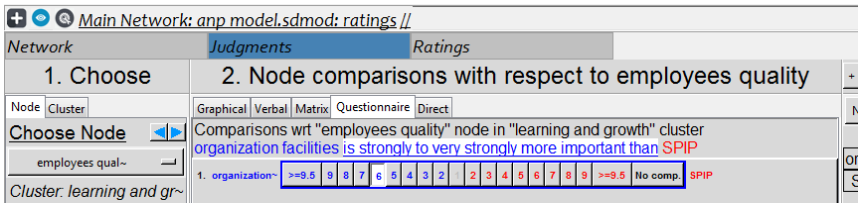


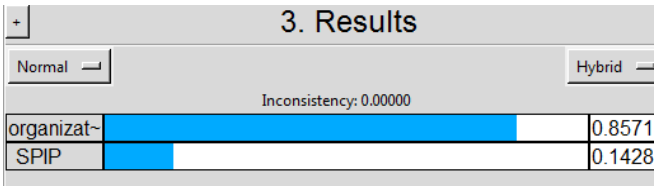


J. Comparison between element that affect research publication



K. Comparison between element that affect employees quality





REFERENCES

Anthony, R. N., & Govindarajan, V. (2005). *Management Control System*. Jakarta: Salemba Empat.

Bambang Syairuddin, Patdono Suwignjo, & I Made Suartika. (2007). Perancangan dan Implementasi Sistem Pengukuran Kinerja dengan Metode Integrated Performance Measurement System (Studi Kasus: Jurusan Teknik Mesin Universitas Mataram). *Jurnal Teknik Industri*, *9*, 131–143. Retrieved from http://puslit2.petra.ac.id/ejournal/index.php/ind/article/view/16713

Bititci, U. S., Carrie, A. S., & McDevitt, L. (1997). Integrated performance measurement systems: a development guide. *International Journal of Operations & Production Management*, *17*(5), 522–534. https://doi.org/10.1108/01443579710167230

Briš, M., & Econ, B. S. (2007). Sensitivity Analysis As a Mangerial Decision Making Tool Faculty of Economics in Osijek, 287–296.

Gradeless, M. (2003). SMART Goals. *Dental Economics*, *93*(9), 74.

Helfert, E. A. (1996). *Teknik Analisis Keuangan: Petunjuk Praktis untuk Mengelola dan Mengukur Kinerja Perusahaan*. Jakarta: Erlangga.

Kaplan, R., & Norton, D. (1996a). *Translating Strategy into Action - Balanced Scorecard*. Boston: Harvard Business School Press.

Kaplan, R., & Norton, D. (1996b). Using the Balanced Scorecard as a Strategic Management System.

Mulyadi, B. S. (2001). *Alat Manajemen Kontemporer untuk Pelipatgandaan Kinerja Keuangan Perusahaan.* Jakarta: Salemba Empat.

Parmenter, D. (2007). *Key Performance Indicators Developing, Implementing, and Using Winning KPIs*. John Wiley & Sons,inc.

Putri, D. A., & Handayani, N. U. (2014). Tbbm Semarang Group Dengan Pendekatan Human Resources Scorecard, *X*(3), 187–196.

Turkay, S. (2014). Setting Goals: Who, Why, How? *Manuscript*. Retrieved from http://hilt.harvard.edu/files/hilt/files/settinggoals.pdf

Vargas, L., & Saaty, L. (2006). Decision Making with the Analytic Network Process, *95*(September 2006). https://doi.org/10.1007/0-387-33987-6

Wayan, M. N. 2007. (2007). Pengelolaan SDM untuk Menciptakan Keunggulan Kompetitif Ni Wayan Mujiati Fakultas Ekonomi Universitas Udayana. *Jurnal Universitas Udayana*, 1–12. Retrieved from https://www.google.co.id/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwik0cWTq-vYAhUIS7wKHYr5CikQFgg4MAI&url=https%3A%2F%2Fojs.unud.ac.id%2Findex.php%2FManajemen%2Farticle%2Fview%2F4507%2F3436&usg=AOvVaw3xN9OkMf2K0ScFXDnNy7np

Wolk, A., Dholakia, A., & Kreitz, K. (2009). *Building a Performance Measurement System*. Root Cause.

BIOGRAPHY

The author, Hafizh, was born in Surabaya, on 3rd May, 1996. He was graduated from SD Muhammadiyah 4 Surabaya on 2008, SMPN 6 Surabaya on 2011, and SMAN 5 Surabaya on 2014. After graduated from senior high school, the author started to begin the college year in Industrial Engineering Department, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia. During the college time, the author had actively engaged in student organization such as: vice president of HMTI ITS 2016-2017 and also become staff member for basketball extracurricular in ITS. Author also has several achievements in college basketball competition such as: 3rd place "Liga Mahasiswa" East Java Conference 2017, 3rd place "Pertalite Cup", and 1st Place VCOM Basketball Faculty Competition. Author also active in training, such as: LKMM Pra-TD, LKMM TD, LKMM TM and P3MTI. The other experience of the author is do the internship in PT Mayora Indah Tbk on 2017. The focus on the internship is workload analysis. In the academic, author focuses on the performance management, risk management, supply chain management, game theory, and sustainable manufacturing. For further discussion, author can be reached through email hafizhie14@gmail.com.