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Implementation Of Continued Improvements Quality Management System At Ptz Company

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ABSTRACT

The general problem faced by the manufacturing industry is how to increase the QMS implementation effectiveness, which affects company performance of quality objectiveachievementsuch as customer perspective and internal business processes perspective. The object research is PTZ company as a pump manufacturing company is located in West Java, Indonesia with domestic and export market share.The research aims to improve the QMS implementation effectiveness by increasing company performance and becoming a practical guide for manufacturing companies.The population taken is the NC number data of Audit findings (internal and external) from 2010 to 2020 at PTZ company. The research method uses DMAIC, fishbone analysis diagrams to identify the main causes of 6M, 5Whys to investigate root causes of problems, 5W1H to determine the corrective actions for improvement.The implication is the increased effectiveness of QMS implementation using the checklist with the scoring system and input all QMS documents at computer network that can be accessed by all auditors and auditees.The conclusion is the results of research PTZ companies can increase the QMS effectiveness indicated by a significant decrease in the number of NCaudit findings of Internal and external audits.

KEYWORDS: QMS; fishbone analyses; 5Why; 5W1H; NC Audit.

INTRODUCTION

Every company organization wants their products to have a good quality, good brand image and well known in the global market also meet customer's satisfaction. Good quality is the fulfillment of customer requirements consisting of proper quantity, correct specifications, agreed prices, delivery on time. Commonly the entrepreneurs/ company owners definitely want their business to be successful and be able to return their investment at the company, therefore a good quality product/service should satisfy the customer.Getting a good response from these customers requires standardization of the organization, which is widely known by domestic and international customers. The trend of global market demands, both domestic customers (government and private institutions) and overseas customers, has become an absolute requirement for to have QMS ISO 9001 certificate.

To gain international recognition, the company's organization wants to implement the ISO Quality Management System to ensure good quality assurance with an ISO quality management system that covers everything from incoming goods, production planning, production processes, QC inspection in each manufacturing process until the final product, Design & Engineering, Marketing, Warehousing, including supporting Human Resource Management, Maintenance. So that corporate organizations have well-implemented QMS ISO 9001 and effectively will make the companyproductive and able to compete in the global market (Vincent Gaspersz, 2012).

The next problem is that there are still quite several companies that fail to explore the potential of the ISO 9001 quality management system if the system that is made does not build a quality commitment but only to gain pseudo prestige with a certificate and consider the certificate that has been obtained, then the quality problem is considered solved (Willy Susilo, 2003).Although the company that has an ISO 9001 certificate is not capable to compete in the global market and maintaining a good product quality

Quality audit activities have been generally practiced by companies that have adopted and implemented ISO 9001 standards. In companies that have developed QMS well and have adequate resources, internal quality audit activities are seen as activities that make a positive contribution to improving company performance, especially aspects of quality, customer satisfaction and internal operation. However, several companies have carried out internal quality audits but no positive influence yet on company performance. They also still have difficulty conducting Quality Internal Audits to meet the requirements following ISO 9001:2015 related to limited resources Auditor competence and inadequate document control system.

Standard ISO 19011:2018 provides guidance on management system audits, including audit principles, managing audit programs,carrying out management system audits, and guidance on evaluating the competence of individuals involved in the audit process. These activities include individual audit program managers, auditors, and audit teams. This applies to all organizations that need to plan and carry out internal or external audits of management systems or manage audit programs. Application of this Standard to other types of audits is possible if special consideration is given to the specific competencies required (ISO 19011, 2018). The application of ISO 19011 applies to all organizations that need to carry out internal or external audits on management systems or to manage audit programs including supplier audits, as well as management system certification.

The research purpose is with effective QMS implementation will influence increasing company quality objectives achievement which is in line with company performance.The research tools used are DMAIC, histogram graph, Fishbone diagram. 5Why and 5W+1H, a checklist with the scoring system of internal audit results and QMS documents on the computer network.

THEORY

A corporate strategy that can be seen from the role of Vision reflects a strong reason for the existence of a company and Vision is the responsibility of the owner or founder of the company, Mission which is a management statement regarding the description of the entire company and mission is usually the responsibility of top management and strategy is the responsibility of the middle and low-level management. While the objectives are statements related to production, market, and financial standards to be achieved by the company. The three instruments produce a company strategy which includes product mix, target customers, production methods, and various other managerial decisions. With the vision and mission, a company will be able to move according to what is aspired or expected by its owners. Of course, to make this company's vision and mission work well, it requires a strategy or tactics and business techniques that are consistent and joint commitment with all management and employees (Gaspersz, 2012). The targets to be achieved are called quality objectives which are translated into sales targets, profit targets, production targets, quality targets, and others. The QMS effectivity implementation will influence increasing achievement of decided quality objectives.

The Vision and Mission statement and become a framework for achieving the desired final results after 3 years to 5 years. Meanwhile, the goals/ Objective of the company's organization is a specific statement that can be measured by numbers (quantitative) with the time of achieving the desired results. Good goals must meet the SMART criteria = Specific- goal achievement must be specific desired, Measurable- goals must be measurable when they can be achieved, Aggressive but Attainable- Aggressive but achievable, Result-oriented- goals must state results, Time-bound- Goals must be time-limited (Gaspersz, 2012)

The ISO 9001:2015 standard brings quality more in line with aspects of an organization's

business and strategy than treating it as a separate entity. Quality policy and quality objectives in the Quality Management System (QMS) must be compatible with the company's strategic direction (David L Goetsc, 2016)

The specific objectives of Internal Audit (Willy Susilo, 2003) are as follows;

a) Priority of problems being faced by the company
b) Business development plan
c) Requirements of a management system as a reference
d) Regulatory or contractual requirements with customers
e) Supplier evaluation
f) There is a potential risk of company activities

According to SNI ISO 9001:2015, clause 9.2.1. *The organization shall carry out internal audits at planned times to provide information on whether the quality management information system complies with the organization's requirements and implements the organization's requirements. And clause 9.2.2. a) The organization must plan, establish, implement and maintain an audit program including frequency, methods, responsibilities, planning, and reporting requirements. (SNI ISO 9001, 2015)*

Fishbone diagram analysis steps

Fishbone diagram because it looks like a fishbone is often also called Cause-and-Effect Diagram or Ishikawa Diagram introduced by Dr. Kaoru Ishikawa, a quality control expert from Japan, as one of the seven basic quality tools (7 basic quality tools) to improve quality (David L Goetsc, 2016). Fishbone diagrams will identify various potential causes of an effect or problem, and analyze the problem through brainstorming sessions. Problems will be broken down into a number of related categories, including people, materials, machines, procedures, policies, and so on. Each category has causes that need to be explained through a brainstorming session. Common problems that occur in the manufacturing industry are as follows;

a) production process delays,
b) High level of product defects
c) Production machines that often experience trouble,
d) Unstable production line output which results in chaos in the production plan,
e) Productivity that does not reach the target,
f) customer complaints that keep on repeating and less controllable

Use of Cause and effect Diagramsfor improvement, process control, to make work standards, quality control and Education

RESEARCH METHODS

1.1 Types of Research

This research method uses a quantitative approach from case studies using data on the number of NC Audit findings from 2010 to 2020 and descriptive models to describe the phenomena used as a result of processing, observing, and analyzing each variable for the basis for making decisions in solving business problems. This research was conducted at a PTZ manufacturing company which became the object of research for further improvement of the QMS implementation.“Research strategies are Experiment, Survey research, Observation, Case studies, Grounded theory, Action research, Mixed methods. Data collection methods are *Interviews, Observation, Questionnaires, Physical measurement, Unobtrusive” (Uma Sekaran, 2016).*

1.2 Operational Definition and Measurement of Variables

The research was carried out at the PTZ company by conducting initial observations of the NC data number of Internal Audit and External Audit from 2010 to 2016 then carried out further observations in 2017 which began to implement improvements to the internal Audit Checklist with a scoring systemand input QMS documents on computer network also shown the NC data findings of Internal Audit and External Audit 2017 to 2020.

Tabel0.1Research on Quality Management System Implementation

Research variable	Dimension	Indicator
NC number findings of Internal Audit andexternal	**DMAIC**is an approach methodologyto solve the problem to	▪ Define ▪ Measure ▪ Analyze ▪ Improve ▪ Control

Audit (the data year 2010 until 2020)	increase PQCDSME performance continuously	
	Fishbone diagram use to find potential causes according to main cause category group	6 M ▪ Measure ▪ Man Power ▪ Machine ▪ Method/ Process ▪ Material ▪ Mother Nature/ Environment
	5Whyuse to find the root cause of all sub-clausesin each 6M main causes	➢ 5 Why
	5W+1Hused to define corrective action for improvement	➢ What ➢ Why ➢ Where ➢ When ➢ Who ➢ How

1.3 Population and Research Sample

According to Sugiyono (2016: 80) "Population is a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions." In this research, the population taken is the NC number findings of Internal Audit and External Audit at PTZ company.

1.4 Types of Data and Data Collection Methods

In this study, the researcher combined the data collection of primary and secondary. Secondary data obtained by researchers from the main source directly in the form of documents or data files in the period 2010 to 2020 in the form of NC number findings of Internal and External Audits at PTZ companies. For primary data, the researcher conducted a Focus Group Discussion (FGD) with Auditors and Auditees from all departments with the positions of manager, assistant manager, staff who are discussion groups to analyze a problem that accommodates various opinions (brainstorming) then discussed together to get a solution that agreed together. The distinguishing feature of the FGD method is not found in other qualitative research methods (in the form of interviews or in-depth observations), namely the interaction between researchers and research information sources (Sutopo, 2006). Data collection techniques are the most strategic steps in research because the main purpose of research is to obtain data (Sugiyono, 2015).

1.5 Data Analysis Method

Data analysis is the activity/process of processing data that has been collected and then analyzed using research methods: histogram graph, DMAIC, Fishbone diagram, 5 Why, 5W+1H, audit checklist with a scoring system, and QMS document on the computer network within the company organization PTZ.

The DMAIC cycle approach methodology (Define, Measure, Analyse, Improve and Control) is used to solve problems in continuously improving PQCDSME performance, with the following steps (Vincent Gaspersz, 2012);

In the process of analyzing this Fishbone diagram, the researcher carried out a Focus Group Discussion (FGD) with all auditors and auditees from all departments in the PTZ company.Steps for making Fishbone, examples of quality problems (Erikusnadi, 2011). The problem statement is translated as the effect, in fishbone as fish head. Draw a box around the text of the problem statement. Create a large branch leading to the Quality problem statement.Identify the main horizontal line categories, draw a diagonal line that becomes the main branch. Each branch represents the main cause of the written problem. Then this branch is translated as a cause that is visually described as a fishbone. The main cause categories commonly used in the **6M** manufacturing industry consist ofMeasurement, Man Power, Machine, Method/ Process, Materials (including raw materials and information),Mother Nature/ Environment.Finding potential causes by brainstorming way. The causes are presented and determined together where the causes must be placed in the fishbone diagram according to the main cause category group. The causes are written in horizontal lines so that many small "bones" come out of the diagonal line. Then ask

again "Why does that cause arise?" so that the "bone" is smaller (sub-cause) out of the horizontal line. A cause can be written in several places if the cause relates to several categories.

1.5.1 5W+1H Method for Development of Improvement Plan

The researchercarried out a Focus Group Discussion (FGD) with all auditors and auditees from all departments andobserve the actual conditions of the QMS implementation in PTZ companies to discuss 5W+1H for developing improvement plans.

Table 0.2 5W+1H Method

Type	5W1H	Description	Action
Main purpose	What?	What are the main targets and improvements of QMS implementation	Formulate targets according to needs
Reason	Why?	Why is the improvement plan needed?	
Place	Where?	Where is the improvement plan implemented?	Changing the order of activities/combinations
Sequent	When?	When will the improvement plan be implemented?	
Person	Who?	Who did the repairs?	
Method	How?	How to implement the improvement plan?	Simplify existing improvement plans

(Vincent Gaspersz, 2012)

1.5.2 ChecklistAudit with scoring system method

In this study, the authors made observations about making the checklist audit based on ISO 9001:2015 clauses and then modified the audit items according to the needs of the company organization and the audit scope applied to each department/section also they can be improved by the Auditor. Please see the sample in Appendix 1. Sample using the Checklist of internal quality audit with scoring at PTZ company.The audit scoring method applied is 0 = Not yet implemented/ no evidence; 1 = Partially implemented/ incomplete evidence and 2 = Completely implemented/ complete evidence. The method of using a checklist with a scoring system had been set out in the Standard Operating Procedures of Internal Audit at PTZ companies and has been implemented since 2017.

1.5.3 Make QMS document on the Computer Network

The PTZ company controlled all QMS documents from 2010 until 2016 still used hardcopy documents. Often found the problems with missing certain documents and had difficulties controlling QMS documents. Since 2017 had beenimproved QMS document control on the computer network from all departments & sections which they can be accessed “read-only” by all departments andthe updated document by central control documents and/ or Management Representative. Please see the sample in Appendix 2.Sample QMS Document Folder on Computer Network at PTZ company

1.6 Research Flow

The flow of research is a way of thinking sequentially to complete research as described bellow;

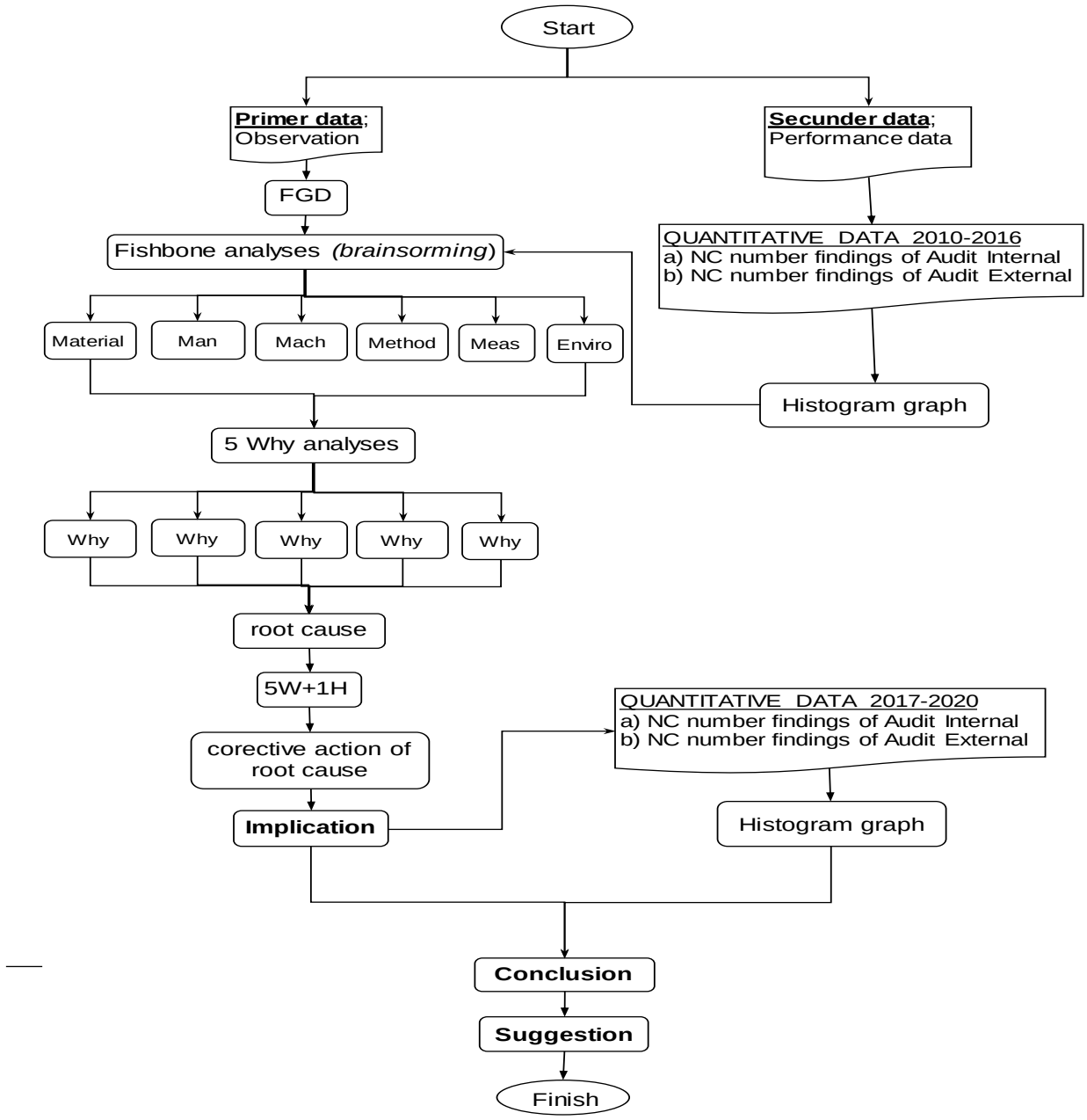

Figure0.1Flow Research

RESULTS AND DISCUSSION

1.7 Overview of Research Objects

The research was carried out at PTZ Company which is the first pump factory in Indonesia located in West Java that makes pump products. The pump products produced by PTZ are centrifugal pumps made of cast iron (Ferro casting) and various Impeller materials (cast iron, Bronze, and Stainless steel). The types of pump products produced are FSA (End suction) pumps for industry, chillers (chiller), CN (Split case) for industry, water treatment, submersible pumps for wastewater, self-priming pumps for irrigation, mix flow pumps for fisheries. and flood control, booster pumps for high-rise buildings, and others. PTZ company has a complete manufacturing facility process consisting of;

1) Model making (wood pattern with epoxy coating, epoxy resin, aluminum pattern, metal pattern)
2) Sand molding process (Furan mold, Green sand, shell mold)
3) Melting process for Ferro iron casting and Bronze casting(Induction Furnace)

4) The process of finishing casting parts (Shot blast, process grinding, primer painting)
5) Machining process (CNC machines, NC machines, and manual machines)
6) Assembling process (small line pump assembling, medium line pump assembling, big pump line assembling, and submersible pump assembling)
7) Pump test bench that has been integrated with the computer (big size pump test, standard pump test, and submersible test)
8) Final product packing process, delivery, and after-sales service

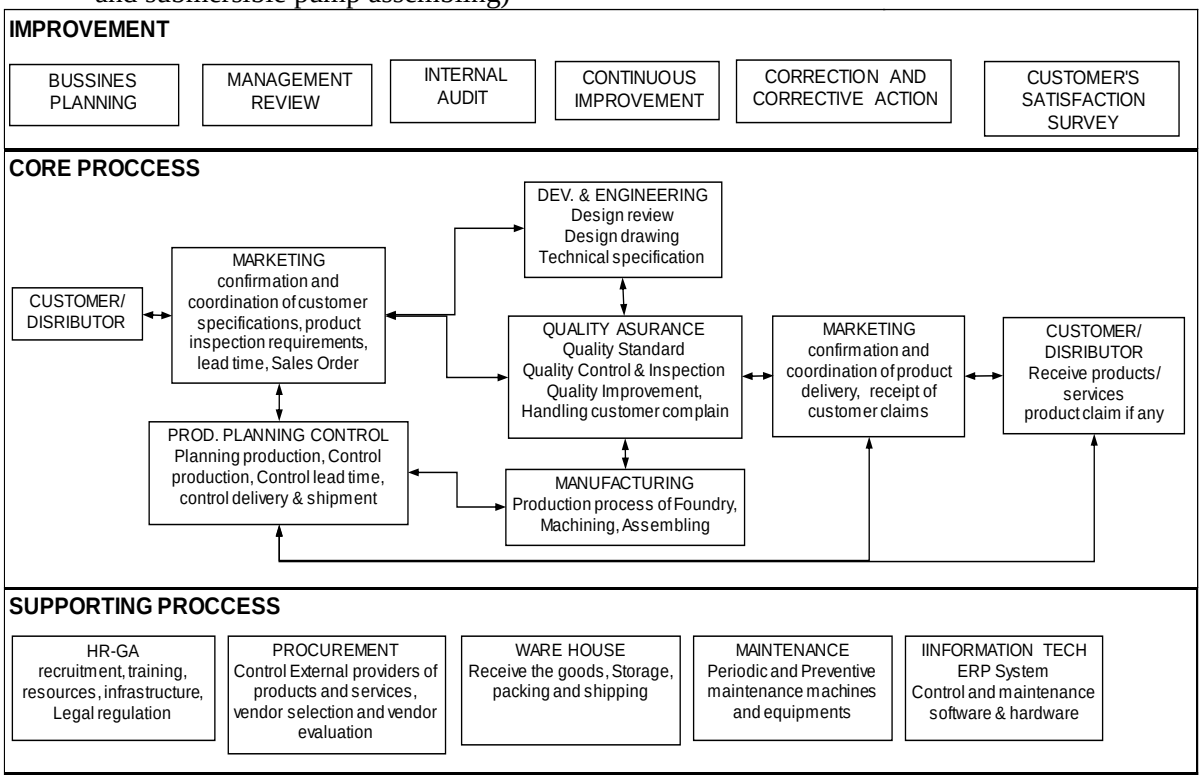

Figure0.1Business Proses Maping at PTZ company

In figure 4.1. Business Process Mapping describes as follow;

Continuous improvement consists of business planning, management review, Internal Audit, Continuous improvement, corrective and corrective actions.

Core Process consists of all activities from customer to Marketing, Production Control, Dev. & Engineering, Quality Assurance, Manufacturing to Marketing and to customers again.

Supporting process consists of indirect activities from HR-GA support department, Procurement, Ware House, Information Technology

1.8 Quantitative Data Processing (before improvement)

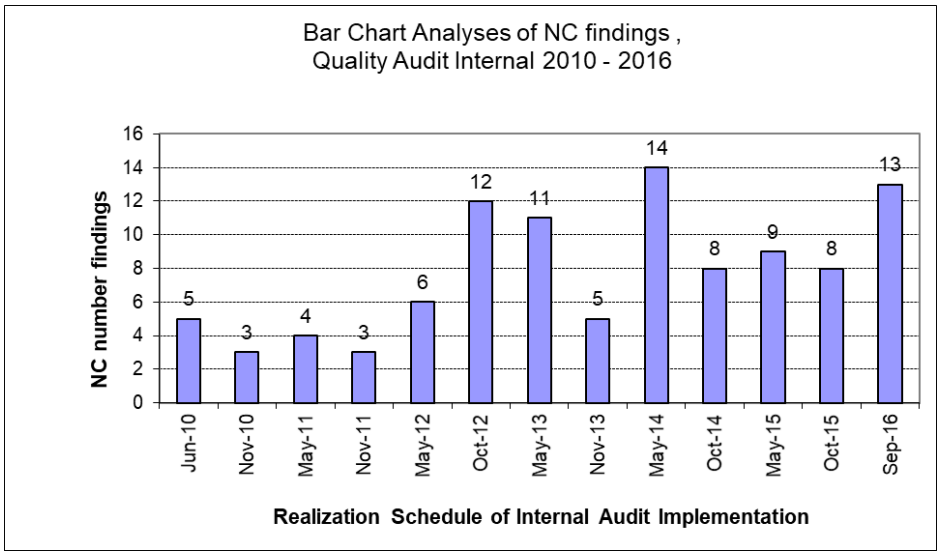

Figure0.2The Bar Chart of NC Internal Audit Findings 2010 to 2016

The Bar Chart of NC Internal Audit Findings 2010 to 2016 of all audited departments and sections (total 27 auditees) in PTZ companies does not describe the targets set by the company because basically no findings are expected or minimal, while the blue bar chart is the realization of the NCfinding number. The internal audit was carried out according to the Internal Audit Schedule 1 year 2 times from 2010 to 2015, while in 2016 it was held once. The fluctuations in NC internal audit findings indicate the effectiveness of the QMS implementationis not yet consistent.

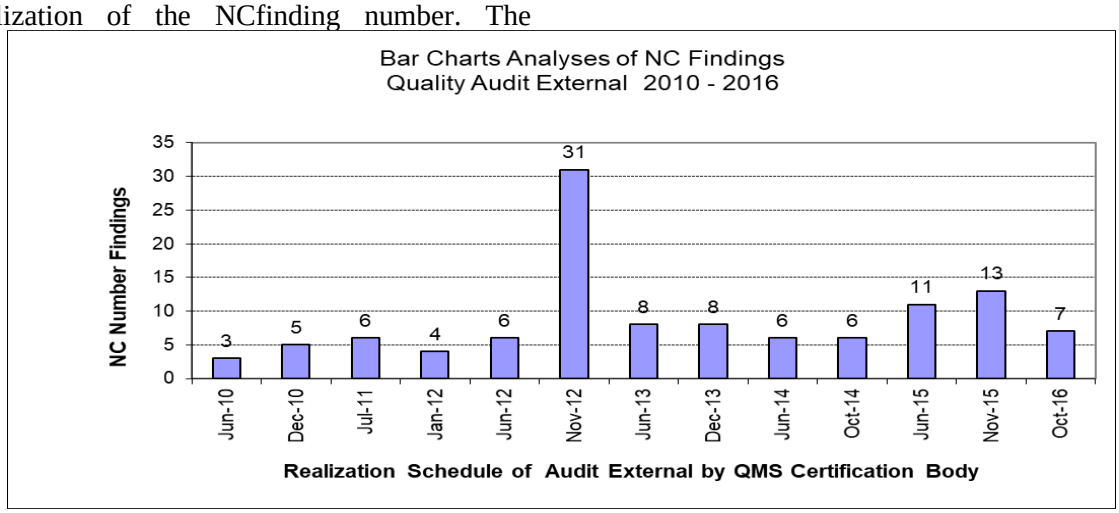

Figure0.3The Bar Chart of NC External Audit Findings 2010 s/d 2016

The Bar Chart of NC External Audit Findings 2010 to 2016 from all audited departments and sections (total 27 auditees) in PTZ companies does not describe the targets set by the company because basically no findings are expected or minimal, while the blue bar chart is the realization of NC findings when the External Audit is carried out according to the Audit Schedule from the certification body, the Audit is 1 year 2 times from 2010 to 2015, while in 2016 it is held once. In November 2012 had many NC findings number because the organization needed implementation adjustments for re-certification and the transition from ISO 9001:2000 to ISO 9001:2008 with an audit duration of 5 Man-days Audit so that there were many NC audit findings occurred. Then from 2013 to 2016, there were still any fluctuations in the NC external audit findingsindicating the effectiveness of the QMS implementation was not yet consistent.

1.9 Quantitative Data Processing (after improvement)

Figure0.4The Bar Chart of NC Internal Audit Findings2017 s/d 2020

The Bar Chart of Internal Audit Findings 2017 to 2020 from all audited departments and sections (total 27 Auditees) in PTZ companies does not describe the targets set by the company because basically no findings are expected or minimal, while the blue bar chart is the realization of NC audit findings with the Internal Audit Schedule once a year. The actual number of NC Internal Audit Findings were 10, 10, 8, 0. In The Bar Chart ,the NC findings of the internal audit have a downward trend which shows the QMS implementation effectiveness is getting better.

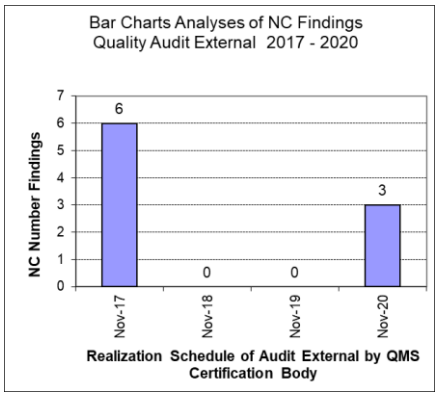

Figure0.1Graph of NC External Audit Findings 2010 s/d 2016

In The Bar Chart of External Audit Findings, 2017 to 2020 from all audited departments and sections (total 27 auditees) in PTZ companies does not describe the targets set by the company because basically no findings are expected or minimal, while the blue bar chart is the realization of NC audit findings with the Audit Schedule from the Audit certification body once a year. The actual number of NC External Audit Findings were 6, 0, 0, 3. From 2017 to 2020. The actual number of NC external audit have a drastic downward trend. the NC findings of the external audit have a downward trend which shows the QMS implementation effectiveness is getting better.

Qualitative Data Processing

Qualitative data processing using the DMAIC cycle approach methodology consist of Define, Measure, Analyse, Improve and Control to solve the problem with the following steps (Vincent Gaspersz, 2012) ;

DEFINE (D) is Defining and selecting existing problems to determine the goals to be achieved

Step 1: Define the problem of the NC number findings of Internal and External as a theme for improving the effectiveness of QMS implementation

MEASURE (M) is Measuring the problems that have been defined by collecting and analyzing data on the number of NC Audit findings

Step 2: Verify measurements and look for all causes of NC Audit findings using (Brainstorming) Fishbone diagrams by conducting FGD

ANALYZE (A) is to analyze by identifying and finding the root cause of the problem

Step 3: analyze Root Causes of Problems with 5 Whys by conducting FGD

Step 4: Planning Corrective Action

IMPROVE (I) is Increase

Step 5: Carry out improvement with steps 5W + 1H by doing FGD

Step 6: Study the improvement results

CONTROL (C) is monitoring and measuring performance to find out the results that have been achieved.

Step 7: Making the best standard of improvement solutions as work guidelines in the form of the next Internal Audit Standard Operation Procedure (SOP)

Step 8: Create a final report and determine the next Performance Improvement Plan

Fishbone diagram analysis of NC Audit Findings

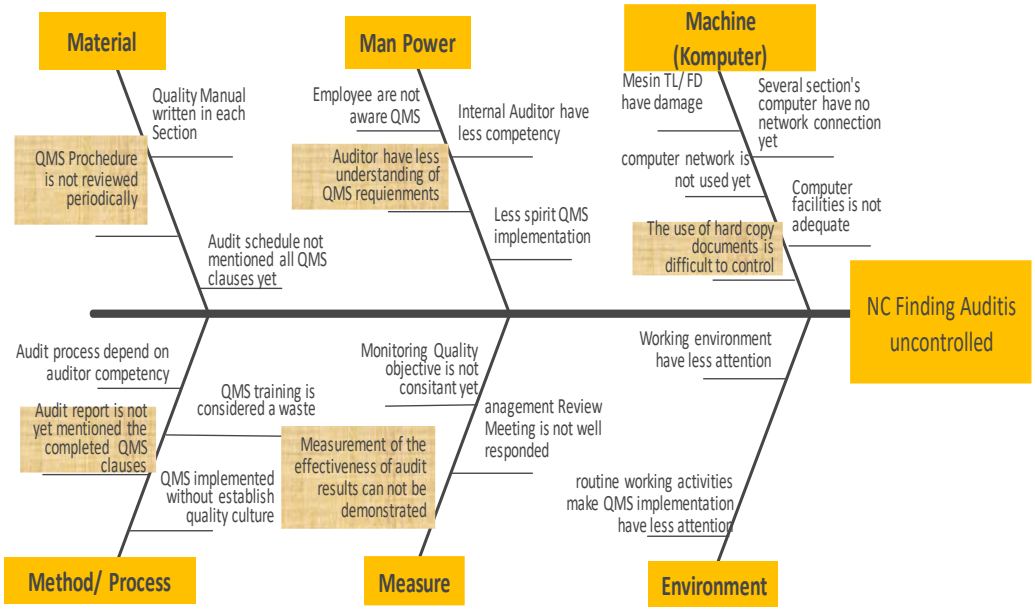

Figure 0.2Fishbone Analysis Graph The effectiveness of QMS performance is not measurable

In solving the problem analysis to reduce/eliminate the number of NC Audit findings (Internal & External) the researcher conducted a Focus Group Discussion (FGD) with all Auditors and Auditees from all departments in the PTZ company which is a discussion group to analyse a problem that accommodates various opinions (brainstorming). By using Fishbone Diagram analysiswrite down all possible sub-causes in the main cause groups Material, Manpower, Machine, Method, Measure, Environment. Then the sub-causes in the main cause group were selected which had the most significant impact on the NC number of Audit findings, consist ofQMS procedures have not been reviewed periodically, Auditors have less understanding in the QMS requirements, using QMS hard copy documents is difficult to control, the Audit report is not yet mentioned the completed QMS clauses, Measurement of the effectiveness of audit results cannot be demonstrated. Furthermore, the significant sub-causes were further analysed to find the root cause of the problem with the 5Why method mentioned bellow in table 4.1.

Table0.1.5Why Analysis of NC Audit Findings

5 WHY ANALYSES TO FIND ROOT CAUSE					FGD participants:	
Subject	NC finding Audit is uncontrolled				Internal Auditor & Auditee (QA, Prod, PPIC, Foundry, Machining, Asemblling, WH)	
No	***Problem***	***Why-1***	***Why-2***	***Why-3***	***Why-4***	***Why-5***
	Problem	Cause-1	Cause-2	Cause-3	Cause-4	Cause-5
1	QMS procedures have not been reviewed periodically	busy work routines tend to ignore the need for updating procedures	Nobody requests to review the procedure	Employee awareness to review the conformity of QMS documents	There is no special control and supervision from the department manager	
2	Auditors have less understand the QMS requirements	Busy work routine Auditor as manager/ manager/ staff/ supervisor	There is no specific time to explore the QMS requirements	Awareness Auditor to re-study QMS	Most Auditors who have worked for more than 10 years tend to be bored with the QMS routine activities	
3	The use of QMS hard copy documents is difficult to control	there are no representative person each department to control documents	QMS hardcopy document storage is easier to lose when any one borrowed and missfilling	if the document controller is not attend, other person can't find the QMS documents	There is no centralized QMS documents yet for easier to control	
4	Audit report is not yet mentioned the completed QMS clauses	it still rely on the ability of the individual Internal auditor	Internal Auditor's abilities and competencies are vary	Internal Auditor lacks the initiative to make a checklist before conducting the Audit	there are no easier guidelines for Internal Auditors to carry out audits	
5	Measurement of the effectiveness of audit results can not be demonstrated	The audit report has no performance data on the effectiveness of QMS implementation	actual audit report only NC findings and some Observations	The results of the report cannot show the effectiveness of the QMS implementation	there is no findings audit with scorring system	Measuring QMS efectivitiy on Audit result can't be shown

From the 5 Why analysis, the results of the FGD discussion found the main root causes of the Material, Man power, Machine, Method, Measure, Environment problems. Then the main root causes are used to determine corrective actions using the 5W+1H method in table 4.2.

Tabel0.2.PenetapanTindakanKorektifdengan 5W+1H

5W + 1H to decide improvement steps				FGD participants :		
Subject	NC Finding Audit is uncontrolled			Internal Auditor & Auditor (QA, Prod, PPIC, Foundry, Machining, Asemblling,		
No	***What***	***Why***	***How***	***Where***	***When***	***Who***
	Problem	The main cause	Corrective action	Where	When	PIC
1	QMS procedures have not been reviewed periodically	There is no special control and supervision from the department manager	MR coordinates with all department managers to review & update procedures every 6 months and audited once a year	at all departments	since 2017	MR
2	Auditors do not understand the QMS requirements	Most Auditors who have worked for more than 10 years tend to be bored with the QMS routine activities	A refreshment of Internal Audit Training was held to motivate the importance of improving the QMS implementation in the organization for a sustainable business	training center	since 2017	MR
3	The use of QMS hard copy documents is difficult to control	There is no centralized QMS documents yet for easier to control	create grouped all QMS documents in one folder in the computer Network which is controlled by document controller or MR that can be accessed by all departments (read only)	PC Computer Network that can be accessed by all dept	since 2017	MR, ISO 9001 QMS Control Document
4	The audit report lacks complete clauses	there are no easier guidelines for Internal Auditors to carry out audits	Make checklist audit which consist of QMS requirements as a guidance for the internal audit process	PC Computer Network that can be accessed by all dept	since 2017	MR, ISO 9001 QMS Control Document
5	Measurement of the effectiveness of audit results can not be demonstrated	there is no findings audit with scorring system	Make scoring system to all audit observation items that refer to the QMS requirements of the ISO 9001 with the criteria of value: 0: if NC is found, score 1: if implementation/documents already exist but are not complete and score 2: if implementation/documents can be demonstrated completely. Then all are added up divided by the number of audit observation items x 2, the result is the value in %	PC Computer Network that can be accessed by all dept	since 2017	MR, ISO 9001 QMS Control Document

From the determination of corrective actions resulting from the FGD discussion using the 5W+1H method, it is used to resolve the main root causes described on “Corrective Action” coloumn

1.10 Implications of Implementation in PTZ Companies

PTZ companies use an internal audit checklist with a scoring system and QMS documents on the Computer Network which makes it easy to observe the complete audit process according to the requirements of the ISO 9001 QMS to improve the Internal Auditor competence and the audit results can show the effectiveness of the QMSimplementation.

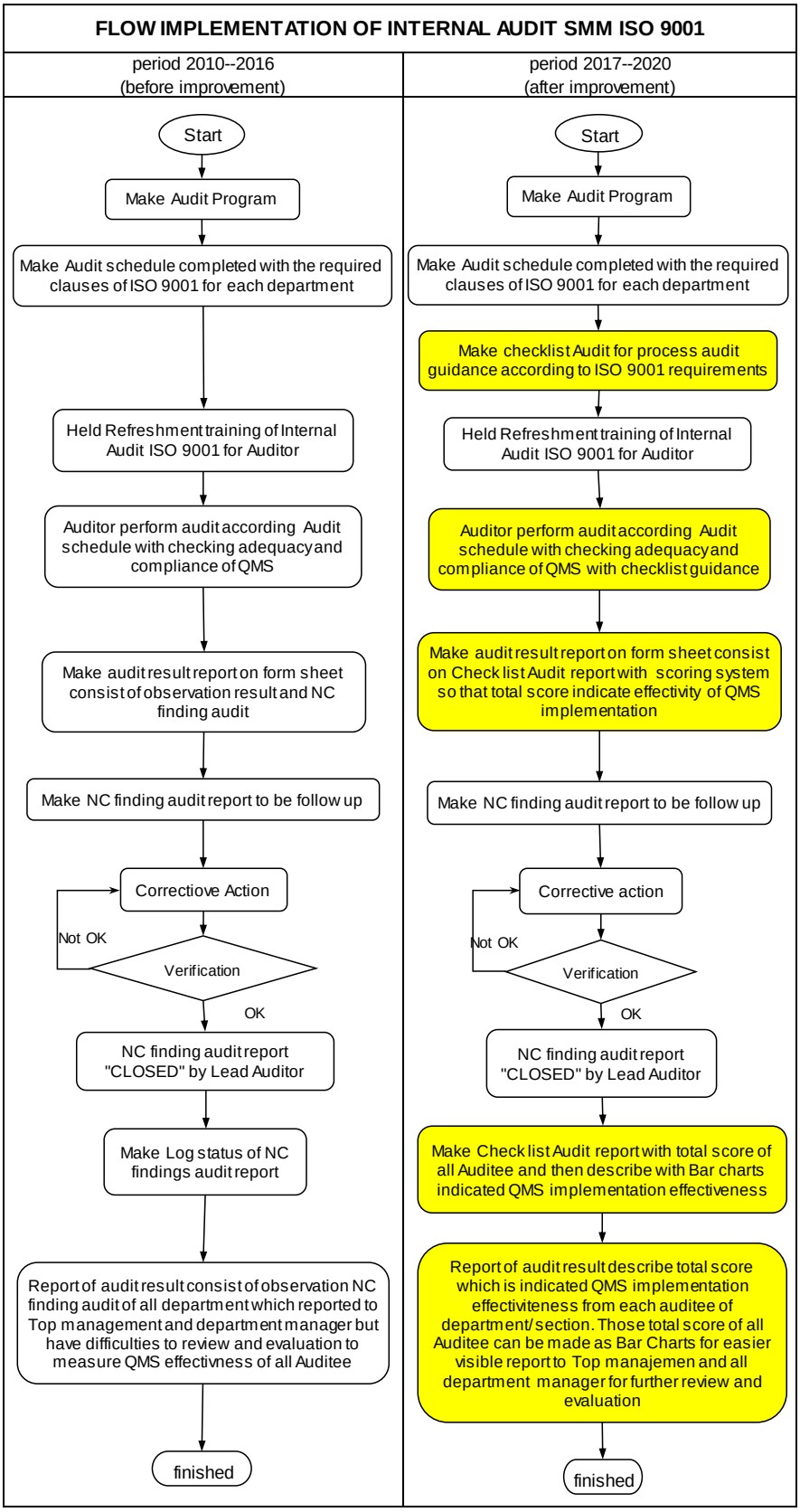

Figure0.7Implementation Flow of ISO 9001 QMS Internal Audit (before-after)

In figure 4.7. The flow of Internal Audit Implementation of QMS ISO 9001 describes the flow comparison before and after improvement:

a) Internal Audit process flow Prior to 2010 - 2016 improvements starting from Creating an Audit Program, making an Audit Schedule equipped

with ISO 9001 clause required for each department auditee, refreshment training of ISO 9001 Internal Audit for Auditors, Auditors carrying out the Audit process according to the Audit Schedule by checking the compliance and adequacy of QMS, Auditors carry out the Audit process according to the Audit Schedule by checking the compliance and adequacy of QMS, Make NC audit findings report included correction, corrective action of improvements, verification. Make log status of NC Internal Audit, Audit results report from all departments to Top management, all department managers.

b) The flow of the Internal Audit process After the 2017-2020 improvementsstages are almost the same as the flow before improvement but there are any improvement stages with yellowcolorconsisting of making an Audit checklist for all audited departments according to the requirements of the ISO 9001 QMS clauses, the Auditor carried out the Audit process in accordance with Audit schedule with checklist guidelines for checking the compliance and adequacy of QMS, make the Checklist Audit Report with the scoring system, make Audit results report of the QMS implementation effectiveness for all departments in bar chart scoring audit result to Top management and all managers department. This bar chart with the total score of each department (auditee) is easier to understand for top management in setting policies for improving QMS companyand for managers to determine corrective actions to improve QMS in their departments.

CONCLUSIONS AND SUGGESTIONS

1.11 Conclusion

The research results with FGD discussion on 5Why found *Root Cause of Problem* are no QMS control and supervision from the department manager, most auditors are tired of the QMS routine, the QMS document is still not controlled, no centralized QMS documents yet for easier to control, no easier guidelines for Internal Auditors to carry out audits, no findings audit with a scoring system

And *Corrective Actions taken* at PTZ are MR coordinating for review & updating procedures, holding SMM Internal Audit Training refreshment, making QMS documents on the computer Network, making QMS Internal Audit checklists with the scoring system.

Results of Implementing Improvements

Description	NC number findings before improvement (2010—2016)	NC n improv
Internal Audit Result	(5, 3, 4, 3, 6, 12, 11, 5, 14, 8, 9, 8, 13)	(10, 10
External Audit Result	(3, 5, 6, 4, 6, 31, 8, 8, 6, 6, 11, 13, 7)	(6, 0, 0

From the results of the Internal Audit and External audit, it had shown a significant decrease in the NC number of Internal and external audit findings, these results prove that the continued implementation of QMS improvements in PTZ companies had been effective and became an integral part of PTZ operational activities to achieve the decided quality objective as well as company performance in business activities.

1.12 Suggestions

It is suggested that PTZ companies require all Auditors and Auditees to have commitment and consistency in implementing the corrective actions which have been discussed in the FGD for QMS implementation improvement

Establish a culture of thought when solving problems by using Fishbone analyses, 5Why, 5W1H to find the root causes of problems and get effective solutions especially to reduce/eliminate NC Audit findings as well as other company performance issues.

REFERENCES

1. Cesaron, D., T. (2015) ‘Penerapan Metode Six Sigma Dengan Pendekatan Dmaic Pada Proses Handling Painted Body Bmw X3 (Studi Kasus: Pt. Tjahja Sakti Motor)’, *Jurnal PASTI*, IX(3), pp. 248–256.
2. Darmawan, A. and Hasibuan, M. (2014)

‘Analisis Dan Perancangan Aplikasi Sistem Informasi Audit Mutu Internal Dan Dokumentasi Penjaminan Mutu Perguruan Tinggi’, *Jurnal Generic*, 9(2), pp. 342–347.

3. David L Goetsc, S. B. D. (2016) *Quality Management for Organizational Excellence*. 8th edn. Edited by Andrew Gilfillan. New Jersey, USA: Pearson Education Limited 2016.
4. Gaspersz, V. (2012) *17. All-in-one-Vincent G.pdf*. 1st edn. Edited by T. Hrawati. Jakarta: Vinchristo Publication.
5. Hakim, A. and E, N. W. P. (2020) ‘UPAYA PENINGKATAN SISTEM MANAJEMEN MUTU DALAM PENERAPAN ISO 9001 : 2015’, 5(2).
6. Hamidy, F. (2016) ‘Pendekatan Analisis Fishbone Untuk Mengukur Kinerja Proses Bisnis Informasi E-Koperasi’, *Jurnal Teknoinfo*, 10(1), p. 11. doi: 10.33365/jti.v10i1.12.
7. Harsoyo, N. C. and Rahardjo, J. (2019) ‘Upaya Pengurangan Produk Cacat Dengan Metode DMAIC Di PT . X’, *Jurnal Titra*, 07(1), pp. 43–50.
8. ISO 19011 (2018) ‘Guidelines for Auditing Management System’.
9. ISO 9001 (2015) ‘Quality Management System- Requirements’. Switzerland: ISO Copyrigth.
10. Li, P., Jiang, P. and Zhang, G. (2019) ‘An Enhanced DMAIC Method for Feature-Driven Continuous Quality Improvement for Multi-Stage Machining Processes in One-of-a-Kind and Small-Batch Production’, *IEEE Access*. IEEE, 7, pp. 32492–32503. doi: 10.1109/ACCESS.2019.2900461.
11. Madar, A. (2020) ‘the Importance of Quality and Quality Strategies for Growing Competitiveness in the Market’, *Series V - Economic Sciences*, 13(62)(1), pp. 41–48. doi: 10.31926/but.es.2020.13.62.1.5.
12. Neyestani, B. (2017) ‘Seven Basic Tools of Quality Control: The Appropriate Techniques for Solving Quality Problems in the Organizations’, *SSRN Electronic Journal*. doi: 10.2139/ssrn.2955721.
13. Nugroho, R. E. and Khoirudin, S. (2020) ‘Overall Equipment Effectiveness Improvement on Cutting Machine by Minimizing Six Big Losses’, *Saudi Journal of Business and Management Studies*, 05(01), pp. 84–98. doi: 10.36348/sjbms.2020.v05i01.011.
14. Pan, Y., Dai, W. and Xiong, Y. (2019) ‘Investigation on the Material Failure in a Small Scale Automotive Camera Module via Root Cause Analysis and Experimental Validation’, *IEEE Access*. IEEE, 7, pp. 72818–72825. doi: 10.1109/ACCESS.2019.2920023.
15. Puspitasari, N. B. and Nurdianti, A. Q. (2014) ‘Analisis Faktor Kritis Implementasi ISO 9001 dan Sistem HACCP … (Puspitasari dan Nurdinati)’, *Analisis Faktor Kritis Implementasi Iso 9001 Dan Sistem Haccp Terhadap Kualitas Produk*, pp. 40–45.
16. Rahardjo, B. (2019) ‘Perancangan dan Implementasi Self Assessment Untuk Sertifikasi ISO 9001:2015 Menggunakan Metode Baldrige Scoring’, *Jurnal Media Teknik dan Sistem Industri*, 3(1), p. 1. doi: 10.35194/jmtsi.v3i1.423.
17. Rais, R. N. Bin *et al.* (2021) ‘Employing industrial quality management systems for quality assurance in outcome-based engineering education: A review’, *Education Sciences*, 11(2), pp. 1–24. doi: 10.3390/educsci11020045.
18. Realyvásquez-Vargas, A. *et al.* (2018) ‘Applying the Plan-Do-Check-Act (PDCA) cycle to reduce the defects in the manufacturing industry. A case study’, *Applied Sciences (Switzerland)*, 8(11). doi: 10.3390/app8112181.
19. Rindengan, V., Lumenta, A. and Rindengan, Y. (2015) ‘Rancang Bangun Aplikasi Audit Mutu Akademik Internal Universitas Sam Ratulangi Berbasis Web’, *Jurnal Teknik Informatika*, 6(1), pp. 1–6. doi: 10.35793/jti.6.1.2015.9979.
20. Samman, R. A. and Ouenniche, J. (2016) ‘Continuous quality improvement programs—part i: survey, critical analysis and future research directions’, *The Journal of Developing Areas*, 50(4), pp. 39–66. doi: 10.1353/jda.2016.0152.
21. Saraf, A. (2019) ‘Running head : Efficacy of ISO 9001 : 2015 Efficacy of ISO 9001 : 2015 to Support Operational Performance Ashesh Saraf Metropolitan State University Dissertation submitted in partial fulfillment for the degree of Doctor of Business Administration College’, *Efficacy of ISO 9001 : 2015 Efficacy of ISO 9001 : 2015 to Support Operational Performance*, (February).
22. Satia, D., Budhi, R. K. and Widianto, Y.

(2020) ‘Rancang Bangun Sistem Informasi Audit Mutu Internal Pada Universitas Widya Kartika Surabaya’, pp. 1–6.
23. Satya, S. (2016) ‘The Application of Fishbone Diagram Analisis to Improve School Quality’, *Dinamika Ilmu*, 16(1), pp. 59–74.
24. SNI ISO 9001 (2015) ‘Sistim Manajemen Mutu’. BSN.
25. Toma, S. G. and Naruo, S. (2017) ‘Total quality management and business excellence: The best practices at Toyota motor corporation’, *Amfiteatru Economic*, 19(45), pp. 566–580.
26. Vincent Gaspersz (2012) *18. Three-in-one-Vincent G.pdf*. Jakarta: Vinchristo Publication.
27. Widyahening, C. E. (2018) ‘Penggunaan Teknik Pembelajaran Fishbone Diagram Dalam Meningkatkan Keterampilan Membaca Siswa’, *Jurnal Komunikasi Pendidikan*, 2(1), p. 11. doi: 10.32585/jkp.v2i1.59.
28. Willy Susilo (2003) *20. Audit Mutu Int-Willy S.pdf*. 1st and. Edited by Nelson Valentino. Jakarta: PT Vorqista Binamega.
29. Wulandari, S. (2021) ‘Strategies to implement total quality management in small scale rural agroindustry to enhance Indonesian pepper competitiveness’, *IOP Conference Series: Earth and Environmental Science*, 733(1), pp. 1–10. doi: 10.1088/1755-1315/733/1/012051.
30. Yunita, N. and Adi, P. (2019) ‘Identifikasi Proses Produksi Komponen Guide dengan Metode DMAIC pada Supplier PT.X’, *Journal Titra*, 7(1), pp. 1–6.
31. Eri Kusnadi (2011), Fishbone diagram dan Langkah-langkahpembuatanya: https://eriskusnadi.com/2011/12/24/fishbone-diagram-dan-langkah-langkah-pembuatannya/

Appendix 1. Sample using the Checklist of internal quality audit with scoring at PTZ Company

AUDIT REPORT OF QMS ISO 9001:2015			Doc. No.: QMR01909011-QC Cast Rev./date : 0/ 10 September 2019		
Auditee = QC CASTING Aditee name =			Audit date : 20 Sept 2019		
No	Clause no ISO 9001	Description of Audit Questions	Auditor scoring	objective evidence of audit findings	Auditee's explanation/ finding description
1	5.2.2 & 7.3	How is the Quality Policy socialized and informed to all employees?	2	QC quality policy is posted on the information board	read every Monday morning (1 once a week)
2	6.2 & 7.3	Are quality objectives set and monitored periodically? (proof shown)	2	Sarmut QC Insp no. dock. QMR1801011-QC-FI	Max target = 1 claim from customer can be achieved
3	7.5.3	Is the documented information of the Quality System and Procedures Manual in the department & understood? (access to	1	Network : 1 SMM 9001 folders; 2. QUALITY MANUAL QUALITY MANUAL 9001and 3b.	Can't explain properly Manuals and Procedures on Network
4	7.5.3 P-QA1004	How to control the documented information section standard? (updated proof of registration)	2	Network : 1 SMM 9001 folders; 16. STANDARD REGISTRATION & STD; 1QA Sub sub folder	The list of QC Casting standards and their standards can be shown well
5	7.5.3 P-QA1004	How to control the documented information of softcopy documents on the computer (periodic back up) section? (sampling see data can be opened or not)	2	Periodic backups are carried out every 3 months (Sept 2019) and stored by Ass Manager QA	Back up can be shown
6	10.2 P-QA1012	How to control non-conforming products/goods/services and corrective actions in the department/section? (Accepted, Repair, Reject)	2	PPTS Base plate 18A reject slide 6-10pcs, July 11 verification: 3pcs OK (doc no.: TSC1907BP02)	Handling PPTS has been carried out effectively
7	9.1 P-QA1009	How to carry out a QC Casting inspection?	2	FC, FCD and BC material acceptance inspection standards (Dock no. S-QA2C001)	Inspection of casting materials has been carried out according to material acceptance inspection standards
8	7.1.5.2 P-QA1003	How to control dimension measuring tools & scales? (proof of list of measuring instruments, identification and calibration/verification).	2	List of measuring scales, date 12 May 2019 - 13 May 2020	Verify the measuring instrument used on the date. 20 Sept 2019 there is already a valid calibration/verification
9	9.1 P-QA1009	How is the QC casting inspection sampling carried out?	2	Sampling of parts for inspection	the actual visual inspection is carried out by a census and the dimensions of certain parts are sampled as needed
10	5.3	Has the QC Casting Job description been set?	2	Job description operator QC Casting no. (doc no. GA0-QA3013)	It can be shown and explained well
11	10.3.	How is Organizational Kaizen implemented to develop and implement value-added solutions to operations and management systems?	2	continuous improvement of customer claim follow up and PPTS	Kaizen/continuous improvement is carried out on the follow-up to claims and NC on PPTS
		Total nilai	**21**		
		Nilai pencapaian SMM	**95**		

Notes
0 = Not implemented / no evidence
1 = Partially implemented / incomplete evidence
2 = Completely implemented / complete evidence

Appendix 2. Sample QMS Document Folder on Computer Network in PTZ company

All QMS document collected into group

1. Quality Policy& Context Organization
2. Quality Manual
3. Quality Procedures
4. Flow Proses
5. Quality Plan
6. Risk and Opportunity Management
7. Quality Objective
8. Internal quality audit and Checklist
9. External quality audit
10. Management Review Meeting
11. Standards/ Work Instruction
12. Forms