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デミング賞  
受賞報告講演要旨

PT Komatsu Indonesia

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# 1. Corporate Profile

## 1.1 Overview

PT Komatsu Indonesia (hereinafter KI), as one of Komatsu overseas affiliated company, has been producing Construction and Mining Equipment in many various of Complete Build Up (CBU) machines and components to fulfill the needs of customers both in domestic and overseas market.

Table 1.1.1 KI's Business Scope

<b>Established</b>	December 13, 1982		
<b>Business</b>	Manufacturer of Construction and Mining Equipment, Fabrication, Steel Casting Component, Hydraulic Cylinders, and Remanufacturing products		
<b>Location</b>	1) Cacing Plant - Jalan Cakung Cilincing KM.4 Jakarta 2) KBN Plant - Jalan Jawa, KBN, Cakung Cilincing, Jakarta 3) Cibitung Plant - Jalan Jawa IV, MM2100, Cibitung, Bekasi		
<b>Capital</b>	USD 67 M	<b>Sales</b>	USD 472 M (FY2017)
<b>Investor</b>	Komatsu Ltd (94.94%), UT (5%), Others (0.06%)	<b>No of Employee</b>	2011 (as of Sept 1st, 2018)

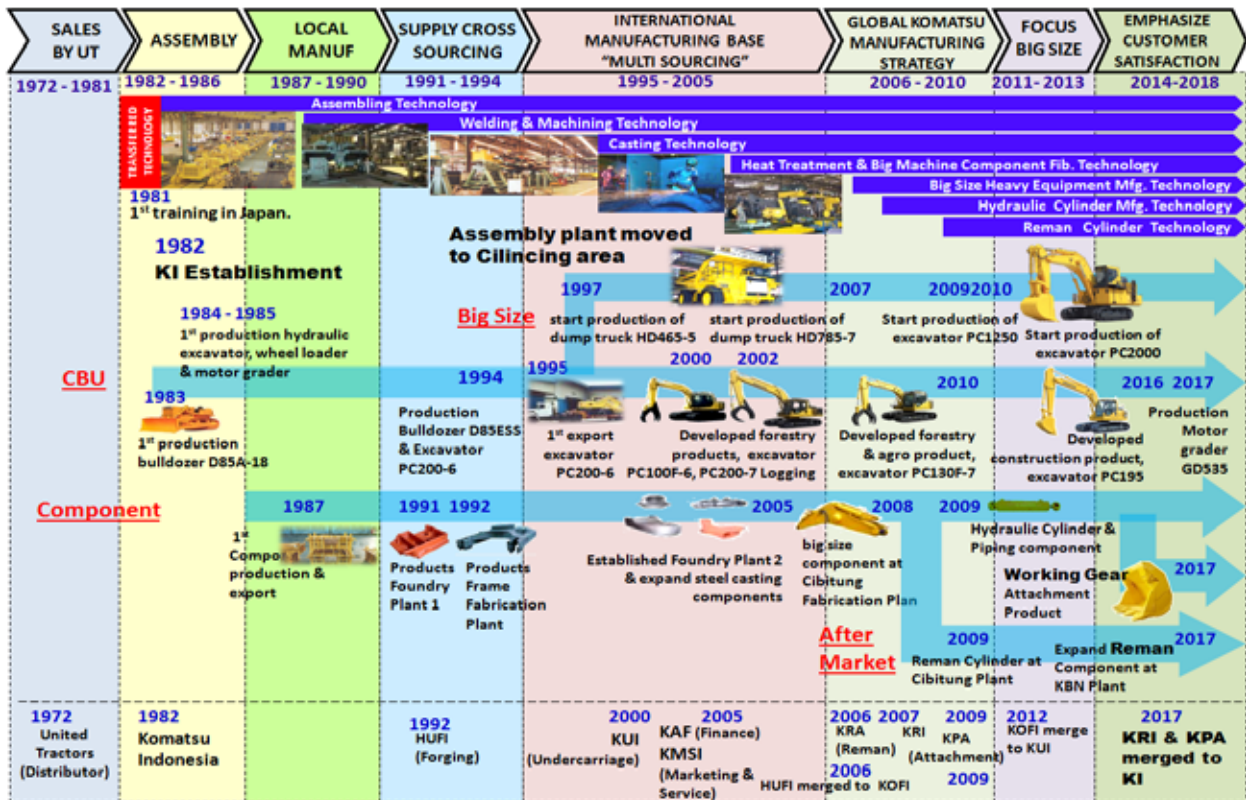


Figure 1.1.1 KI's Milestone

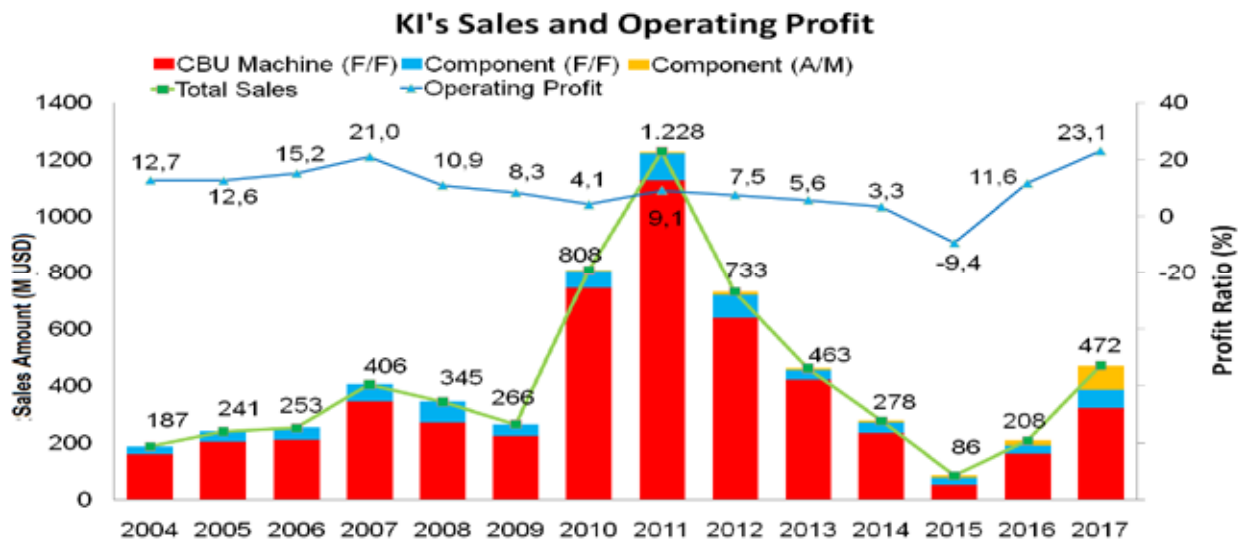


Figure 1.1.2 KI's Sales and Operating Profit

### 1.2 Products

KI has been producing Construction and Mining Equipment in many various of CBU and components.

Scheme	Product Line	Unit Name	Model	Picture
First Fit	CBU	1. Bulldozer	D68 - D85	 1. Bulldozer      2. Dump Truck 3. Excavator      4. Motor grader
		2. Dump Truck	HD465 - HD785	
		3. Excavator	PC130, PC195, PC200, PC300, PC400, PC1250, PC2000	
		4. Motor grader	GD535	
	Component	Fabricated	Boom, Arm , Trak frame and etc.	 Boom      Arm      Track frame
		Steel Casting	Boss, Vertical Member, Booden Plate and etc.	 Boss      Vertical member      Booden Plate
Hydraulic Cylinder		Small-medium-big cylinder	 Hydraulic Cylinder	
After Market (*)	Working Gear Attachment	Front Shovel Bucket	PC2000-PC4000	 Front shovel bucket      ME bucket      Log Grapple Skeleton bucket      Log clamp      Serrated Bucket
		Skeleton Bucket	PC70-PC300	
		ME Bucket	PC195-PC2000	
		Serrated Bucket	WA600-WA1200	
		Log Grapple	PC160-PC300	
		Log Clamp	WA500-6	
	Remanufacturing	Hydraulic Cylinder	PC700-PC4000; HD465-HD785; 730E-930E	 Hydraulic Cylinder
		Engine	D65EX-D85EX; D155-475; PC400-PC2000; HD325-HD985; HM300-HM400; GD825; WA450-WA900	 Engine
		Piston Pump Motor	PC800-PC3000	 Piston Pump Motor
		Transmission	D155-D475; HD325-HD985; HM300-HM400; GD825; WA450-WA900	 Transmission
Spare parts	Hose	PC130-PC20, D68-D85; HD465-HD785	 Hose	
	Pin	HD785	 Pin	

(\*) Started after KRI & KPA merged with KI at April 2017

Figure 1.2.1 KI's Main Products

KI also has produced special application machine as original KI's development such as PC130F (for Forest application), PC195 (for Construction application) and PC200 Swing Yarder (for Forest application) in order to meet specific customer's operation in Indonesia. Those developed products are shown in Figure 1.2.2.



Figure 1.2.2 KI's Development Products

### 1.3 Business Flow

In the business flow, KI's role is mainly as product development, production and product support function.

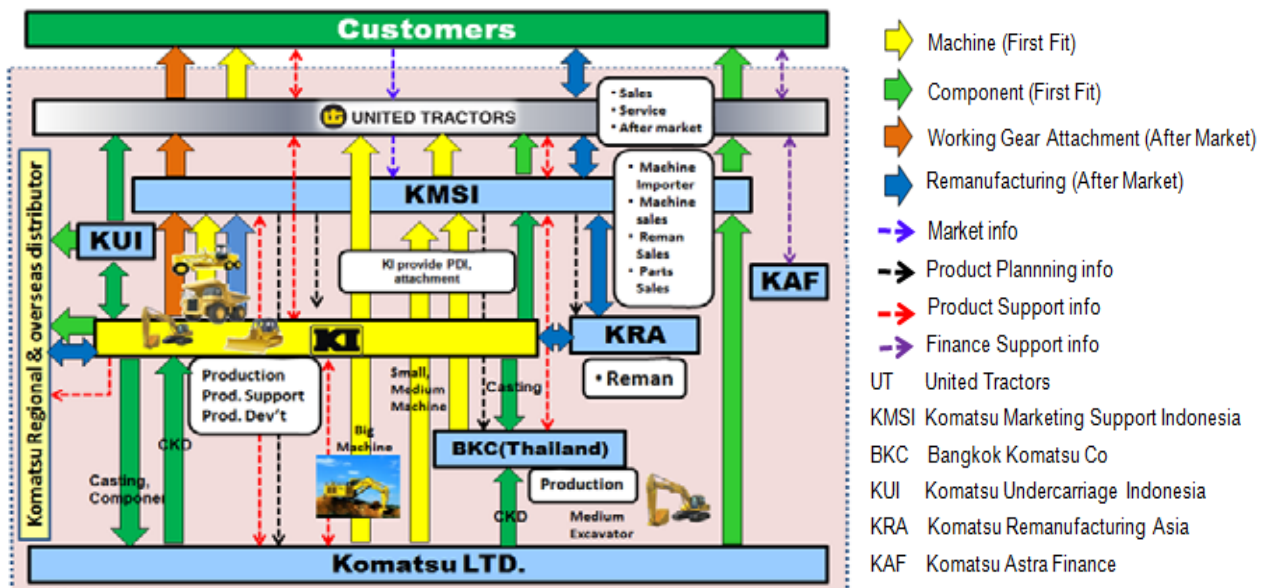


Figure 1.3.1 KI's Business Flow

## 2. Organization Structure & Management

### 2.1 The Organization and main job

KI's organization (as of September 2018) which has 2011 employees is described below :

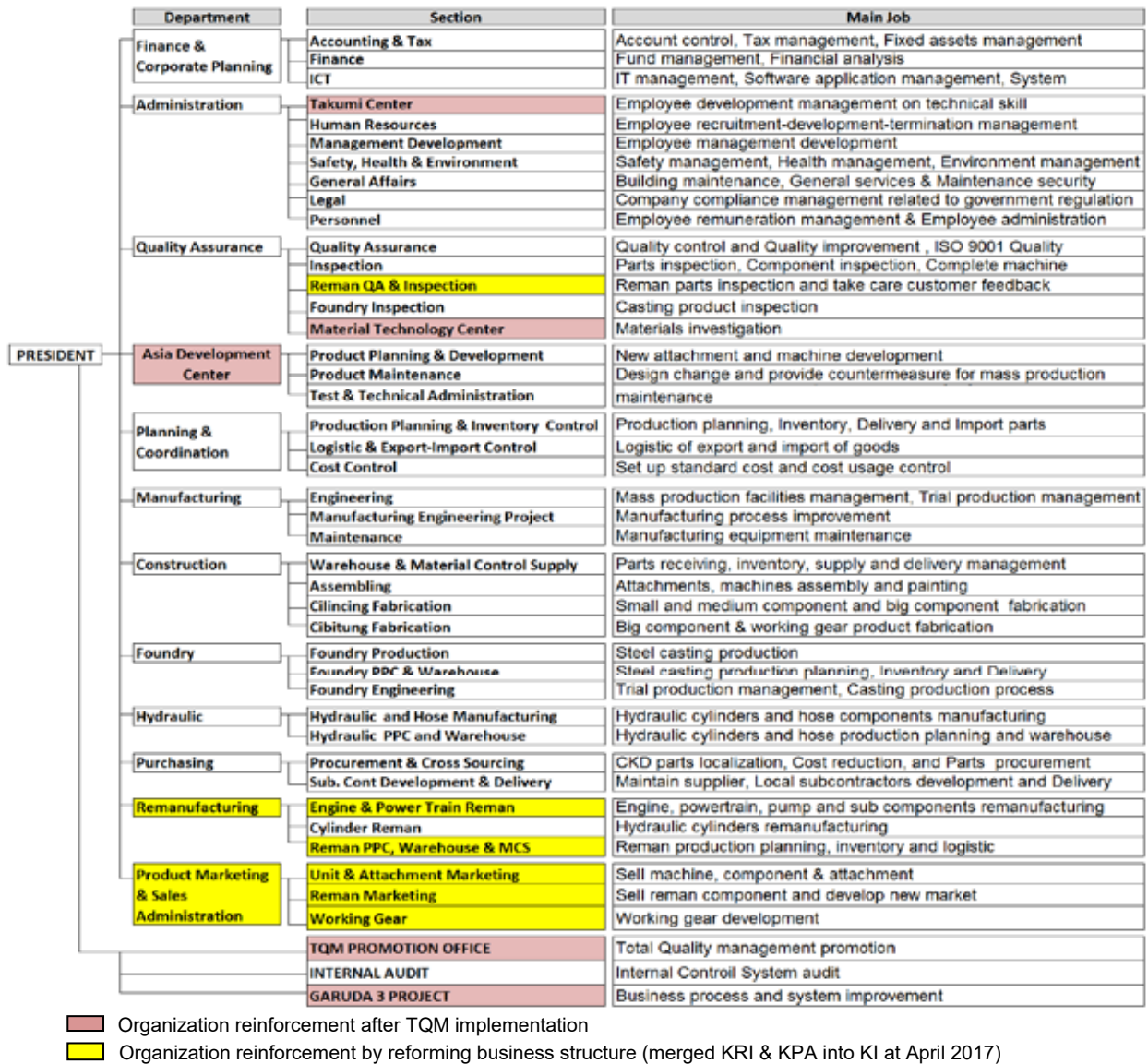


Figure 2.1.1 KI's Organization

### 2.2 Major Meetings

Table 2.2.1. KI's Major Meetings

INTERNAL MEETING			EXTERNAL MEETING		
Category	Title	Freq.	Title	Participants	Freq.
Management	BOD Meeting	1/Quarter	UT-Komatsu Management Meeting	KI-UT-KMSI	1/Month
	Executive Meeting	2/Month	Indonesia Management Committee Meeting	KI-KMSI-KUI-KLTD-UT	2/year
	National Manager Meeting (Include TQM Update)	1/Month			
Safety and Environment	Safety Meeting	1/Month	Safety and cross patrol Meeting	KI-KMSI-KUI	1/Month
Quality	Quality Meeting	1/Month	Indonesia Quality Meeting	KI-KMSI-KUI-KLTD	2/Year
			UT- Komatsu Quality Meeting	KI-UT-KMSI	1/Month
Planning & Production	Production Meeting	1/Week	Indonesia Technical Review Meeting	KI-KMSI-KUI-KLTD	2/Year
	Customer Satisfactory Meeting	1/Week	UT-Komatsu Product Development Meeting	KI-UT-KMSI	1/Month
	Project Meeting	1/Week	UT-Komatsu Hansei Meeting	KI-UT-KMSI	1/Week
	Development Meeting	1/Month	Subcont Gathering	KI-Supplier	1/Month
Cost	Cost Control Meeting	1/Month			

### 3. Business Objectives and Strategies

#### 3.1 KI Vision & Mission

##### <Vision>

Komatsu, as one of the few manufacturers in 1980's, was selected by the government of Indonesia to initiate the Construction and Mining Equipment industry in Indonesia. Since the establishment, the role of KI has been very essential in Indonesian Construction and Mining Equipment industry and will keep growing consistently and continuously in the future. This existency will make KI becomes valuable for the nation, a pride for Indonesian people and its stakeholder. Therefore, KI created the following vision :**“To become indispensable construction equipment and Machinery Company which is valuable for the nation and its stakeholder (customer, business partner and employees)”**.

##### <Mission>

KI will emphasize the business by focusing more on the customers, contributing to nation development in Indonesia and concerning more to employees. Therefore, KI set its mission as follows :

1. Create best value together with customer.
2. Contribute to the nation development.
3. Create highly motivated and capable employees.

#### 3.2 KI Objective and Midterm Strategy

##### <Business Environment>

Indonesia is known as a resource-rich country and categorized as developing country. The country has abundant natural resources like coal, oil, palm oil, wood pulp, and etc. Since 1970, Indonesian government has been starting to promote infrastructure development activities intensively and also expanding natural resources utilization. Demand of Construction and Mining Equipment has increased in order to support mechanization for such kind activities.

UT, as an exclusive Komatsu distributor, has captured that demand and started to promote Komatsu's Construction and Mining Equipment to logging expansion project and infrastructure projects since 1972. Then, It was continued to palm oil plantation project and coal & mineral exploration project. Based on UT's experience in Construction and Mining Equipment business, UT categorized the customer business sectors into 4 (four) business sectors which consist of Mining, Agriculture (Agro), Forestry, and Construction.

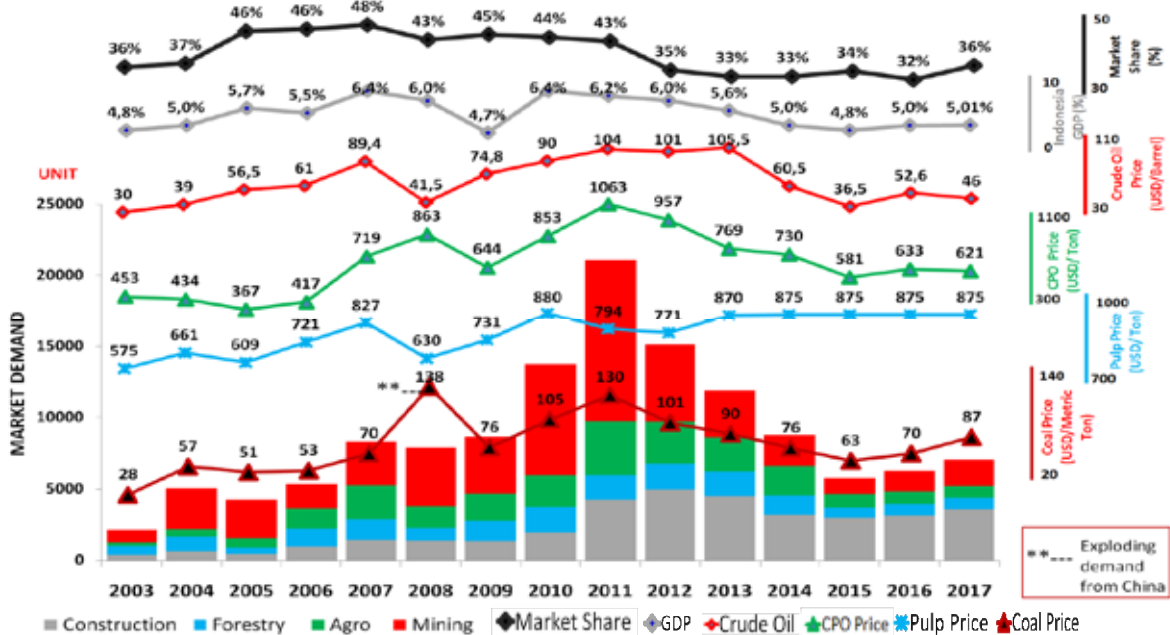


Figure 3.2.1 Market Demand, Market Share and Commodity Prices

The trend of Construction and Mining Equipment market demand in Indonesia was fluctuative. Nowadays, the demand has increased sharply since 2003 and reached the highest level in 2011. Then, the market demand declined up to the lowest level in 2015. Recently, the demand has slightly increased. The fluctuation on the demand was triggered by commodity prices especially coal price which has stronger correlation to Mining demand and infrastructure development projects in Indonesia for Construction demand. Relation between market demand, market share and commodity prices is shown in Figure 3.2.1. On the other hand, Komatsu has dominated market of Construction and Mining Equipment in Indonesia even though the share tended to decrease due to tight competition recently.

**<Objective>**

KI as the nearest Komatsu factory to the Indonesian market has faced challenging situation since the market change was dynamic. It urged KI to be more adaptive in responding that change. Then, KI needs to be faster and flexible in providing the best solutions for the customers. Therefore, KI set up the Objective as follows : **“Faster and flexible in providing best solution for customer to achieve dominant market share (40%) in Indonesia ”**.

The Objective emphasizes on necessity to make immediate solution in order to get customer trust and then buy Komatsu products repeatedly. Thus, KI expects total market share (40%) in Indonesia can be achieved gradually up to 2019 and keep the domination continuously.

**<Midterm Strategy>**

In order to achieve the Objective, KI set up following Midterm Strategy and the background :

**1. Realize market requirement quickly and develop suitable product**

KI understood the urgency of quick development of specific machine and attachment which are needed for Indonesian customers.

**2. Capture market change in advance and to improve manufacturing flexibility**

KI has faced bigger challenges to anticipate any drastic change in market demand. These challenges have driven KI to utilize manufacturing capabilities include suppliers and move forward to be more flexible manufacturer and improve accuracy in sales plan.

**3. Improve Quality proactively**

KI has committed to improve reliability of product quality by strengthening proactive prevention in quality to increase customer satisfaction.

**4. Reduce cost to enhance competitiveness for customer’s Life Cycle Cost**

KI was expected to be able to provide the best solution in reducing Life Cycle Cost (LCC) of Construction and Mining Equipment for customers especially in Mining sector by reducing Repair & Maintenance (R & M) cost. Therefore, KI needed to respond it by enhancing After Market business such as Spare part, Remanufacturing and Working Gear attachment. The chart of typical LCC for Mining Equipment is shown in Figure 3.2.2.

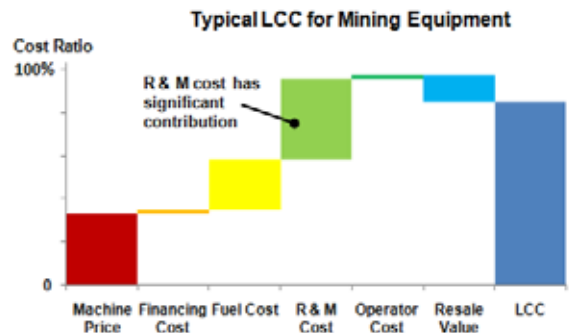


Figure 3.2.2. Typical LCC for Mining Equipment

**5. Develop human resources valuable to the nation and stakeholder**

In order to meet the Business Objectives and Strategies, KI needs to enhance human resources capability systematically through improvement of skill and knowledge.

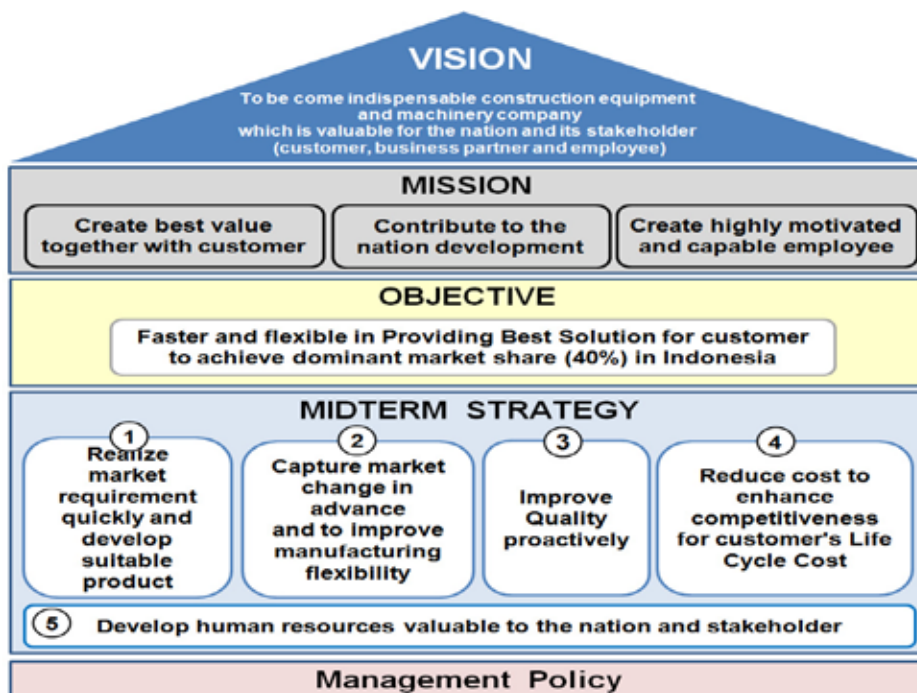


Figure 3.2.3 Vision, Mission, Objective and Midterm Strategy

Midterm Strategy	Main Activity	KPI	MIN	AGR	FOR	CON
1) Realize market requirement quickly and develop suitable product	Indonesian Customer Oriented Product Development	* Customer satisfaction * Sales achievement of new developed product		○	○	○
	After market business expansion (Working Gear)	* Number of Working Gear Item * Working Gear sales	○	○	○	○
2) Capture market change in advance and to improve manufacturing flexibility	Production Planning Accuracy Improvement	* Sales Plan Accuracy * Inventory FMI consolidated * Delivery Achievement	○	○	○	○
	Manufacturing flexibility	* Training lead time for new comer * Productivity * Supplier Delivery Achievement	○	○	○	○
3) Improve Quality Proactively	Strengthen Proactive Prevention in Quality	* Claim Ratio * 100 H Claim Ratio * Supplier reject ratio	○	○	○	○
4) Reduce cost to enhance competitiveness for customer's Life Cycle Cost	After Market Business Expansion (Reman)	* Number of Reman Menu item * Reman Sales	○			
5) Develop human resources valuable to the nation and stakeholder	Human Resources Development in line with Business Objectives	* Number of developed required capability * Number of completed training programs * Employee Satisfaction Index				
	Zero Accident and Zero Emission	* Rate of Accident * Water Recycle Ratio * Waste Recycle Ratio * Electrical consumption Index				

Figure 3.2.4 Midterm Strategy Deployment

### 3.3 Management Policy Deployment System

KI executes Midterm Strategy through annual Management Policy. Then, Management Policy is deployed by Department Objectives and Section Activity Plan as described in Figure 3.3.1.



Figure 3.3.1 Outline of Vision Deployment



## 4. TQM Introduction and Promotion

### 4.1 Background

Since its establishment in 1982, KI has been focusing on customer satisfaction by applying TQC and implementing QC as company culture. In order to enhance employee's awareness to always make improvements, KI has used QC tools to analyze problem for making countermeasures. Moreover, KI also introduced QCC to its employees to develop their improvement capabilities. In 1983, KI joined the QCC Convention with UT. KI has joined All Komatsu QC Convention in Japan since 1998. KI won Special Prize in 2009 and won QCC Golden Prize twice in 2014 and 2015. On the other hand, competition in the market got tougher and customer demand became more difficult to fulfill as the impact of global business structure change since 2012. This condition made KI facing difficulties in understanding the real customer's needs which caused in imperfectness in satisfying the customers.

To achieve better customer satisfaction, in June 2014, KI declared the implementation of TQM and established TQM promotion office for promoting TQM activity. As the first step, KI conducted TQM training for all employees and enhanced Policy Management and Daily Management. In addition, KI has been continuously acquiring deeper understanding on TQM through JUSE consultation.

By implementing TQM, KI expects that KI will be able to achieve Business Objective in order to achieve better customer satisfaction. QC and TQM implementation milestone are shown on Figure 4.1.1.

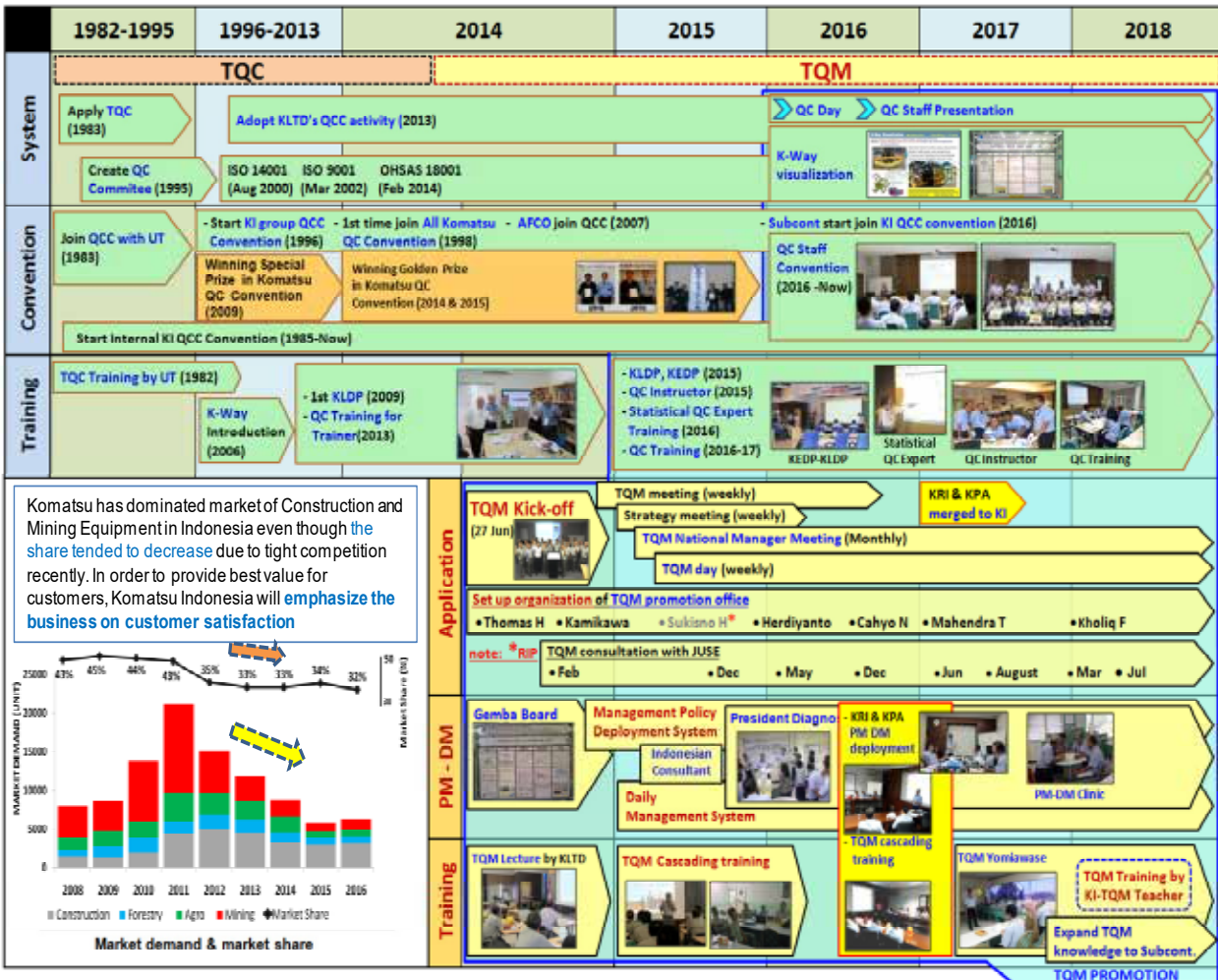


Figure 4.1.1 QC and TQM Implementation Milestone

### 4.2 Activity Elements of TQM to Achieve Business Objective

KI has positioned TQM as a tool for the realization of Business Objectives and Strategies. It has been introduced and at the same time KI has been promoting TQM activities such as Policy Management, New Product Development Management, Quality Assurance, Daily Management, Process-based Assurance, Cross-functional and Small Group Improvement Activity, Human Resource Development and etc. The relation Midterm Strategy and Activity Elements of TQM is shown in Table 4.2.1.

Table 4.2.1 Relation Between Midterm Strategy and Activity Elements of TQM

Midterm Strategy	Main Activity	Functional Management										Improvement Activities					Utilization of ICT	Human Resource Development
		Policy Management	New Product Development	New Business Development	Quality Assurance	Production Control	Cost Control	Safety-Health-Environment	Daily Management	Process-based Assurance	Cross Function Activities	Small Group Improvement Activities						
1. Realize Market Requirement Quickly and Develop Suitable Product	Indonesian Customer Oriented Product Development	Follow-up	Design base on customer need		Analysis of Indonesian operation		Accuracy of Cost Estimation				Standardization of R&D Management				Analysis Required capability	Data collection and analysis of customer need		
	After Market Business Expansion (Working Gear)	Follow-up	Design base on customer need		Analysis of Indonesian operation		Accuracy of Cost Estimation				Standardization of KI BOS				Analysis Required capability	Data collection and analysis of customer need		
2. Capture Market Change in Advance and to Improve manufacturing Flexibility	Production Planning Accuracy Improvement	Follow-up				Planning accuracy & forecasting					Standardization of sales plan				Analysis Required capability	Data collection and analysis of market demand		
	Manufacturing Flexibility	Follow-up			Problem Prevention	Automatik Multi process -Supplier performance Level production method	Cost Structure Analysis				Standardization of production control				Analysis Required capability	Analysis of operation status		
3. Improve Quality Proactively	Strengthen Proactive Prevention in Quality	Follow-up	Analysis of new product evaluation survey		Problem Prevention						Standardization of GASC				Analysis Required capability	Data collection and analysis of product problem		
	After Market Business Expansion (Roman)	Follow-up	Analysis of new product evaluation survey	Remain technology	Problem Prevention	Remain production control	Accuracy of LCC Estimation				Standardization of KI BOS				Analysis Required capability	Analysis of defect data		
5. Develop Human Resource Valuable to the Nation and Stakeholder	Human Resource Development in Line with Business Objective	Training of required capability	Training of required capability	Training of required capability	Training of required capability	Training of required capability	Training of required capability	Training of required capability	Training of required capability	Training of required capability	Training of required capability	Training of required capability	Training of required capability	Training of required capability	Training & analysis of Required Capability	Training of required capability		
	Zero Accident and Zero Emission	Follow-up									Standardization of SHE				Training of required capability	Proactive safety circle		

☉ : Most Strengthen      ○ : Strengthen

## 5. Practice of Challenging and Base Building Strategies

### 5.1 Indonesian Customer Oriented Product Development

#### 5.1.1 Background

KI has been developing local products to fulfill market demand from Indonesia which has specific operation conditions. However, some of KI local development products did not achieve development sales target due to product less-matched with real customers' needs. Some Products' Initial-failure was undetected during product performance test and launching time was delay which lead to customer distrust.

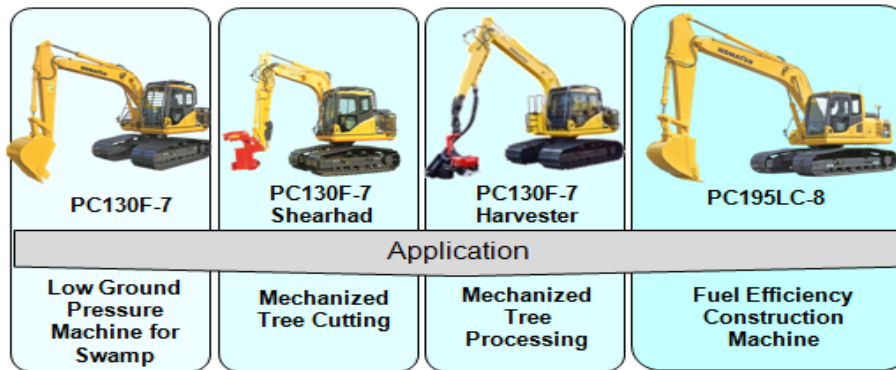
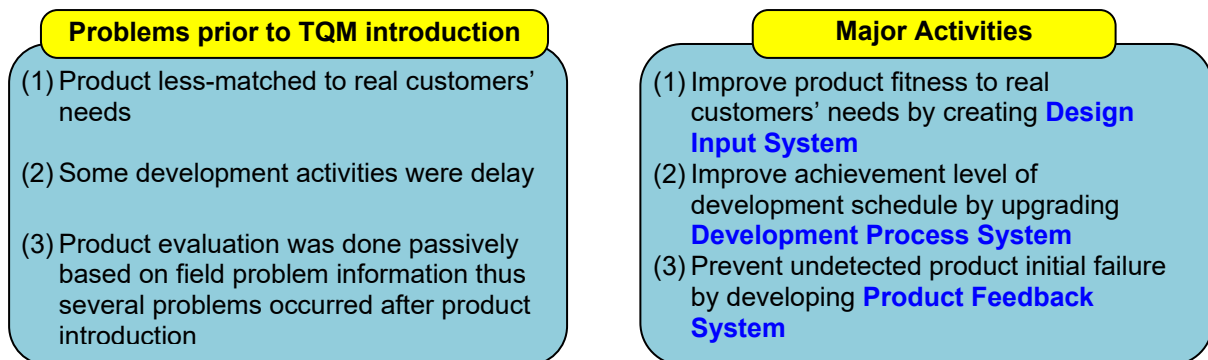


Figure 5.1.1.1 Unique Development Product

Therefore, the improvement concept is ensuring superiority of new developed products in Indonesian market by performing early identification & prediction of real customers' needs and developing products which matched the needs faster than competitor.

#### 5.1.2 Major activities



#### 5.1.3 Contents of activities

##### (1) Improve product fitness to real customers' needs by creating **Design Input System (DIS)**

KI has done proactive actions to understand customers' needs by applying **Design Input System**. In the activity to grasp real customers' needs, at first KI will review KOMTRAX data (i.e. each machine population, performance and field problem) and analyze by applying Statistical Inference (i.e. using confidence interval and probability distribution) to get the estimation which represents populations. Based on KOMTRAX data analysis, KI then selects sampling customers, which represents population, for performing **Proactive Customers Survey** together with UT and KMSI by utilizing survey check sheet to get the real customers' needs and machine condition. The survey result at first will be confirmed to ascertain its validity then analyzed using Statistical Tools for easy and fast decision making process in KI during development process.

Furthermore, to speed up and efficiently organize all abundant data of KOMTRAX, Customers' Survey and field problem information and to easily share the data among Komatsu group of companies in Indonesia, KI created **Komatsu Information of Operation Sales and Support (KIOSS)**. Through **KIOSS**, KI could integrate data utilizing **Equipment Care (EQP-Care)** (about machine population data), **Komatsu Tracking System (KOMTRAX)** (about operating time, location and abnormality of machine), **Service, Sales & Spare Parts Map (S-MAP)** (about field problem information), **Komatsu Integrated Sales Support (KISS)** (about commodity price, Komatsu sales outcomes and competitors information) and **Survey data** (about customer's data and soil condition information).

As the result, KI has been able to clearly and quickly identify real customers' needs and to provide design concept that fits with customers' needs for further development process.

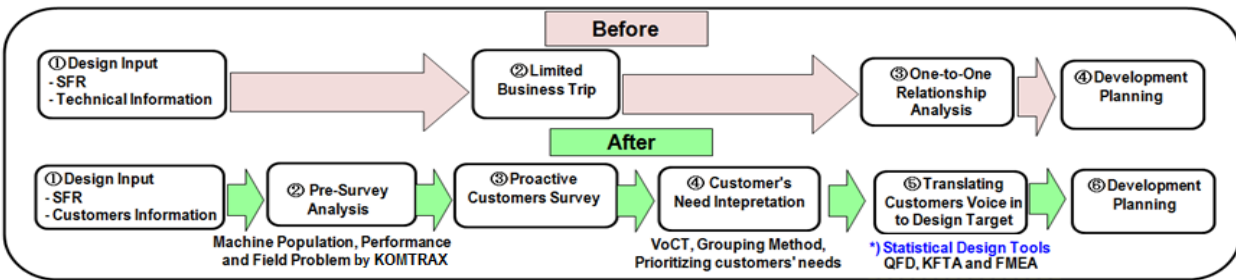


Figure 5.1.3.1 Systematic Diagram of Design Input System

**P** ① Design Input  
**D** ② Pre-Survey Analysis  
**D** ③ Proactive Customers Survey  
**C** ④ Customer Needs Interpretation  
**C** ⑤ Translating Customers Voice into Design  
**A** ⑥ Development Planning

**① Design Input**  
Special Feature Request (SFR) from KMSI to penetrate market of 20T class construction sector

Development Project Name	16t-20t class excavator new model development
(2) DESCRIPTION OF SPECIAL FEATURES REQUIRED	Range of the SFR Application New excavator development between 16t-20t class 2.9m arm 5.2m arm Additional counterweight for general construction work

**② Pre-Survey Analysis**  
2-1 Machine Distribution (e.g Location and model)  
2-2 Machine Performance (e.g Fuel Consumption)

Grasp Market information by KOMTRAX Using Statistical Inference. Add quality check points estimation and criteria based on KOMTRAX Data Analysis

**③ Proactively Customers Survey**  
Checksheet for PC200 Next Generation Survey

(a) Owner Interview  
(b) Operator Interview  
(c) Machine/site observation

Proactively Customers Survey Create systematics checksheet survey to get real customers' needs by sampling

**④ Customers Needs Interpretation**  
(a) Get Real Customers' Needs using Voice of Customers Tabel (VoCT)

Sector	Customer Segment	Customers Verbatim (Voices of Customer)	I/O	Problems Gap Analysis	Customers Needs
Construction	Highway & Road Construction	For PC160LC-8 with 2.25M arm, they need 2 times work for sloping work, even for the shortest slope at the area ( 8.5M slope length) it still about 1.5M short of reach. Even if we use 2.9M arm for 8.5M slope, the PC160LC-8 still 0.7M short of reach. For 20tons class HE they can finish the 8.5M slope by 1 times work only. (only 0.1M short of reach), but for 11.2M slope, they still require 2 times work.	O	In Highway and road construction (-) sloping range enough but need increase sloping range effective for 5 m to increase productivity (-) Easier crack for Arm and Boom (-) Problem short attachment in PC160 to loading 20T truck reach around effective for 8.5 m (+) With Shorter range PC160, can agile in movement	<b>Working reach effective to working 20T class with easy</b> KI grasps & interprets customers' voice, categorizes customer requirement together with KMSI & U

(b) Clustering Customer Needs Using Grouping Methode

**Machine Performance**

- Machine Productivity
- Efficient Bucket Performance
- Working reach
- Working reach effective to working 20T class with easy

**Travelability**

- Controllability
- Easy to operate machine
- Good stability with low ground pressure
- Travel Performance

(c) Prioritizing Customer Needs

Category	Item	Value	Requirement
Machine Productivity	Machine Power	12.9%	Good machine power suitable with application 20T
	Productivity	5.1%	Efficient Bucket Performance
	Working Reach	18.8%	Working reach effective to working 20T class with easy movement
Customers Satisfaction		36.57%	

**⑤ Translating Customers Voice in to Design**  
e.g. Quality Function Deployment (QFD)

Quality Characteristics (i.e., "Functional Requirements" or "How")	Customer Requirements (i.e., "What")		Weighting	Priority
	Weighting	Priority		
Working Reach	4	11%	4	11%
Technical Benchmarking (SK200 (KOMELCO))	2.0	5.7	0.9	
Design Target (new model PC195LC-8)	2.0	5.1	0.1	

Interpreting customers' voice into design by Integrating Statistical Design Tools i.e QFD method for get customer's value and target design

**⑥ Development Planning**

Machine Concept

- Improve Productivity
  - Optimize working reach able to load 20T truck
  - Optimize Bucket size
  - Faster Movement and swing
- Good Stability & Operate ability
  - Big Counterweight and wide shoe width
  - Engine (4 cylinders) with 92 kW Power
  - Engine poor fuel arrangement (pre fuel filter)
- Low fuel consumption
- Easy to Maintenance

KI create product planning concept based target design on QFD Result

Figure 5.1.3.2 Case of Design Input System Activity for PC195LC-8 Development

**(2) Improve achievement level of development schedule by upgrading Development Process System.**

KI has been improving **Design System** to be more proactive and efficient in keeping the development schedule. During product design process, KI holds **Development Meeting** and **Simultaneous Engineering Meeting** which are lead by ADC to intensively communicate and review design and schedule to prevent defect occurs in manufacturing trial stage. KI is also increasing the number of quality confirmation points by utilizing **Local Test Method** and **Simulated Ground Test** which adopt some methods that match with real Indonesian condition. This system is called **Quality Confirmation System** which aimed to avoid additional or repetitive work during test activities. Therefore, KI has been able to improve the achievement of development schedule that met customers' satisfaction

**(3) Prevent Undetected Product Initial Failure by developing Product Feedback System**

KI has improved product evaluation method by creating **Product Feedback System** to prevent product's initial failure undetected during operation thus; KI has been able to provide early countermeasure/improvement which finally increased customers' satisfaction. To achieve this objective, firstly KI collaborated with UT and KMSI to confirm product acceptance discreetly by conducting **Machine Demonstration Activity** at customer's site in order to obtain initial customers' feedback on performance and durability. Furthermore, KI proactively evaluated customers' satisfaction by conducting **New Product Evaluation Survey** within one year after the product being introduced into market. KI evaluated machine performance and customers' voice by surveying several customers. Additionally, KI also evaluated machine performance from actual machine operation in-site through KOMTRAX data analysis using statistical tools to understand the customers' satisfaction level comprehensively. As a result, the system has helped KI to efficiently identify product's initial failure and promoted necessary improvement or action at very early stage after market introduction thus finally increasing customers' satisfaction level.

**5.1.4 Effects**

**(1) Tangible effects**

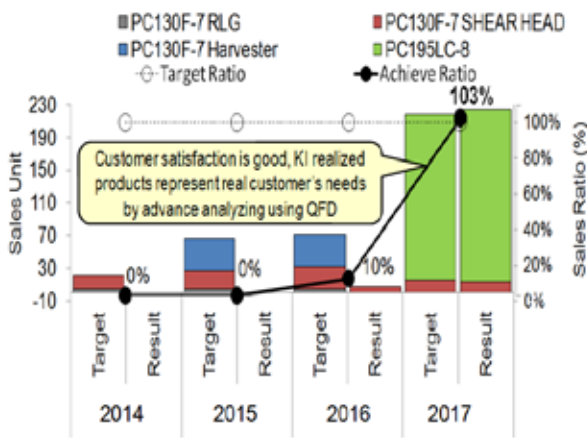


Figure 5.1.4.1 Sales Achievement New Developed Product (in case 3 development)



Figure 5.1.4.2 Customer Satisfaction (In case PC195LC-8)

**(2) Intangible effects**

1. KI awareness on collecting customer information proactively has increased.
2. KI became able to understand the advantage of using statistical design tools in analyzing design input which was also useful for other applications.

**5.1.5 Future Plan**

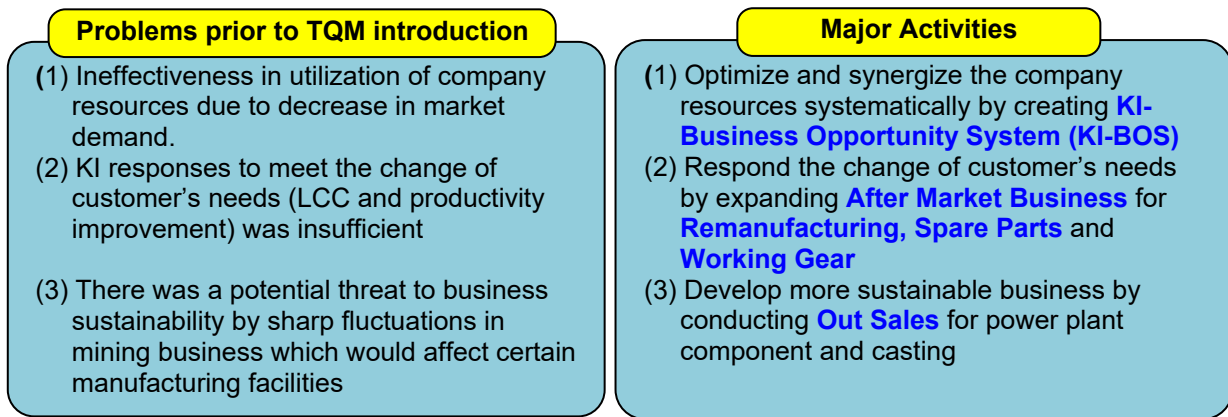
- (1) KI will expand its activities to develop ASEAN specification machine by cooperating with Komatsu Ltd.
- (2) KI will improve its market review and analysis in partnership with Komatsu Group and Distributor utilizing ICT framework.

## 5.2. After Market Business Expansion

### 5.2.1. Background

KI which engages in construction and mining equipment business, has expanded its capabilities by establishing some company resources in order dealing with market requirement. However, the new machine business is fluctuating, where mining sector is the most fluctuating compared to other sectors. The decrease in market demand for new machines had affected in ineffectiveness in company resources utilization. In addition, the shrinkage of mining market had changed the customer needs, where customers preferred to keep using the existing machines while strengthening machine maintenance. On the other hand, there were customer needs to Specific Attachments to improve their productivities. Both of the above things are parts of After Market Business which KI had not provided sufficient response. Therefore, the improvement concept is to be more flexible and sustainable growing company through After Market Business.

### 5.2.2. Major Activities



### 5.2.3. Contents of Activities

#### (1) Optimize and synergize the company resources systematically by creating **KI-Business Opportunity System (KI-BOS)**

KI has created a new system called **KI-Business Opportunity System (KI-BOS)** to introduce new businesses. This system also considers the availability of company resources to be optimized and synergized. The system will be started from researching the market, capturing customer candidates, studying manufacturing capabilities until getting approval from top management. KI requires a comprehensive picture of existing business and company resources as strong point and business potential that will be taken. KI has started the business by integrating the strength and opportunity factor. The **Business Matrix** which is shown in Figure 5.2.3.1 has function to identify potential new business.

BUSINESS MATRIX			EXISTING BUSINESS		STRENGTH										RESOURCES TO BE SYNERGIZED																						
			Approved	Prepared	KI	KUI	KPA	KHWG	KRI	KIBEN	KRA	CASTING	FORMING	CUT & MACH	JOINING	SURFACE FN	HEAT T	FLUID MECH	RESEARCH	SKILLED WO	KI-FOUND	KI-CONST.	KI-HYD	KI-HYD RE	KI-MTC	KI-TEST CT	KI-TAKUMI	KUI	KRI	KI-KBN	KPA	KI-WC	KRA	KMI			
HEAVY EQUIPMENT BUSINESS	NEW MACHINE (FIRST FIT)	MINING																																			
		CONSTRUCTION																																			
	COMPONENT (FIRST FIT)	AGRO																																			
		FORESTRY																																			
	AFTER MARKET	WG	UNDER CARRIAGE ATTACHMENT																																		
		REMAN	ENGINE																																		
			POWER TRAIN																																		
		SPARE PART	CYLINDER																																		
UNDER CARRIAGE																																					
NON H/E BUSINESS	ENERGY	BRIDGE MFG																																			
		MINING INDUSTRY																																			
	AUTOMOTIVE	DIES MFG																																			
		POWER PLANT MFG																																			
	OIL & GAS	RIG MFG																																			
		BOILER MFG																																			

Fig 5.2.3.1 Business Matrix

(2) Respond the change of customer's needs by expanding **After Market Business**

**CASE A. Fulfill customer's needs by enhancing Reman cylinder for domestic market**

**INTRODUCING REMANUFACTURING CYLINDER BUSINESS FOR DOMESTIC MARKET**

**BACK GROUND**  
 1) To improve customer satisfaction by completing the reman menu  
 2) To expand business by establishing domestic remanufacturing business  
 3) To increase utilization of existing resources --> the reman cylinder Plant

**Expand Reman Menu for Cylinder**      **Lower utilization < 23%**

Komatsu Group in Market	KRA		KRI		KI	
	Dom	Co/S	Dom	Co/S	Dom	Co/S
Engine	○	○	X	X	X	X
Transmission	○	○	X	X	X	X
Rear Axle	○	X	X	X	X	X
Differential	○	X	X	X	X	X
Final Drive	○	X	X	X	X	X
Cylinder	X	X	NEW	○	○	○
Under Carriage	X	X	X	X	X	X

**MARKET VISITATION**  
 To broaden knowledge for market needs, KI have visited main customers to hear their problem and expectation  
 FY14-Q4 : 5 visit. for 14 customers  
 FY15 : 6 visit. for 17 customers  
 Big customer such as PAMA, KPC have established reman/rebuilt facility due to cost operation and lead-time issue.

**MARKET VOLUME ESTIMATION**  
 by utilizing KOMTRAX data to get machine population operation and reman cylinder cycle, the market volume can be estimated

**RESULT => Prod. has increased significantly**

**VOICE OF CUSTOMER**

1. Cust. A If Komatsu can provide price 30% from new, I can buy
2. Cust. B Current life-time cyl from 3rd Party only 4000-5000 hr expectation 6000-8000 hr
3. Cust. C Current max price 60% from new. Lifetime expected upto 8000 hr
4. Cust. D do reman on 3rd Party, reman price max 60%, seal kit is always supplied by UT because of quality reason
5. Cust. E have 'comp. reman center'. If require advance process will be send to 3rd Party

**BUSINESS STRATEGY FORMULATION**

**KIND OF STRATEGY**

PRODUCT STRATEGY	Focus on HD785 as most of machine population and already localized	1	2
PRICING STRATEGY	Set up pricing position	2	2
MANUF. STRATEGY	Keep lead time one week by providing rotatable stocks on BLP Reman Cbt as Reman Based & Reman BLP as evaluation & assy	4	4
MARKETING STRATEGY	Penetrate market thru GOH scheme Promoting attractive advantage by Life-Cost Calculation	1	3

**GAP ANALYSIS**

Customer	Market Requirement Value	Existing Value
Cheaper cost	30-40% from brand new	70% (2)
Longer for cylinder life-time	8,000 hr > (currently 3rd Party : 4000-6000)	has no data, but as first fit cylinder more than 10,000 hr (1)
Warranty period	no specific request, but 3rd Party : 3,000 hr	6,000 hr (3)
Lead time order	< 1 week	min 3 weeks (2 weeks for (4)

**SWOT ANALYSIS => internal & external factors**

SWOT	DESCRIPTION
○	1 No sales function on KI
○	2 Longer L/T due to transportation (different island)
○	3 Bad delivery due to less facility on near customer location
○	4 Some cylinder has been localized as first fit component
○	5 Has MTC as development basis for salvaging
○	6 Have good facility (robot & chrome) on CBT Plant
○	7 Reman cyl technology relatively is easy to imitate
○	8 Substitute by new cylinder (down-grade) with similar cost level
○	9 Limitation bargaining to sell due to many competitors
○	10 Big customer has potential to build rebuilt facility by themselves
○	11 Inadequate support for technology & spare part by 3rd Party
○	12 Limited bargaining to buy due to small order volume

**COMPETITOR ANALYSIS**

SUBJECT	KI (Cyl Reman)	3rd Party		
		UTR	DUMA	
Corrosion resistance of plating	CASS Test	9.8	9.0	8.5
Prevent damage of seal	Roughness	Rmax: 0.89s Ra: 0.06	Rmax: 1.42s Ra: 0.1s	Rmax: 0.87s Ra: 0.05
	Judgement	○	△	○

by comparing product with 3rd Party. Quality of KI's product is **better** than competitor

**Strengths:** Synergize company resources as **STRENGTH**

**Threats:** set up the **attractive pricing** to prevent **THREAT**

Fig 5.2.3.2 Reman Cylinder Market Penetration Activities

**CASE B. Customer productivity improvement by conducting Working Gear activities**

In order to support customer productivity improvement, KI has been providing Specific Attachment by performing Working Gear activities. The Attachment will be designed according to customer's needs more specifically which refers to their respective operating conditions.

**BUCKET PRODUCTIVITY IMPROVEMENT by Me BUCKET**

**Customer requirement**  
 • Our company has target to improve productivity. Related to the attachment operation, how to improve the bucket performance. Could you help with this?  
 • In our location, the wood is getting smaller, with the current log grapple has ineffective. Can you create an attachment that matches this condition?

**1 Site visitation**

**2 Designing concept** Brand name become 'Me Bucket'

**3 Testing**

**4 Effect**

Description	P-300E		E-300E	
	Convent	Me	Convent	Me
Operation hour	1.30	1.00	1.00	1.00
Prod Volume	1.30	1.54	1.00	1.54
Fuel Economy	1.30	1.54	1.00	1.54

**Productivity Increase 5%**  
**Fuel consumption efficiency Increase 4%**

**Durability based on bottom wear plate life**

Bucket Type	PC260	PC300	PC400
Conventional	100%	100%	100%
Me	121%	150%	150%

**Durability Increase 50%**

**ME Bucket case**  
 damage on bucket

**Conventional bucket:** Damage to bottom by abrasion flows

**Me bucket:** Improved bucket stiffness by extended lip width. Durability of 'wear plate' is better. Wear proof again abrasion flows.

**Effect:** Productivity Increase 5%, Fuel consumption efficiency Increase 4%, Durability Increase 50%. Me Bucket is faster in work completion in same work volume.

Fig 5.2.3.3 Bucket Productivity Improvement Activities

### (3) Develop more sustainable business by conducting Out Sales

KI also has entered non construction and mining equipment business by manufacturing power plant components and casting for mining industry. In these cases, product determination refers to the similar manufacturing characteristic.

### CASE C. Manufacturing of power plant components at Cibitung Plant

Cibitung Plant has capability on large size fabrication for mining equipment. Based on this specification, KI has started to manufacture the power plant components. By utilizing the advantages as one of the few of big size fabrication facilities in Indonesia (Cibitung Plant has one of the biggest machining center-with 3 axis, 5 position and stroke up to 11.2x4x5.2m), also supported by qualified welders in thick/special material and reliable supply chain of the raw material provision. Those factors made KI more competitive in manufacturing the power plant components.

#### 5.2.4 Effects

The followings are the tangible and intangible effects.

##### (1) Tangible Effects

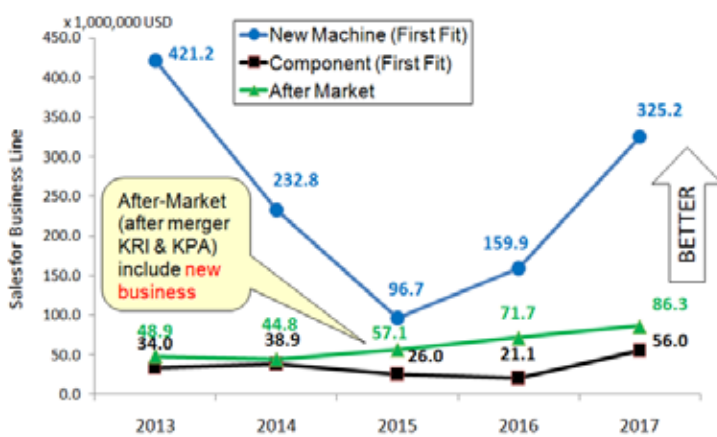


Fig 5.2.4.1 Sales of Each Business Line

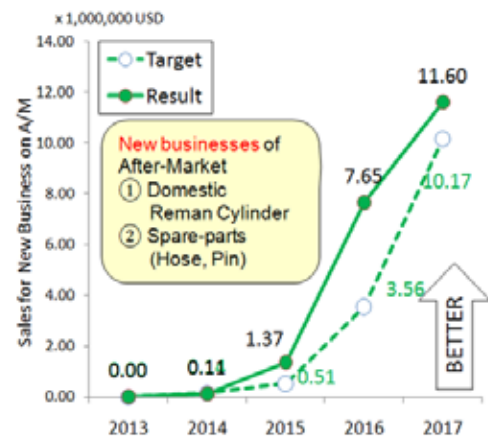


Fig 5.2.4.2 Sales of New Business of A/M

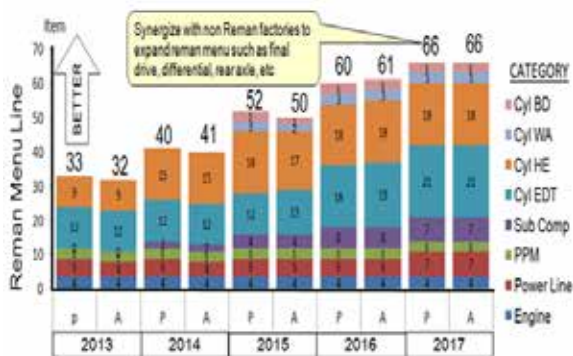


Fig 5.2.4.3 Reman Menu Item

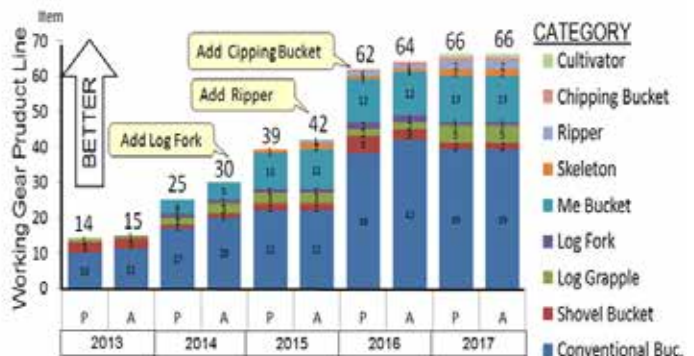


Fig 5.2.4.4 Working Gear Item

##### (2) Intangible Effects

1. Engineers' skill and knowledge have increased.
2. KI has sharpened business sense by conducting direct interaction with customers.

#### 5.2.5 Future Plans

KI will expand Remanufacturing Business by entering Remanufacturing unit machine business which called "Certified Reman Machine (CRM)".



## 5.3 Strengthen Proactive Prevention in Quality

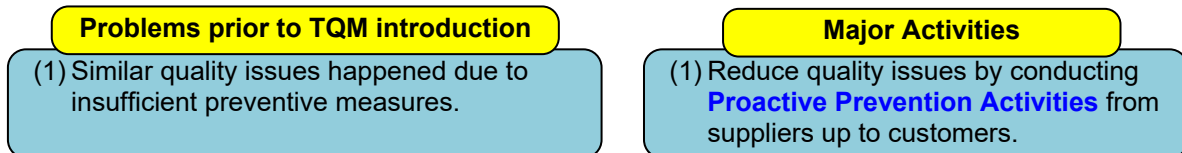
### 5.3.1 Background

KI assured product quality by implementing quality control activities in each process of production. It is started from supplier's incoming raw material up to finished product. If problem happens after product delivered, KI will take responsibilities. KI already had quality assurance flow process to guarantee that quality assuring processes were done properly. This flow process explained KI's manufacturing process from trial stage until mass production stage.

In the previous quality assurance flow process, role (function), responsibility, and authorities from each department were unclear, so when ensuring quality or addressing quality issue, the respective department would take action based on their internal processes consideration only. As the result, the taken countermeasure was not thoroughly deployed. Consequently, similar quality issue might occur in other departments. Some prominent similar issue that occurred was problem related with contamination in production process. This issue is crucial to be solved as contamination in heavy equipment system is archenemy. Other case was the recurring claims of problems that should not have happened if machines were well-maintained and properly operated. This problem appeared because machine manual provided by KI was not user-friendly, thus customers were reluctant to read which caused lack of understanding in machine operation and maintenance.

Therefore, the improvement concept is to provide high quality products and services by assuring quality control process from suppliers to customers for better customer satisfaction.

### 5.3.2 Major Activities



### 5.3.3 Contents of Activities

- (1) Reduce quality issues by conducting **Proactive Prevention Activities** from suppliers up to customers

KI has done improvement to reduce similar quality problem by implementing **Cross Function activities using New PCC(Problem Cause Countermeasure) form** as a tool to prevent recurrence (**saihatsu boushi**). New points such as root cause analysis and preventive measures have been included into New PCC Form, and every related department can understand the content of the countermeasure better. Through the utilization of New PCC Form, other departments would be able to use it as reference to pursue the root causes and solve similar problems in their processes.

Another tool that KI uses to prevent recurrence is the implementation of **Statistical analysis** that would analyze collected data as the base to enhance process control. After successfully applying recurrence prevention of quality problem, KI follows up those activities by conducting proactive approach (**mizen boushi**). The activities of proactive approach consist of implementation of **Failure Mode & Effect Analysis (FMEA), Cleanliness Audit and Customer Enlightenment Activity**. FMEA is applied to help determining improvements during trial stage based on countermeasures of previous problems. Related with the problem of contamination, KI reinforced activities to reduce the problem by conducting **Cleanliness Audit** as a part of **Cleanliness Management Activity** (Fig 5.3.3.1). Regarding problem of improper operation machine in customer, KI conducts **Customer Enlightenment Activities** (Fig 5.3.3.2).

#### [ Improvement 1 : Cleanliness Management Activity ]

KI has been striving to reduce product defects by improving manufacturing processes to assure end-product quality. Heavy equipment is one of the products that manufactured by KI, which relies its workability on its hydraulic system and parts. As contamination is the archenemy of hydraulic components and system, it is crucial for KI to keep its production process cleanliness above the minimum standard. Cleanliness level is checked by conducting regular hydraulic oil **NAS Level Check** and conducting **Regular Allowable Particle Contamination Count** which applied from stored hydraulic components up to finished machine. The results of these regular checks will be reported to respective departments to prevent contamination from getting worse. However, claims related with oil contamination still occurred frequently, which means activities to control contamination issues in production line were insufficient.

Consequently, to ensure that **Cleanliness Management Activity** is well implemented, KI conducts **Cleanliness Audit** in quarterly basis. In order to implement cleanliness audit effectively, KI created standard of ideal “clean” condition and audit scoring system was made by referring to that standard. To eliminate contamination thoroughly, KI has been expanding **Indoor Storage Facilities** and **Building Clean Room** for hydraulic component assembling in order to get higher cleanliness level. By conducting comprehensive cleanliness activities, claim related with cleanliness has decreased.

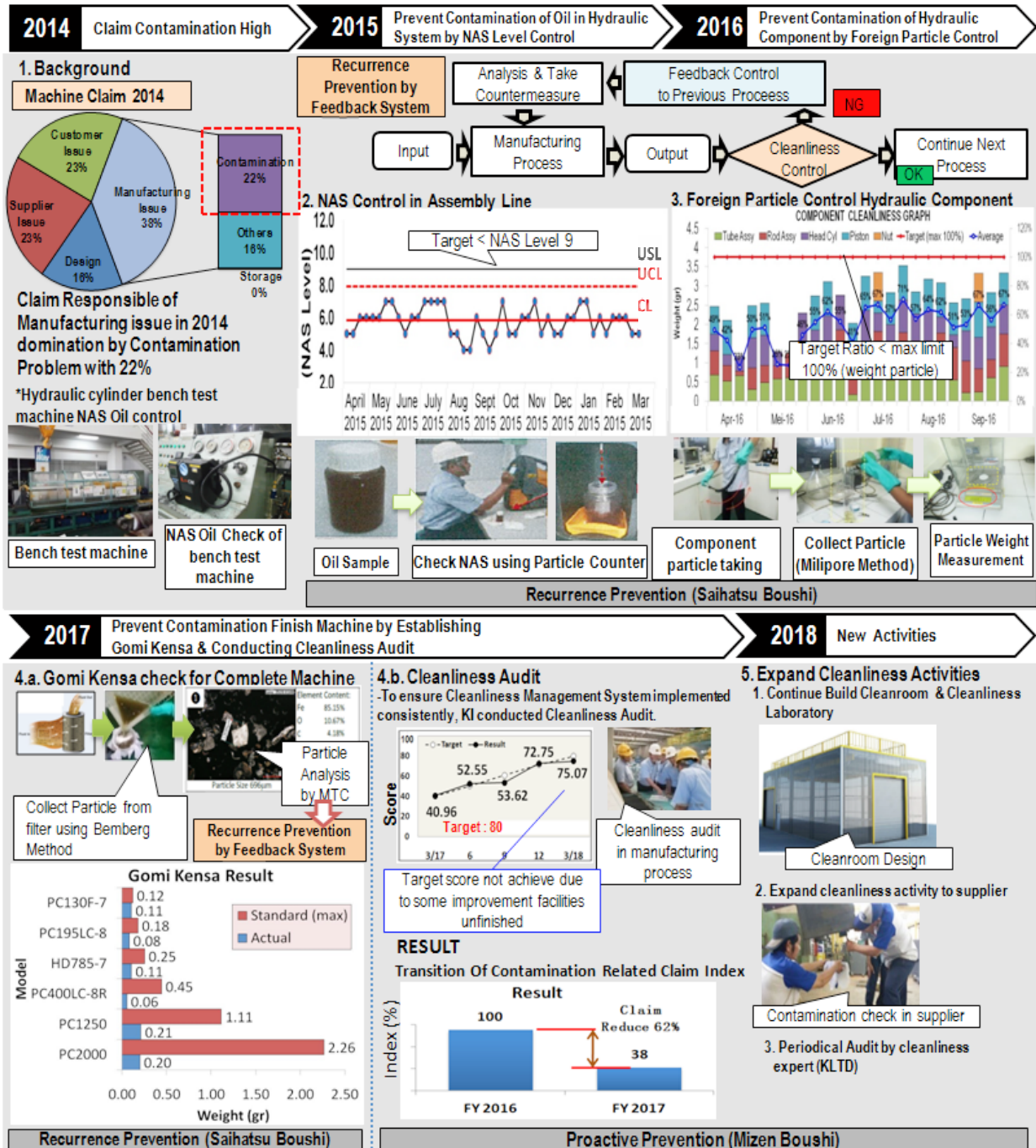


Figure 5.3.3.1 Cleanliness Management Activities

**[ Improvement 2 : Customer Enlightenment Activities ]**

KI had provided information on the proper use and maintenance of machines to the customers in the form of Operation & Maintenance Manual (OMM) that supplied on each delivered machine, however it was ineffective due to this OMM was unattractive for customers to read. This condition had made problems that should not have occurred if machines were properly operated and well-maintained recurred. For example, without prior discussion with KI, some customers operated machine with function that was not described in the OMM. To solve this problem, **KI proactively visited customer in regular basis** to find out actual condition of machine usage. If KI found improper operation, KI would provide education to

customer and give **User-Friendly Media** in the form of **Video and Booklet**. These media were developed based on 4 main types of machine that manufactured in KI, which are Hydraulic Excavator, Bulldozer, Dump truck and Motor Grader. As the result from this activity, claim related with improper operation has decreased 15%.

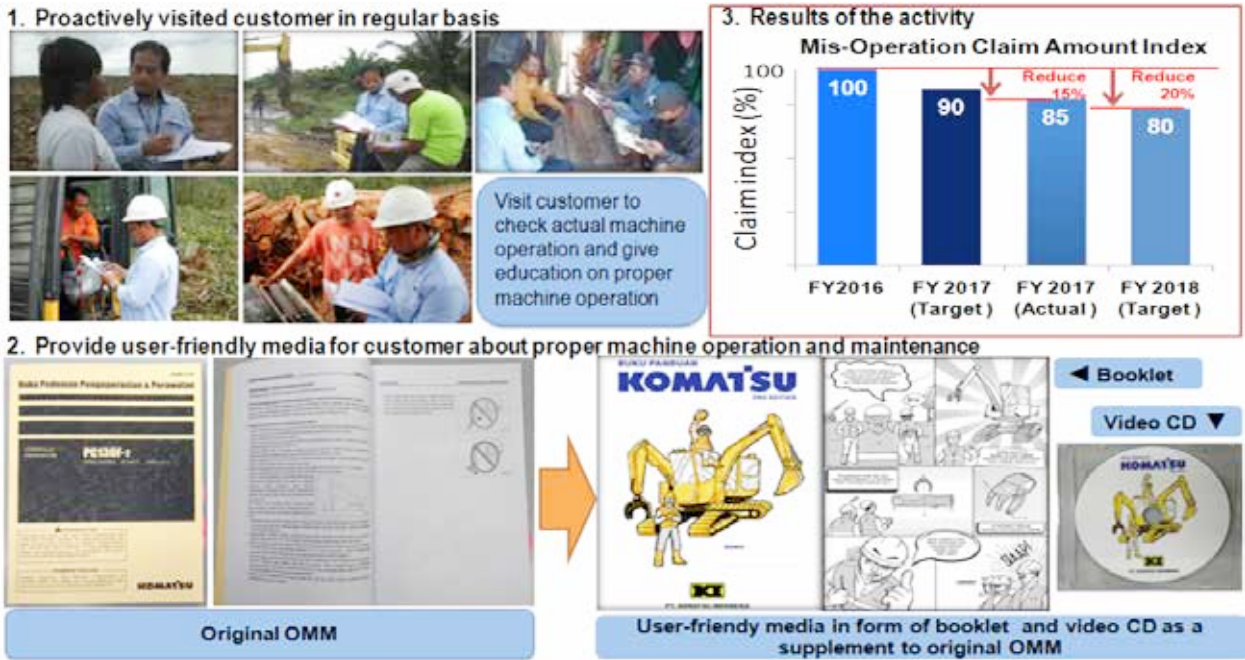


Figure 5.3.3.2 Customer Enlightenment Activities

### 5.3.4 Effects

#### (1) Tangible Effects

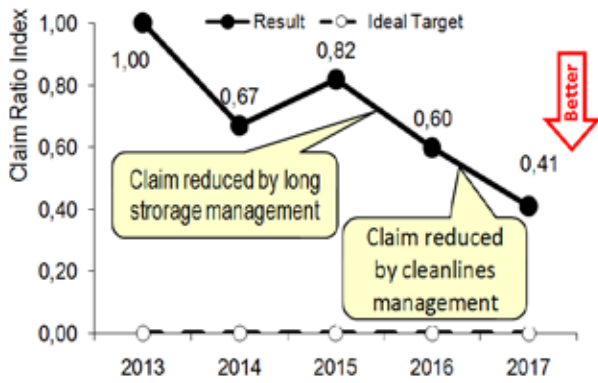


Figure 5.3.4.1 Claim Ratio (Index)

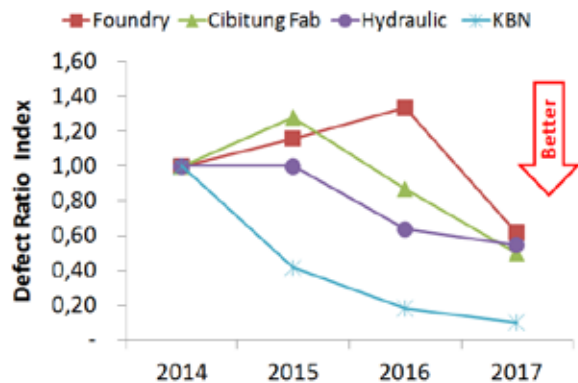


Figure 5.3.4.2 Internal Defect Ratio (Index)

#### (2) Intangible Effects

1. Awareness relating importance of proactive prevention (mizen boushi) is increasing.
2. By doing cross function activities, cooperation between sections or departments including suppliers increased.
3. Through cleanliness management system, KI raises awareness of cleanliness in all production aspects which eventually leads to maintaining product quality.

### 5.3.5 Future Plan

- (1) KI will expand Cleanliness Management Activities to Komatsu Group Companies in Indonesia.
- (2) KI will continue to improve the current QASC so it can keep up with changes in time by keeping PDCA cycle (Kaizen).

## 5.4 Production Planning Accuracy Improvement

### 5.4.1 Background

Until 2014, KI adopted UT Sales plan and reflected into HANSEI plan which caused inaccuracy in sales plan. On the other hand, KI found there were 2 big characteristics in the Indonesian construction and mining equipment market : 1) Market is consisted of 4 sectors: construction, agro, forest and mining; and 2) Big change in demand, especially in mining sector due to affected by commodity price.

As the market changed drastically, it was very important how to predict the demand, and how to set up appropriate production and sales plan by each sector with ICT tool and market-related information. To fulfill customer request in timely manner, KI needed to establish sales plan by itself and reflected it into HANSEI plan which could reduce gap between sales plan and actual result even though main components come from overseas and took Lead Time around 3-4 months.

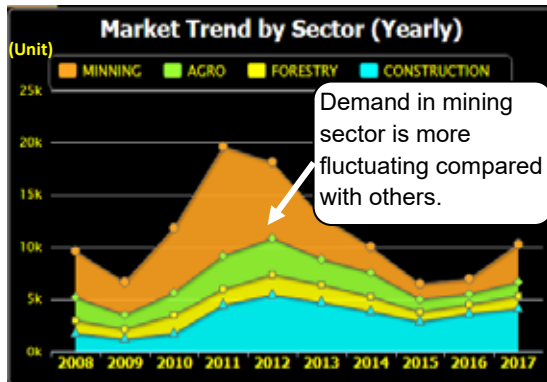


Figure 5.4.1.1 Market Trend by Sector

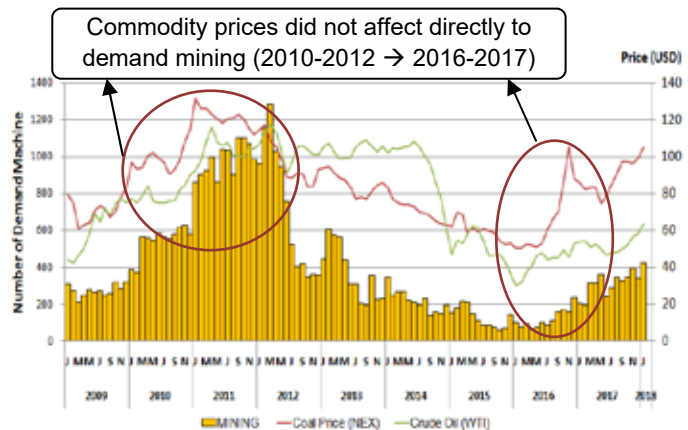


Figure 5.4.1.2 Demand Mining and Commodity Price

Even though KMSI and KI created Indonesian HANSEI Operation Center which intended to manage sales information, but the accuracy of sales plan was not so good which caused by using UT sales plan and therefore impacted to excessive machine's inventory (FMI) in 2014. Consequently, delivery to customer could not be in time because machines that stored over 3 months would need some rework processes. Therefore, the improvement concept is to improve production and sales plan accuracy and keep delivery to customer in time.

### 5.4.2 Major Activities

#### Problems prior to TQM introduction

- (1) Production and Sales accuracy were not so good; therefore KI machine inventory was out of proper level.

#### Major Activities

- (1) Improve Production and Sales accuracy by utilizing **SMR data of KOMTRAX with scientific analysis (Demand Prediction System)** in cooperation with KMSI.

### 5.4.3 Contents of Activities

(1) Improve Production and Sales accuracy by utilizing **SMR data of KOMTRAX with scientific analysis (Demand Prediction System)** in cooperation with KMSI.

① KI has been able to grasp and understand machine operation condition weekly by visualizing **KOMTRAX's working data by model**, making sales plan by itself and reflecting it into HANSEI plan. The activity is shown in Figure 5.4.3.1.

② KI has been expanding **KOMTRAX's working data by sector** and analyzing each sector's operation trend, thus KI has been able to judge the production by spec as future forecast in production and sales plan and to prepare required parts in advance. This activity is described on Figure 5.4.3.2.

Through ①② activities, inaccuracy in sales plan of non-mining sectors was decreased but for mining sector was not decreased yet.

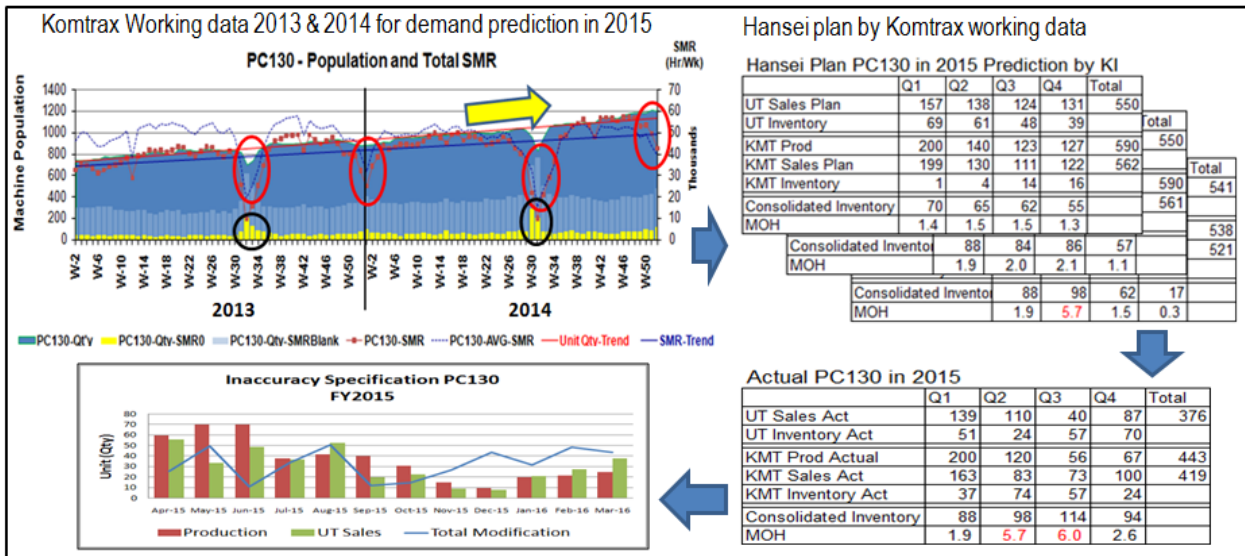


Figure 5.4.3.1 Hansei Plan by Utilizing KOMTRAX's working data by model

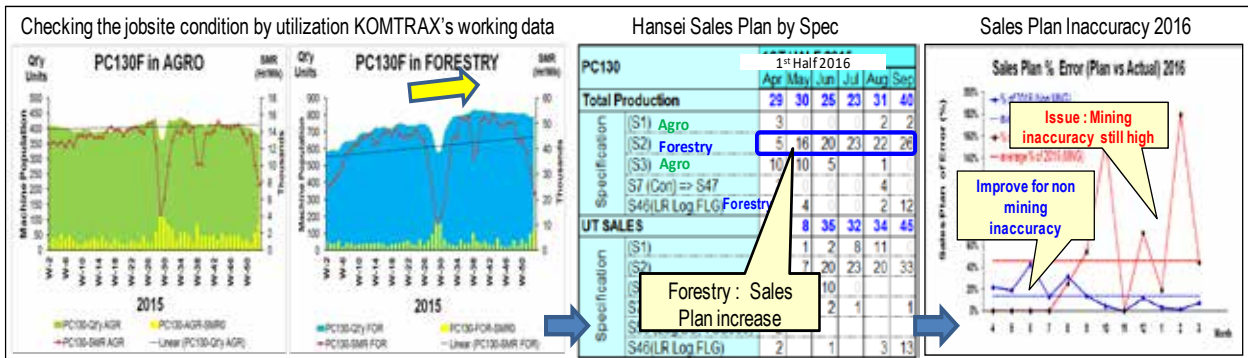


Figure 5.4.3.2 Grasp Sector's Operation by Utilizing KOMTRAX's working data by sector

③ KI continued the improvement with the application of **Demand Prediction System (DPS)** and responded market fluctuation by utilizing KOMTRAX's working data. By using this system, KI is able to calculate how many units of machine will be needed by the customers and this system also can be a **tool for scientific analysis** for mining Sector.

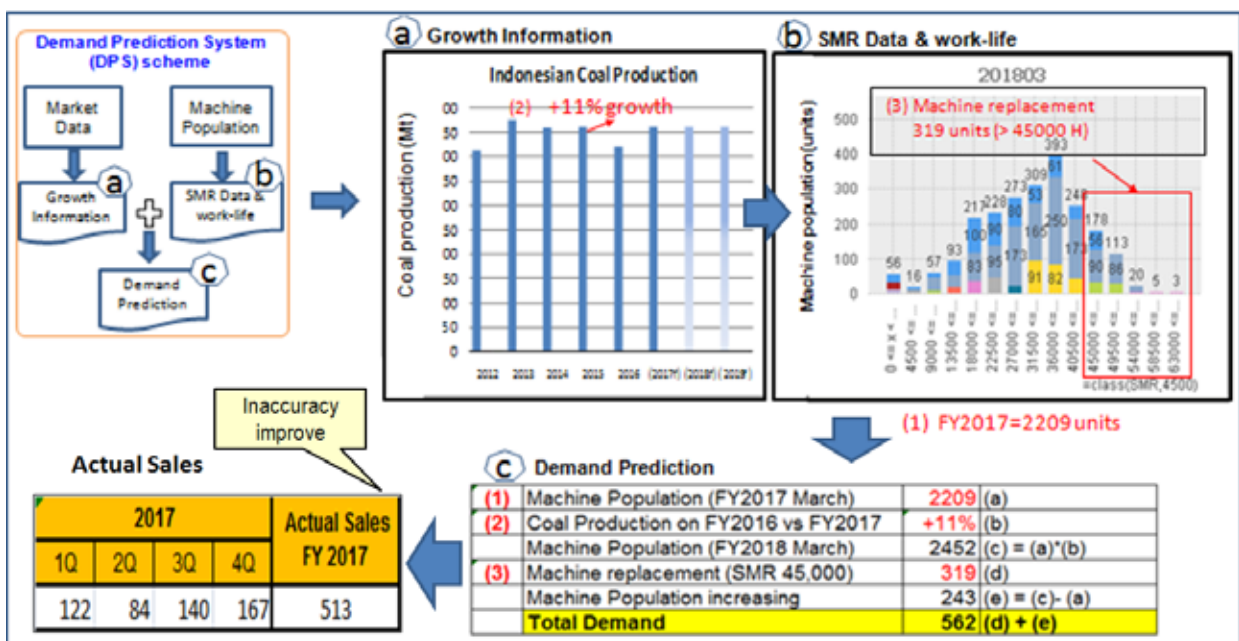


Figure 5.4.3.3 Demand Prediction System

### 5.4.4 Effect

#### (1) Tangible Effects

KI was able to improve Production and Sales Plan accuracy by utilizing KOMTRAX's working data with scientific analysis together with KMSI and UT, and finally inventory level could be managed at the proper level.

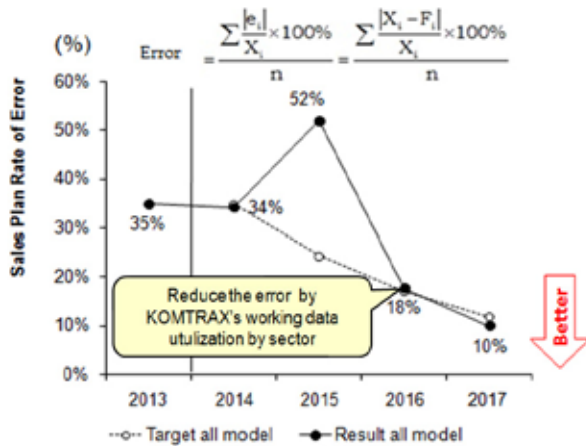


Figure 5.4.4.1 Sales Plan Accuracy of all models

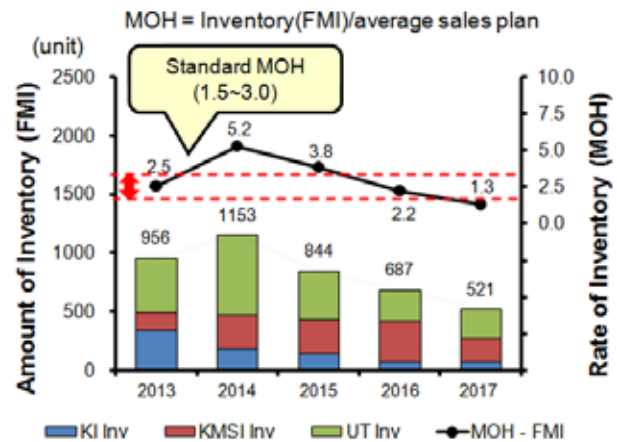


Figure 5.4.4.2 Inventory FMI Consolidate (UT, KMSI and KI)

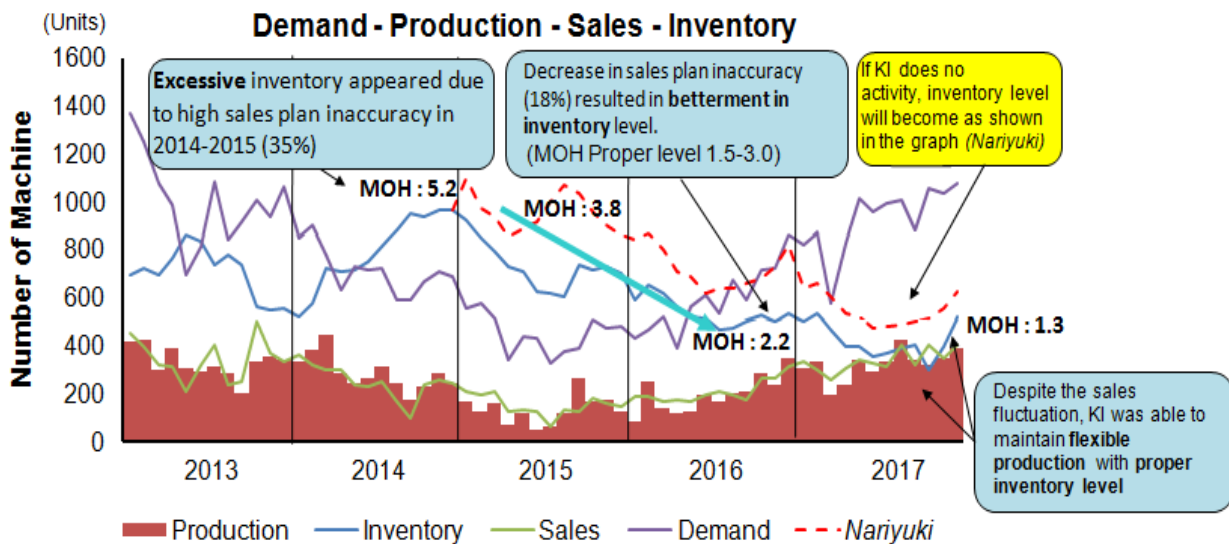


Figure 5.4.4.3 Relation of Demand – Production – Sales - Inventory

#### (2) Intangible Effects

1. Staff's skill in analysing Komtrax's working data has improved
2. UT, KMSI and KI could make good collaboration in setting up Production and Sales Plan through Indonesian HANSEI Operation Center.

### 5.4.5 Future Plan

- (1) KI will improve the operation of Production and Sales Plan through the utilization of new ICT tool (KIOSS)
- (2) KI will pursue the exact parameter of Demand Prediction System

## 5.5 Manufacturing Flexibility

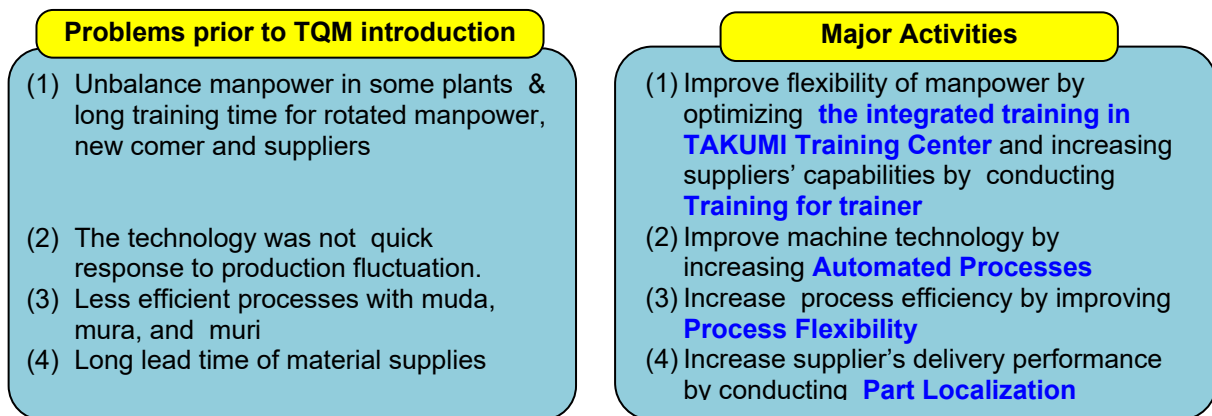
### 5.5.1 Background

Indonesian Construction and Mining Equipment market demand is fluctuating which impacts on manufacturing process in KI. Consequently, KI has to be able to respond the rapid changes of market demand not only to stay survive, but the most important is also to fulfill its customers' needs satisfactorily. These reasons ask for abilities to be a flexible manufacturing company. Regardless the market change is predictable or unpredictable, KI should be able to keep its resources such as manpower, facilities, process and material availability including suppliers stay flexible while maintaining its production stability.

Meanwhile, fluctuating production volume was an influential external factor which caused instability in productivity. On the contrary, manpower, machine and process were internal factors that also affect on instability in productivity. In the matter of manpower, KI would have over manpower when production volume decrease, and when production volume increase KI would have difficulties with new hired manpower who has inadequate capabilities to work immediately. In the matter of machine or facilities, they still had high dependency to manpower due to manual process. As for process, there were many inefficient processes with many muda, mura and muri. Moreover, supplier's delivery performance was low when responding market change.

Therefore, the improvement concept is to become flexible manufacturing company that able to fulfill customers' needs in fluctuating production volume with stable productivity.

### 5.5.2 Major Activities



### 5.5.3 Contents of Activities

#### (1) Improve flexibility of manpower by optimizing integrated training in TAKUMI Training Center and increasing suppliers' capabilities by conducting Training for trainer

To overcome job rotation problem and to provide capable new manpower according to job requirements, KI established **TAKUMI Training Center** as employee development center and followed by the creation of systematic curriculum that met the needs. By conducting training at Takumi Training Center, KI could shorten training lead time significantly. Takumi Training Program is shown in Figure 5.5.3.1. Moreover, KI also has been cooperating with some vocational schools to increase the provision of potential human resource. KI could accelerate the provision of manpower and they were ready to be placed in any process.

#### (2) Improve machine technology by increasing Automated Processes.

KI became more flexible to respond production fluctuation by increasing **Automated Process** with the application of additional robot machines in some plants. With the increase of automation ratio, productivity increased because process kept running and no more dependancy on manpower. Automation activities is shown on Figure 5.5.3.2 As the Result, KI became able to maintain productivity in fluctuating production volume.

Furthermore, KI has implemented an application integrator from welding robot to web-server which is called **TurnGreen** to speed up data collection and to facilitate report of welding robot operation automatically. There by, robot operation became easier to be analyzed which led to a quicker improvement actions and optimization in welding robot utilization. For example, KI did improvement to reduce waste time (Planned Stop, Error Stop, No Operate, Teaching). After the improvement, KI could

reduce waste time significantly. Using this system also means that KI could grasp level of welding robot operation efficiency compared to other factories.

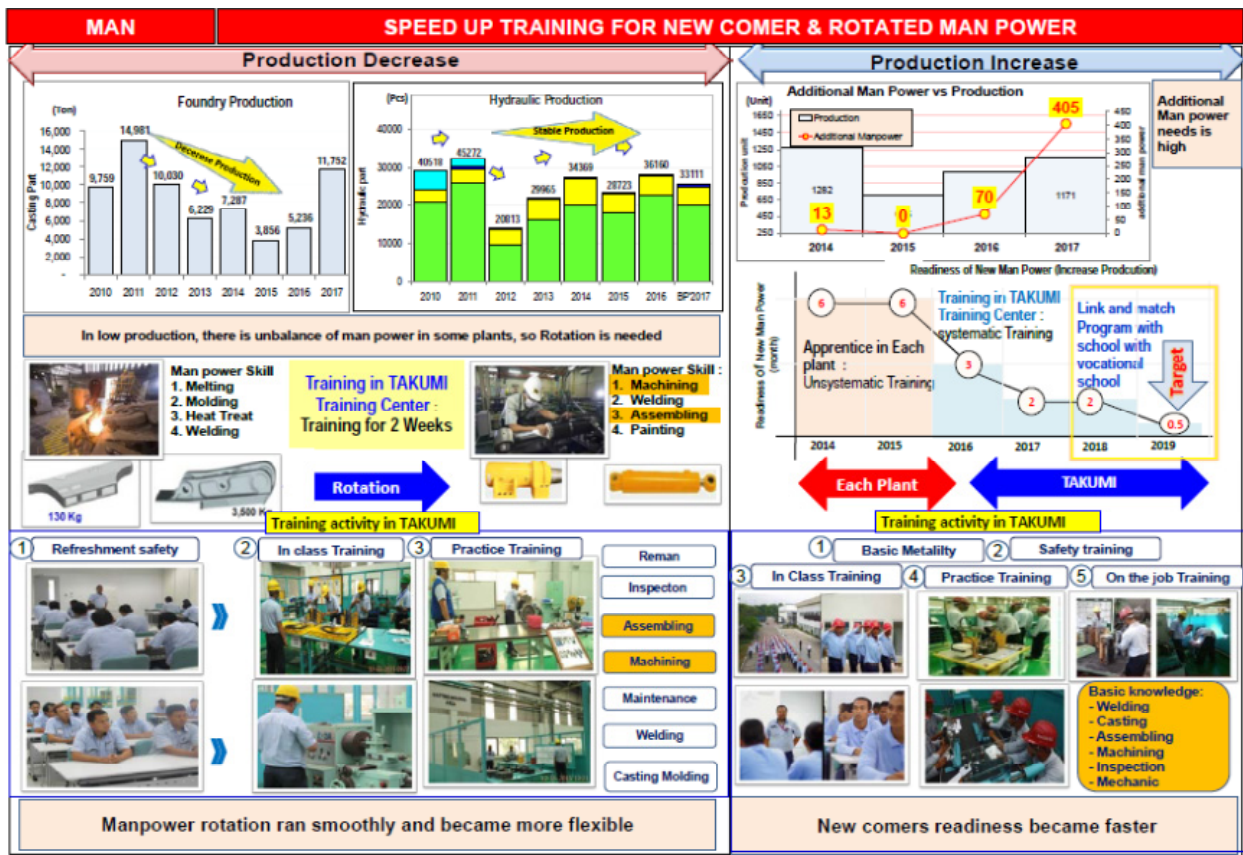


Figure 5.5.3.1 TAKUMI Training Program

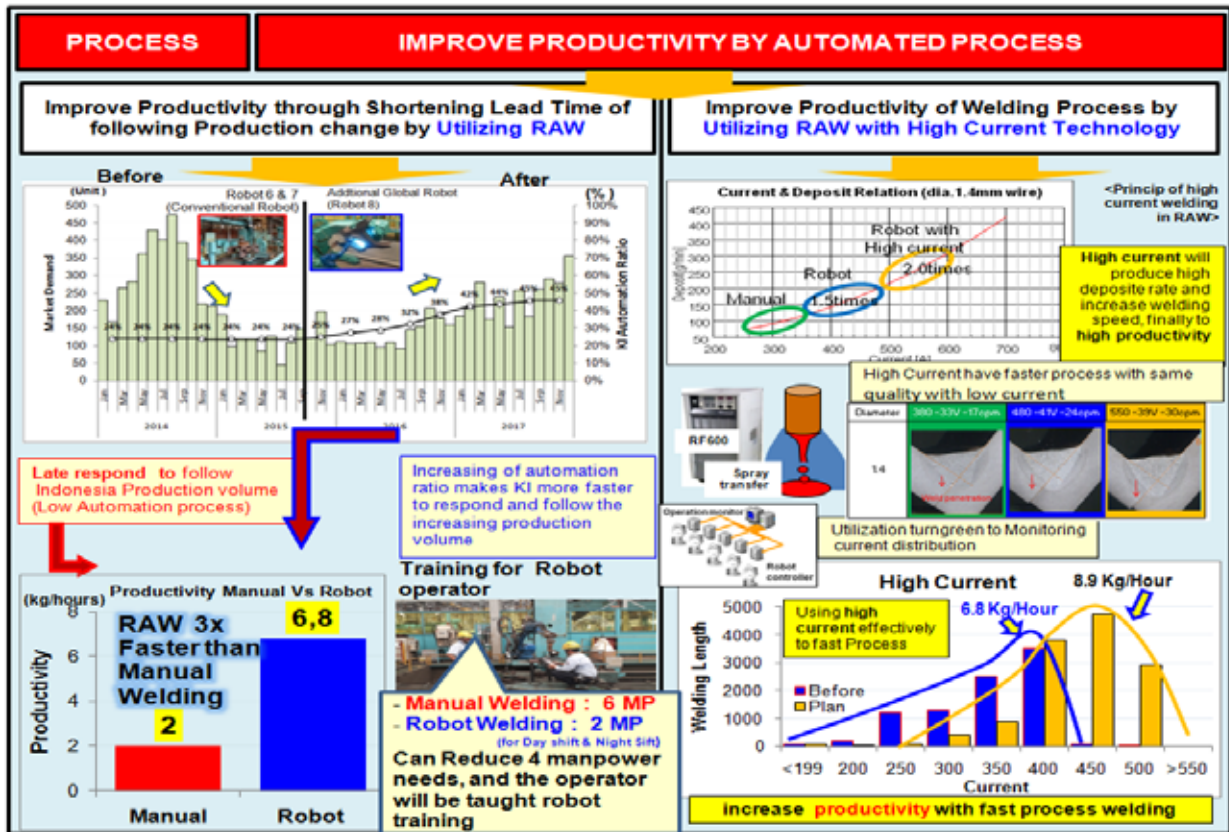


Figure 5.5.3.2 Automation activity



**(3) Increase process efficiency by improving Process Flexibility**

KI could increase productivity significantly in every situation by creating **Process Flexibility** such as **Flexible Assembling Arrangement System (FAAS)**, **Multi Process Capability Training Program** and **Multifunction Jig** to get an effective and efficient process since the process could follow production condition flexibly and shorten lead time. As the result, KI could increase productivity while ineffective processes were eliminated thoroughly.

**(4) Increase supplier’s delivery performance by conducting Part Localization**

To be a flexible manufacturer in responding production change, KI has taken improvements which one of them was conducting by **Part Localization** where overseas material sources were replaced by local material sources so that 4 months lead time could be reduced into 4 weeks. There by, a large order quantity would no more be required because KI could make frequent order to local supplier in required quantities. As the result, KI became able to provide material flexibly following market change

**1.5.4 Effects**

**(1) Tangible Effects**

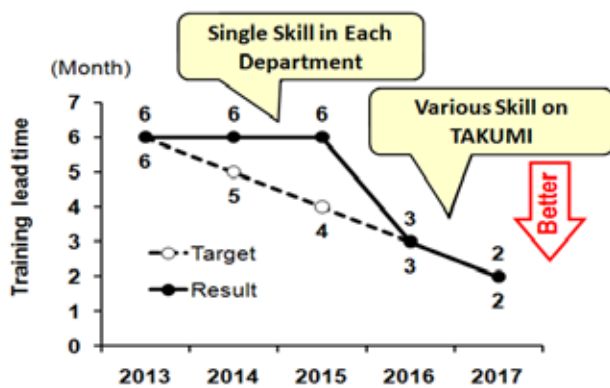


Figure 5.5.4.1 Timing training for new man power (systematic training )

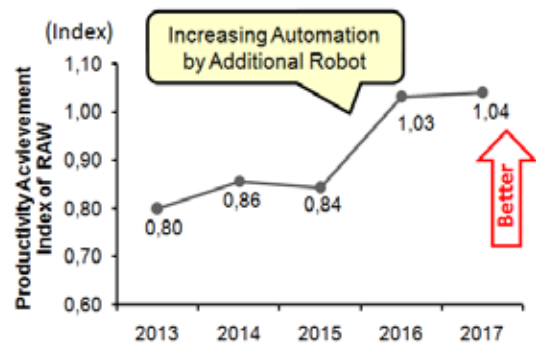


Figure 5.5.4.2 Productivity RAW fabrication (Automation facility)

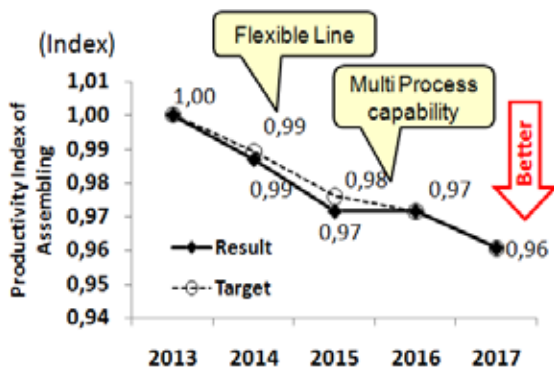


Figure 5.5.4.3 Productivity Index of Assembling plant (Production Lead Time Index)

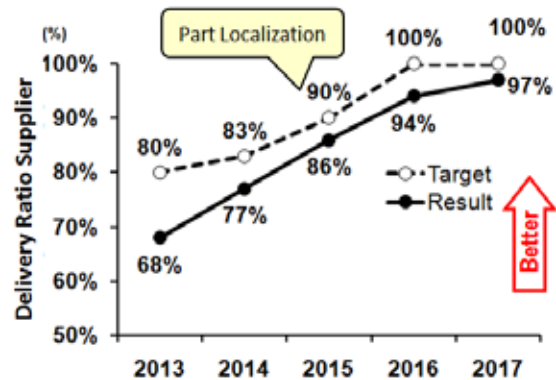


Figure 5.5.4.4 Delivery Performance Supplier (Part Localization)

**(2) Intangible Effect**

1. KI has been able to fulfill customer satisfaction with confident and customers satisfied with KI products and services
2. Quick response to market change with respect to product mix and product volume.

**5.5.5 Future Plan**

KI will enhance its production stability in any situation with multi-skilled manpower in every department.

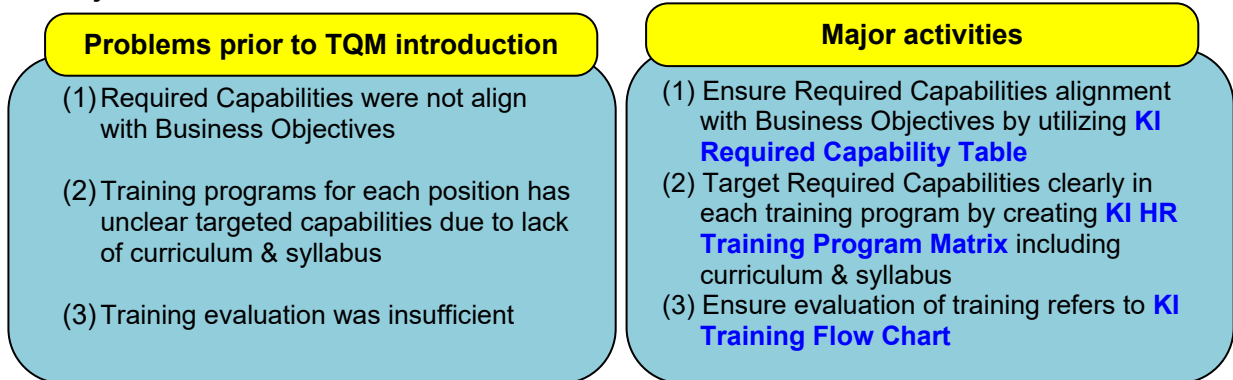
## 5.6 Human Resources Development in line with Business Objectives (Midterm Strategy & Management Policy)

### 5.6.1 Background

As KI has been facing volatile and uncertain of business condition, KI understood that KI needed to adapt quickly in order to sustain in the challenging business condition. On the other hand, adaptability of organization depended on capabilities of its human resources in order to meet Required Capabilities. So, KI needed to ensure that its human resources had Required Capabilities which needed by organization to sustain referring to KI Business Objectives.

KI Training Plan was made based on Training Requisition that was submitted by each manager in the beginning of fiscal year. Each department defined type of training based on their own analysis. There was no reference on what capabilities the proposed training was targeted. These made training could not be ensured whether it has strong relation with objectives or not. Furthermore, even though curriculum and syllabus have already made for every training program, but most of them were not clearly defined the targeted capabilities and employee in what position (Level and Function) should join the training. Consequently, it led to inadequacy in measuring the impact of training programs. Therefore, the improvement concept is to develop capabilities of employees in line with Business Objectives.

### 5.6.2 Major Activities



### 5.6.3 Contents of Activities

#### (1) Ensure required capabilities alignment with Business Objectives by utilizing KI Required Capability Table

To ensure the alignment of Required Capabilities and Business Objectives, KI created KI Required Capability Table (Figure 5.6.3.1)

Midterm Strategy	Main Activity	Function Execute	Detail Man Activity	Desire Outcome	Capability Issue	Required Capability	Current Capability	GAP	Training Needs	Participant	Method	
Realize market requirement quickly and develop suitable product	Indonesia Customer Oriented Product Development	1. New Product Development 2. Quality Assurance	Improve product fitness to real customers' needs by creating Design Input System	Design Based on customer requirement	Less capability in analyzing customer requirement	1) Design based on Customer need Capability 2. KFTA 3. FMEA 4. Matrix Diagram 5. Design Concept 6. Quality Target 7. Cost Target 8. Cause Effect Diagram	Design capability based on standard 1. Matrix Diagram 2. Design Concept 3. Quality Target 4. Cost Target	Capability to design based on customer requirement: 1. QFD 2. KFTA 3. FMEA 4. Cause Effect Diagram	Enhance level 2 capability Statistical inference (FMEA, QFD, Cause Effect Diagram, KFTA)	Design Engineer (6 Person)	1. In class training 2. Assignment	
			Improve achievement level of development schedule by upgrading Development Process	On time In design schedule	Less speeding in new prototype test	2) Develop local test method capability	Capability in process design drawing to prototype: 1. Ground Test 2. Stress Test	Capability making prototype 1. Ground Test 2. Stress Test	Capability to develop local test method	1. Enhance employ competency in Local Test Method	Test Engineer (Person)	Assignment
			Make necessary product improvement at very early stage of market introduction by developing Product Feedback System	Correctly identify customers' satisfaction level	Less accurate to identify customers' satisfaction level after introduction of newly developed	3) Product feedback method capability	1. Collaboration to obtain initial customer product feedback. 2. Proactively evaluate customer satisfaction	Evaluated customers satisfaction only based on actual field problem information	Capability of review and evaluate customer satisfaction of new product after massproduction at customer site	1. Evaluate customer satisfaction at customer site 2. Product evaluation after massproduction	Engineer	Assignment

Figure 5.6.3.1 KI Required Capability Table

**(2) Target Required Capabilities clearly in each training program by creating KI HR Training Program Matrix including curriculum & syllabus**

KI created **KI Human Resources Training Program Matrix** (Figure 5.6.3.2). By using this matrix, training program for each position has been clear and capabilities being targetted through a training has been clarified. KI has been completing each training program in the matrix with curriculum and syllabus which described capabilities which would be targetted through a training program.

Created	Revised	Reason	KOMATSU INDONESIA HUMAN RESOURCES TRAINING PROGRAM MATRIX									
Revised	: 2016/04	△ x 3	Add statistic program	Approved	Checked	Prepared	Legend: Before 2015 (Before 2015)			Plan FY 2015	Plan FY 2016	Plan FY 2017
Revised	: 2017/01	△ x 2	Add basic production control & EDP				Single Line (employee in related position)			Double Line (Selected employees)		
Revised	: 2018/04	△ x 1	HR Program									
Revised	: 2018/05	△ x 2	Add Quality Management & Operation Management Program for Supplier									

Position Level	Leadership		Functional				TQM & QC			Safety & Compliance
			Non Technical		Technical					
Top Management	Executives Program									Safety & Compliance
General Manager	GM Program	KLDP								
Senior Manager	SM Program	KEDP								
Middle Manager	Middle Manager Program									
Manager	New Manager Program									
Assistant Manager										
Coordinator	Supervisor	Supervisor Leadership Program								
Staff/ Eng	Supervisor									
Jr. Staff/ Jr. Eng	Foreman	Foreman Leadership Program								
	Group Leader	GL Leadership Program								
Operator	Operator	Reform Apprentice Training with Link & Match								
New Entry Employee	New Employee Development Program						Basic TQM			
Apprentice	New Apprentice Training		Pre Basic technical							
Midori Kai Suppliers	Quality Management for Supplier	Operation Management for Supplier			Technical training		QC Program	QC Convention	QC Instructor	Safety & Compliance

Figure 5.6.3.2 KI Human Resources Training Program Matrix

**[Develop National Competency Standard]**

Training programs have been conducted not only for KI employees, but also for apprentice and suppliers. In regard with training program for apprentice, KI has recruited employees who were vocational school graduates. However, competency level of graduates were below standard which caused by mismatched between subject being learned at school and the needs of construction and heavy equipment industry. To overcome this issue, KI has been cooperating with HINABI (Association of Heavy Equipment Industry in Indonesia) and the Ministry of Industry to run **Link & Match Program** by developing **National Competency Standard of Construction and Mining Equipment Industry** with KI as the forefront leader in this activity.

**[Link & Match Program]**

This National Competency Standard then would be used as a reference in composing learning materials, curriculums and syllabus. KI has been working with 35 vocational schools spreading across 6 provinces over Java Island. KI also provides learning facilities, apprenticeship, and training for school teachers, and even send employees to hold Komatsu Class in schools. In every school, there will be a specific Komatsu class where the students would be selected and enrolled in the Komatsu Class to learn heavy equipment competency for 3 years. After 3 years, the targeted number of the capable graduates who are ready to work in the construction manufacturing and heavy equipment machinery industry will reach 1,050 graduates. By running this activity, KI would be able to speed up manpower fulfillment with more qualified labors. Surely, not all of the graduates would be able to work for KI, but they would also be able to work for KI suppliers and other similar

companies in heavy equipment industry. Consequently, KI has contributed to the nation by developing human resource quality in the heavy equipment industry.

**(3) Ensure evaluation of training refers to KI Training Flow Chart**

KI created **KI Training Flow Chart** as procedure to plan, execute and evaluate training properly. Training Flow Chart is described in Figure 5.6.3.3.

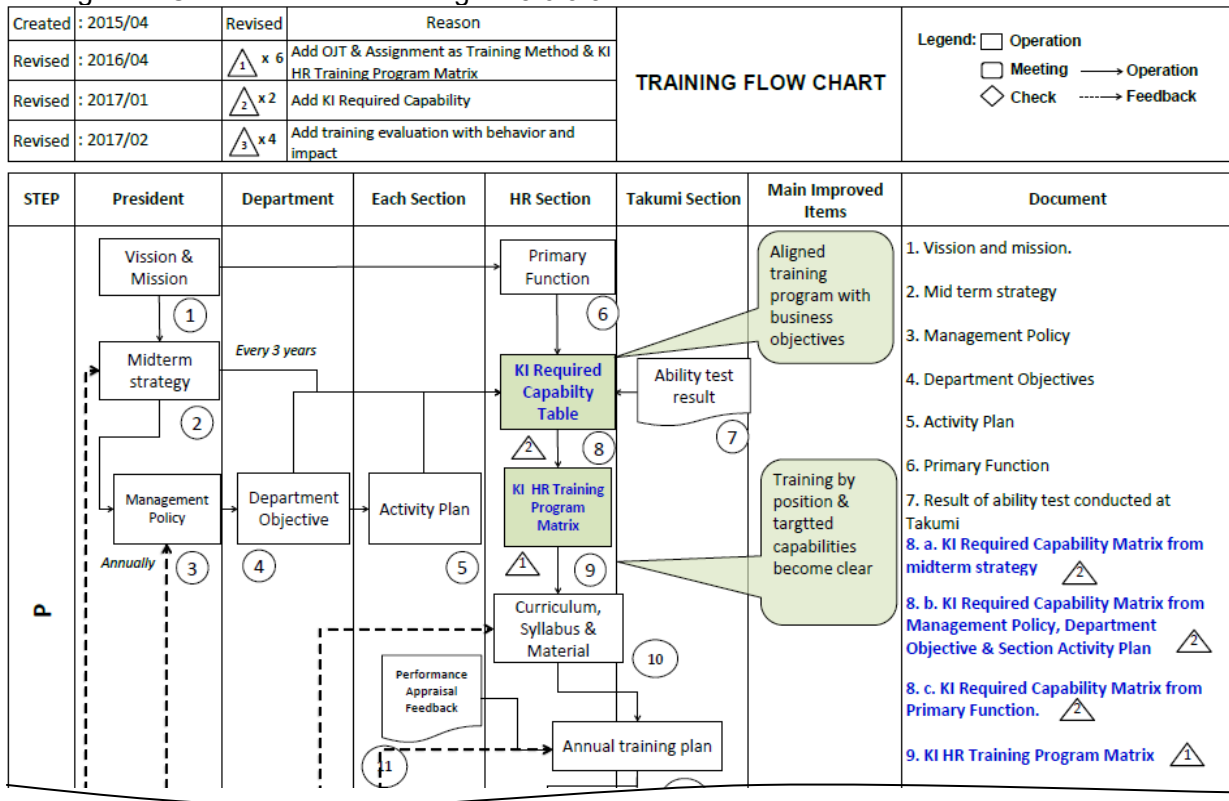


Figure 5.6.3.3 Training Flow Chart

**5.6.4 Effects**

**(1) Tangible effects**

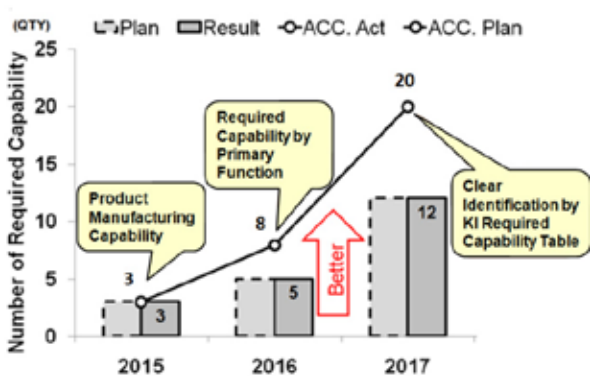


Fig 5.6.4.1 Number of developed Required Capability

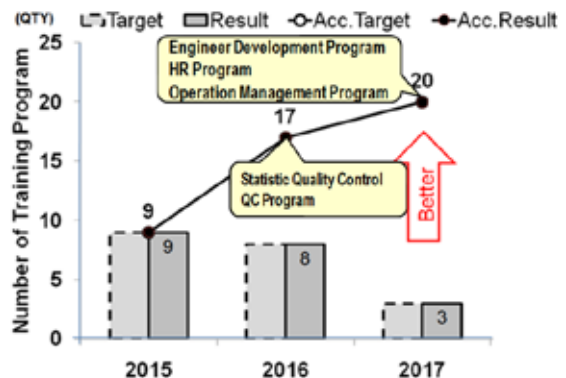


Fig 5.6.4.2 Number of completed training programs in KI-HR Training Program Matrix

**(2) Intangible effects**

1. Employees' motivation has increased due to having capabilities to execute their work.
2. Employees' satisfaction and commitment to the organization have increased because company put special attention to their development.

**5.6.5 Future Plan**

KI will Integrate Required Capability development by utilizing corporate university framework.

## 5.7 Zero Accident and Zero Emission (Abbreviated)

## 5.8 Accelerating Data Collection and Information Analysis (Abbreviated)

## 6. Overall Effect by TQM Implementation

KI has achieved the following tangible and intangible effects by carrying out the TQM activities with full participation.

### (1) Tangible Effects

KI have identified KI Objective and Midterm Strategy and organized a system for making the Management Policy according to those upper level policies. The achievement of Management Policy has been improved by deploying the Management Policy to every department and making a system to follow up every Department Objectives and Activity Plan.

#### [Sales & Market Share]

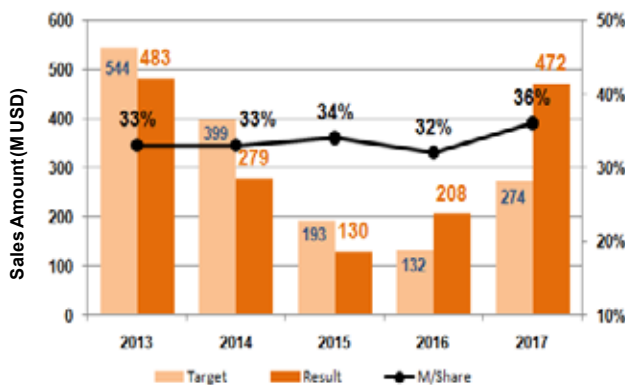


Figure 6.1 Sales & Market Share

#### [Realize market requirement quickly and development suitable product]



Figure 6.2 Customer Satisfaction

#### [Capture market change in advance to keep manufacturing flexibility]

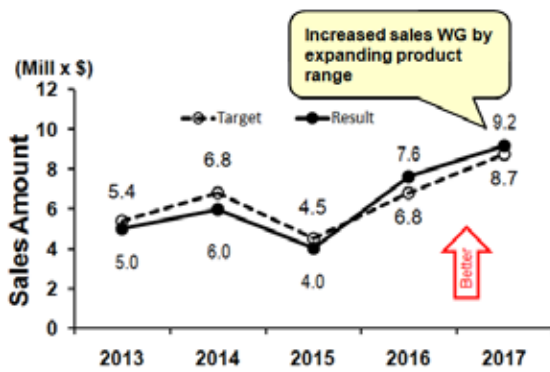


Figure 6.3 Working Gear Sales

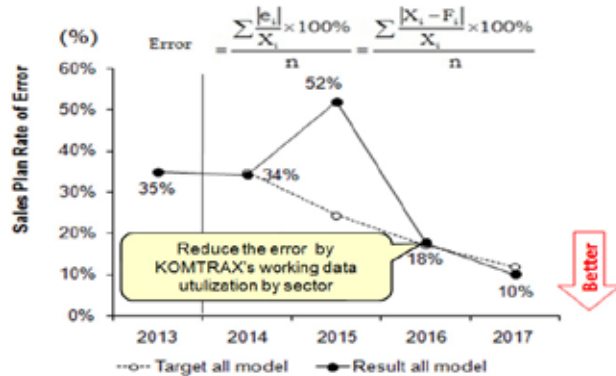


Figure 6.4 Sales Plan Accuracy

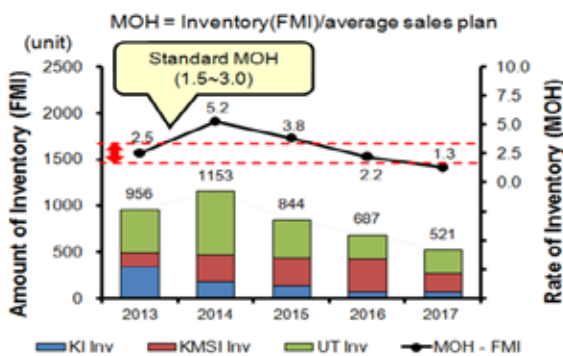


Figure 6.5 Inventory FMI Consolidated



Figure 6.6 Delivery Achievement

**[Improve quality proactively]**

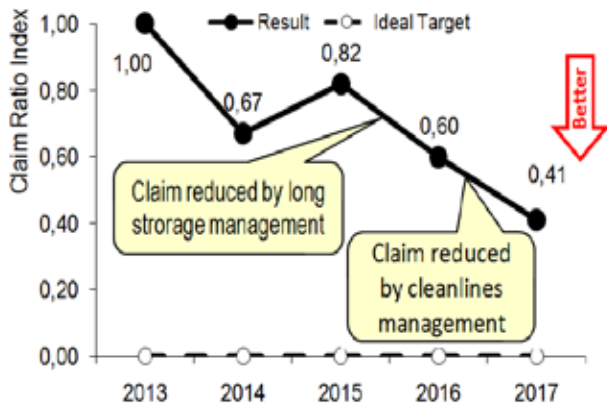


Figure 6.7 Claim Ratio (Index)

**[Reduce cost to enhance competitiveness for customer's Life Cycle Cost]**

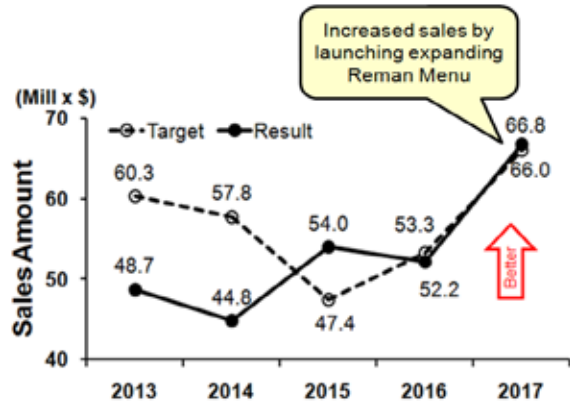


Figure 6.8 Reman Sales

**[Develop human resources valuable to the nation and stakeholder]**

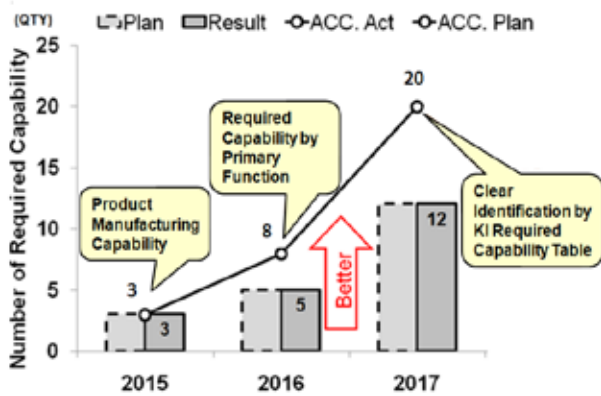


Figure 6.9 Number of developed Required Capability

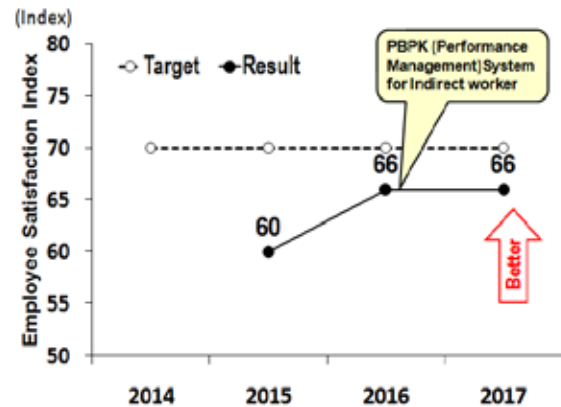


Figure 6.10 Employee Satisfaction Index (Performance Evaluation)

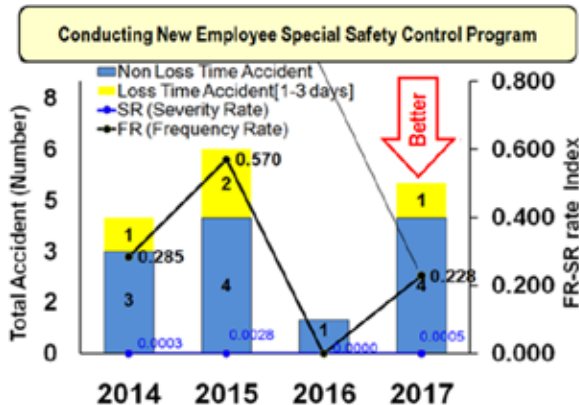


Figure 6.11 Rate of Accident

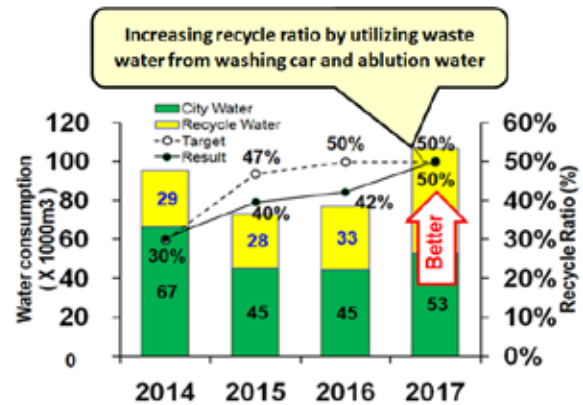


Figure 6.12 Water Recycle Ratio

**(2) Intangible Effect**

1. With TQM implementation activities, internal KI cooperation became good as well as relation among business partners.
2. KI could provide faster response to customer need.
3. Various improvement activities came to run continuously through the deployment of Management Policy at all of the departments.

## 7. Future Plan

KI will continue to become dominant market share of Construction and Mining Equipment in Indonesia even though business environment will be change rapidly as projected. It will take challenge for KI to reach **market share 42% in Indonesia and also total sales (machines & components) will be 0,8 billion USD in 2021** (in the same time of 100 years Komatsu's anniversary) by **strengthening TQM implementation in all aspects**. Therefore, KI will set up road map of future plan as shown in Figure 7.1.

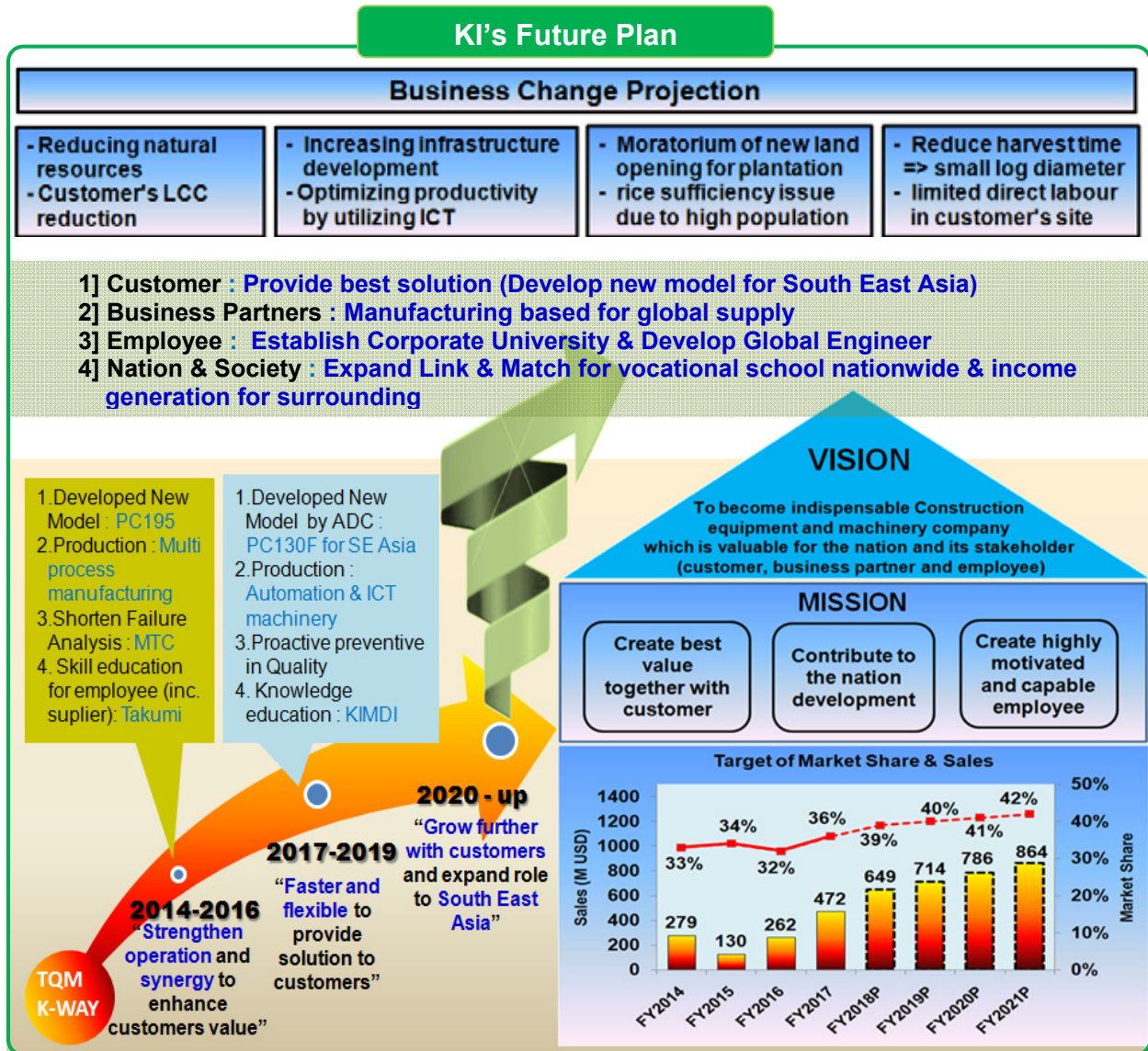


Figure 7.1 Road Map of KI's Future Plan