Departemen Teknik Industri
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Sistem Penjaminan Kualitas

Full DMAIC Case Study | Ganjil 2019/20
Kode: Paralel

Dosen	: Irvanu Rahman, ST., MT., MPA
Format Ujian	: Kerja Kelompok
Waktu	: Kamis, 31 Oktober 2019
Level Kompetensi (Tertinggi)	: C5
Kompetensi Diuji (Tertinggi)	: Mampu untuk mengidentifikasi, mendefinisikan, menyusun, memilih/memprioritaskan, dan mengaitkan akar masalah dengan solusi terbaik dari beragam alternatif dalam proyek peningkatan kualitas berkesinambungan serta memetakan resiko solusi yang dipilih dalam penyelesaian masalah kualitas
Expected Learning Outcomes (ELO)	: D, E, F, G, dan H

D. Kemampuan menerapkan siklus PDCA ke dalam pendekatan Six Sigma beserta alat – alat bantu untuk penigkatan kualitas (C3)
E. Kemampuan menggunakan kemampuan menggunakan alat – alat peningkatan kualitas dalam studi kasus peningkatan kualitas (C3)
F. Kemampuan menggunakan konsep peningkatan kualitas berkesimbungan dalam sebuah kasus menggunakan pendekatan Six Sigma (C3)
G. Kemampuan menelaah data kuantitatif dan kualitatif untuk menemukan akar masalah dalam peningkatan kualitas (C4)
H. Kemampuan mengidentifikasi, mendefinisikan, menyusun, memilih/memprioritaskan, dan mengaitkan akar masalah dengan solusi terbaik dari beragam alternatif dalam proyek peningkatan kualitas berkesinambungan serta memetakan resiko solusi yang dipilih dalam penyelesaian masalah kualitas (C5)

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~ Drop of Customer Satisfaction in Jacksonville Industry ~

Jacksonville Industry specializes in selling and delivering industrial hardware products to individual users, small businesses, and large corporations. Most sales are made by its sales representative (JSRs) in the Inverness warehouse, Scotland, but more experienced individual and corporate customers buy direct from its web site.

As the end-of-year is approaching, the company has found out several insights from its sales performance through data monitoring system, as follow:

- Compared with previous year, sales are increasing 45% this year.
- However, it is revealed that a recent survey presents a sharp drop in customer satisfaction, from 95% to 78%, and complaints about poor customer service were increasing at alarming rate.
- Another bad news is about the inability of sales force to generate more revenue from new customers

Despite better sales growth from previous year, Mario Jacksonville – company's CEO – is hiring a Six Sigma Quality consultant to help him solving the declining customer satisfaction issue. After

introduction meeting has been made, the team, with the help of Mario, quickly decided they needed to limit the scope of its study to the first three steps of the process, because that seemed manageable.

The team started with a problem statement that "customers are unhappy with Jacksonville products." However, this statement is still ill-defined problem. As Mario left the team for another board meeting, he told the team to deep dive into the sales performance of company's products to shape it into better and concise language. He also told them to focus their attention on "how to increase customer satisfaction?" and the process of product sales in Inverness.

The team then is now heading to production floor to see how all Jacksonville's products are handled and processed to customer. At the production area, the team found out that there are 11 types of product produced by the company. Each of them could have five types potential defects: components incompatibility, part missing, defective packaging, incorrect method of shipping, and others. One of team member randomly inspects 76 orders and find out that 4 orders are having part missing, 1 order is both damaged and shipped incorrectly, and 3 orders couldn't work due to incompatibility issue.

While one member investigating the production floor, there is another member that is currently interviewing the production manager about the whole process of Jacksonville's product handling. She able to outline 7 basic process from the manager, as follow:

1. Customers place orders with the GSRs at the call center - (25 mins per customer)
2. GSRs send billing information to Accounting and forward customer order information to the Order Verification Dept. (OVD) - (40 mins for 3 placed orders)
3. OVD verifies the order and sends it to Order & Pick (O & P). - (7 mins per order)
4. O & P picks the parts and components and sends them to Assembly - (37 mins per order)
5. Assembly assembles the orders and sends them to Shipping - (240 mins per order)
6. Shipping sends the filled orders to Customers - (15-hours service delivery)
7. Orders with wrong or missing components are corrected in the Returned Materials Area (ARO).

The manager adds, "All of these processes is based on my knowledge in understanding Jackson's system for this past two years. There might be differences from actual process, but nobody's here understand better than me".

Besides Production Manager, she also directly checks those seven processes in actual implementation by asking staffs and clerks in the respective departments. She found out that those three steps describe the "sales" portion of the process: salespeople (GSRs) take the customer orders over the phone and send the information on to OVD clerks, who check every phone order for systems compatibility and completeness. When the OVD clerks find a problem, they contact the GSR or the customer, or they check a database used by the GSRs, called "Jack-V." Sometimes they check the information in the website, which has all the latest information on it, often before "Jack-V" does.

Delving into the history of this process, the team discovered several interesting facts. For example, salespeople receive a bonus on the volume of business they handle. When sales grew at a faster pace than expected in the third quarter, management moved some of the order verifiers from OVD into direct phone sales jobs. Those who made the transition into sales say they like the bonuses and they don't miss the often tedious and time-consuming work of checking every order. Lastly, the team collected data on product sales per category, number of orders received, and how many returns were authorized, as shown below.

No.	Monthly Sales Per Product Category		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	Quarter Turn	6,096	7%	12%	19%	17%	16%	4%	3%	5%	4%	5%	7%	1%
2	T&L Handles	6,183	10%	12%	10%	8%	7%	8%	11%	20%	5%	3%	1%	5%
3	Swing Handles	53,335	23%	7%	21%	15%	16%	3%	5%	2%	2%	1%	4%	1%
4	Folding T Handles	18,935	28%	13%	12%	8%	5%	8%	6%	12%	3%	4%	1%	0%
5	D-Pull Handles	43,462	20%	14%	12%	0%	10%	7%	8%	22%	3%	2%	1%	1%
6	Cams & Cam Locking system	137,638	8%	14%	3%	13%	7%	8%	2%	3%	10%	8%	1%	23%
7	Locking Rods	212,795	14%	16%	13%	3%	13%	7%	8%	2%	3%	10%	8%	3%
8	Flush Locking Solution	16,727	17%	18%	14%	8%	4%	10%	5%	6%	2%	3%	1%	12%
9	Hinges	694,914	20%	8%	13%	12%	8%	5%	8%	6%	12%	3%	4%	1%
10	Earth / Neutral Bars	28,481	14%	8%	4%	14%	16%	13%	3%	5%	8%	6%	7%	2%
11	Door Handle	177	0%	2%	4%	14%	16%	2%	3%	1%	12%	20%	14%	12%

Month	Proportion of Authorised Returned Order (ARO) from Monthly Sales	ARO Type						
		Incompatible internal components	Incompatible external components	Internal components missing	External components missing	Defective packaging	Incorrect shipping method	Others
JAN	28.48%	38%	8%	3%	23%	10%	12%	6%
FEB	30.40%	40%	7%	5%	29%	7%	9%	3%
MAR	25.89%	26%	15%	9%	18%	15%	8%	9%
APR	16.10%	33%	13%	8%	15%	14%	10%	7%
MAY	19.78%	29%	17%	3%	32%	9%	8%	2%
JUN	31.57%	30%	14%	22%	10%	12%	8%	4%
JUL	29.21%	25%	20%	11%	21%	16%	4%	3%
AUG	32.28%	29%	18%	4%	19%	23%	6%	1%
SEP	26.34%	33%	7%	16%	23%	8%	10%	3%
OCT	29.40%	42%	16%	15%	14%	3%	2%	8%
NOV	27.47%	22%	19%	16%	23%	18%	1%	1%
DEC	19.54%	28%	15%	23%	14%	8%	5%	7%

It is also known that the ARO value for each type as follow:

ARO Value by Major Type				
Components Incompatibility	Missing components	Defective packaging	Incorrect shipping method	Others
$2,700	$1786	$1438	$1,250	$1685

While gathering data, the team also found out the following: Fishbone

- The TSCs don't always verify all customer shipping data or systems compatibility because it takes too long, and they think Order Verification clerks will make any corrections needed.
- There are different inventory data between website and Jack-V
- In Order Verification, orders tend to pile up, and OV clerks do not always verify them in the order they arrive, preferring sometimes to do the ones that can be verified quickly, leaving the tougher ones for later.
- There are several interviewed OVD staffs have insufficient knowledge on the products whilst working on the Sales department during regular job rotation
- The company runs deficit budget, making it difficult to spend for developing its staffs' competences
- During peak circumstances, both OVD and Assembly staff are overwhelmed by increasing orders
- When they do check orders, OV clerks often go to the web site, where they find more current information than in Jack-V as the website is updated daily and the other one once in a month

After establishing the current baseline and identifying the cause of problems, your team move to improvement stage at which several options to better the process developed.

- Option 1 - Product Marketing Training

  This alternative focus on developing staff competences, particularly in providing sufficient knowledge on products and service offered to customer. The pros of this option rely on reducing AROs from defective packaging and incorrect shipping method by 18% and 50% each. These benefits can effectively apply one-month after the training finished. However, the 5% increase of incorrect shipping and reduction of sales workforce taken for training is considered as cons, making this option considered as medium-effort improvement.

- Option 2 - Process Improvement Initiatives

  This alternative focus on grouping the Accounting, OVD, and O&P into one department. This option could help company's process by saving 45% of total time from those three departments, reducing incompatibility issues and defective packaging by 29% and 16% respectively. This alternative is considered as a quick win as its low-effort improvement category, so it can be applied at any time but the earliest activities is kicking-off in March next year.

- Option 3 - Install ERP Inventory Management

  This alternative will centralize the inventory and customer order data, so the company will have single data platform among website and Jack-V. If your team choose this option:

  - the enterprise will financially suffer through the year due to high installation cost during budget deficit circumstances, The company definitely cannot choose Option-3, and can only run Option-2 simultaneously starting in August to ensure company's financial stability.
  - The estimated cost of implementation for this option is roughly $ 40.000 per month
  - the system starts working in March next year and operates at 25% capacity. This assumes projected AROs from missing component (internal and external) can be reduced by 10% at that month. For the coming periods, the system will work as shown in the table below:

Month	APR	MAY	JUN	JUL - DEC
ERP Inventory System Capacity	30%	48%	65%	100%
Total AROs reduction from Missing component	15%	24%	33%	40%

- Option 4 - Increasing Sales Commission

  This alternative focus on increasing sales incentives for its workforce, hence increasing the monthly product sold by 15% without any effect on reducing AROs. This option vote in favor of Mario's credibility towards Jacksonville's business partners and can be applied starting March next year. The estimated increase of wage is around $ 6.250 per person per month for 125 JSRs.

If no counter measure is taken, the projection of sales, received orders, and authorized returned order will be (as shown in the data below):

Month	Projected Sales[1]	Projected AROs Count	Projected ARO per Type						
			Incompatible internal components	Incompatible external components	Internal components missing	External components missing	Defective packaging	Incorrect shipping method	Others
JAN	289,568	37.80%	24%	17%	12%	17%	19%	7%	4%
FEB	187,510	27.91%	33%	7%	21%	15%	16%	3%	5%
MAR	195,147	57.98%	28%	13%	22%	18%	5%	8%	6%
APR	260,256	38.05%	21%	14%	16%	12%	20%	9%	8%
MAY	163,256	18.16%	29%	17%	3%	32%	9%	8%	2%
JUN	158,691	27.89%	23%	16%	22%	15%	12%	8%	4%
JUL	98,458	25.10%	17%	20%	19%	21%	16%	4%	3%
AUG	90,284	26.81%	30%	18%	4%	19%	22%	6%	1%
SEP	186,122	7.94%	32%	7%	16%	23%	9%	10%	3%
OCT	84,056	19.44%	45%	16%	15%	14%	0%	2%	8%
NOV	78,750	22.39%	29%	19%	10%	22%	18%	1%	1%
DEC	77,960	32.76%	31%	15%	20%	14%	8%	5%	7%

CASE INSTRUCTION:

Your team is the Jacksonville consultant and you are tasked to recommend solution that betters the overall quality system. Here's are some guidelines:

- What is the problem faced by Gemini? What are the critical quality measures?
- How the quality is delivered from the end-to-end perspective of process flows?
- How was the performance of those indicators overtime?
- Does your team note any pattern, so you would have a hypothesis towards the cause of declining quality in the products offered?
- How much improvement is feasible to do after knowling the process baseline?
- Which option that gives highest impact on overall quality system?

[1] Multiply this order sales with the last digit of your group coordinator's student number. If it's zero (0), then use the second last digit.