

Dosen	: Irvanu Rahman, ST., MT., MPA
Format Ujian	: Individu, Excel Spreadsheets
Waktu dan Durasi	: Jumat, 5 November 2020 65 menit
Level Kompetensi (Tertinggi)	: C4
Kompetensi Diuji	:

1. Kemampuan menerapkan siklus PDCA ke dalam pendekatan Six Sigma beserta alat – alat bantu untuk peningkatan kualitas (C3)
2. Kemampuan menggunakan kemampuan menggunakan alat – alat peningkatan kualitas dalam studi kasus peningkatan kualitas (C3)
3. Kemampuan menelaah data kuantitatif dan kualitatif untuk menemukan akar masalah dalam peningkatan kualitas (C4)

--

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 the product directly from the web site (Order Placement Systems – OPS).

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

- Compared with previous year, sales are increasing 25% this year.
- However, it is revealed from the survey that there has been a sharp drop in customer satisfactions, from 98% to 72%, with major contributions from product issues. The remaining complain categories are presented in the following chart:

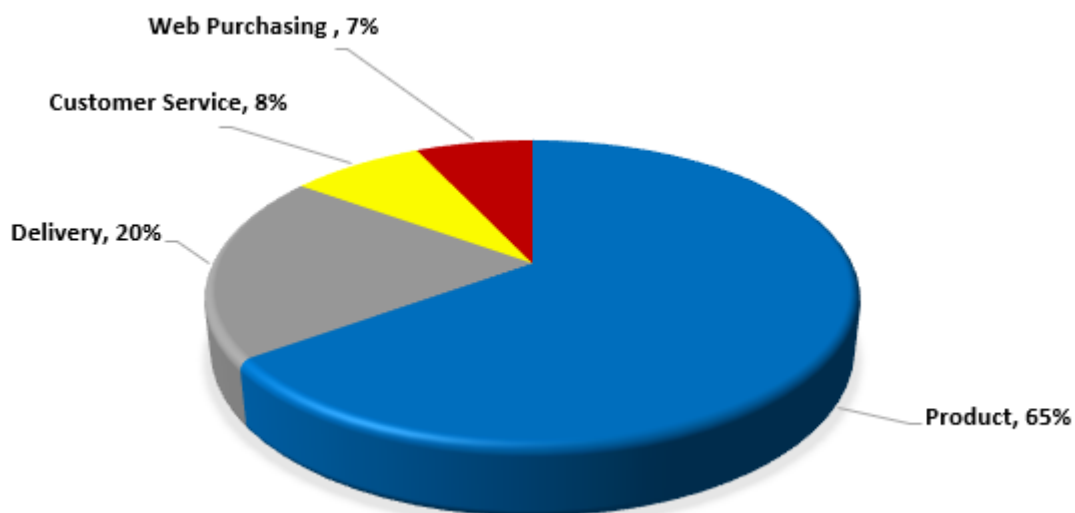


Figure 1. Proportion of Jacksonville's Customer Complaint Issues in the past six months

Despite the company's better sales growth, Mario Jacksonville, company's CEO, decides to hire a Six Sigma consultant to help him solving the current company's challenges. He does not want to lose his customer's trust after using his products. Long story short, Mario get one decent quality consultant [that is YOU]. After having an induction meeting with the consultant, Mario calls his management team to accompany the consultant heading to production floor.

At the production area, the consultant found out that there are 11 product categories produced by the company. Each of them could have five types potential defects: incompatibility of components, part missing, defective packaging, incorrect method of shipping, and other insignificant issues. He randomly inspects 36 ready-to-deliver orders and finds out that 14 orders are having part missing, 3 order is both damaged and shipped incorrectly, and 3 orders could not work due to incompatibility issue. During his observation, the consultant also finds out that the Jacksonville has been serving these major corporate customers for years:

Top-7 Jacksonville Corp. Customers	Industrial Specialty	Spokesperson
Wayne Tech Enterprise	Military and Defence force equipment	Mr. Bruce
Ace Chemicals	Anti-toxin and medical drugs testing	Mrs. Elizabeth
Stark Industries	Military and Defence force equipment	Mr. Anthony
Oscorp	Bio-tech Weaponry	Mr. Norman
Pym Tech	- <i>classified</i> -	Dr. Hank
Lex Corporations	Alien Technology	Mr. Luthor
Richard Robotics	Molecular Battle suits	Dr. Reed

He continues the observation to production floor and inquire some basic information regarding the manufacturing process and product handling to one of the workers around. From the interview. He notes 7 steps on how the company receives, produces, and delivers its products, as follow:

1. Customers place orders through the OPS - (25 mins per customer)
2. After order placed, OPS administrator 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 the Assembly - (37 mins per order)
5. Assembly assembles the ordered items 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 delivery method, missing components, and defective parts are corrected in the Returned Materials Area.

Delving into these processes, the consultant inquires the current-year data to Mario, and he receives several items as presented in the following table:

No.	Total Sales Per Product Category (1-Year) *		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	Quarter Turn	13.568	7%	12%	19%	17%	16%	4%	3%	5%	4%	5%	7%	1%
2	T&L Handles	13.510	10%	12%	10%	8%	7%	8%	11%	20%	5%	3%	1%	5%
3	Swing Handles	13.432	23%	7%	21%	15%	16%	3%	5%	2%	2%	1%	4%	1%
4	Folding T Handles	14.605	28%	13%	12%	8%	5%	8%	6%	12%	3%	4%	1%	0%
5	D-Pull Handles	15.656	20%	14%	12%	0%	10%	7%	8%	22%	3%	2%	1%	1%
6	Cams & Cam Locking system	12.691	8%	14%	3%	13%	7%	8%	2%	3%	10%	8%	1%	23%
7	Locking Rods	16.584	14%	16%	13%	3%	13%	7%	8%	2%	3%	10%	8%	3%
8	Flush Locking Solution	14.581	17%	18%	14%	8%	4%	10%	5%	6%	2%	3%	1%	12%
9	Hinges	15.675	20%	8%	13%	12%	8%	5%	8%	6%	12%	3%	4%	1%
10	Earth / Neutral Bars	17.462	14%	8%	4%	14%	16%	13%	3%	5%	8%	6%	7%	2%
11	Door Handle	15.750	0%	2%	4%	14%	16%	2%	3%	1%	12%	20%	14%	12%

* multiply the sales value with the last-digit of your student number. If it is a "0", pick the previous digit

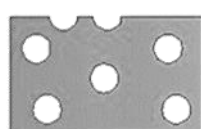
Month	Proportion of Authorised Returned Order (ARO) from Monthly Sales	ARO Types						
		Incompatible internal components	Incompatible external components	Internal components missing	External components missing	Casting Defects	Incorrect shipping method	Others
JAN	28.48%	3%	12%	10%	8%	38%	23%	6%
FEB	30.40%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

After gathering yearly sales data, he decides to prolong his observations overnight and finds out the following information:

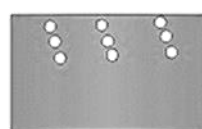
- Many assembled products left unchecked before being shipped to customers
- The warehouse usually has stock out condition when there is a fluctuate demand
- OVD staffs do not always verify all customer shipping data because it takes too long, and they think Shipping Clerks will make any corrections needed.
- There are different inventory data between the warehouse's manual database and OPS
- In Order Verification Dept, orders tend to pile up and OV staffs sometimes do not verify them in order by the time their arrivals, preferring 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 recruiting new staffs or improving its staffs' competences
- Jacksonville have some obsolete dies casting and machines that are irregularly inspected by the staffs before using. The staffs just do the cleaning during the casting-shifts occurred.
- During peak seasons, both OVD and Assembly staffs are overwhelmed by increasing orders – while the Shipping staffs are idle as their human resources are relatively abundant
- When they do check orders, OV clerks often go to the OPS, where they find more current information than in manual database as the website is updated daily and the other one once in a month
- The factory's luminosity level is inadequate, particularly in the production floor whose most of the workers having impaired visions.

The next day, the consultant tries to dig some information from anonymous Jacksonville's customers to have a balanced view regarding the problems his client are facing. He finds out:

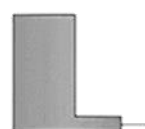
- Customer usually did not receive the product in timely-manner
- Almost 20% of ordered items are malfunctioned
- Sometimes the defective ordered items take too long to be replaced by Jacksonville and customers decided to make a new order rather than waiting for product replacement.
- The casting quality is lower than the required industrial grade as some of the ordered products have following conditions:



Blowholes



Pinholes



Misrun



Shift or mismatch

- One of the Jacksonville's customers also adds, *"If your company (Jacksonville) wants to survive in industrial hardware markets, the precisions and compatibility of products are the key determinants in this highly dynamics business environment, not to forget the accuracy of items dispatched and delivery time !!"*

After getting customer feedbacks, the consultant returns to Jacksonville office. He bumps into the worker once he interviewed and the worker gives him a documentation of metal casting activities in the production floor, as shown below.

Time Stamp	Time to Cast (in seconds)	Thickness (in mm)
17.32 – 17.40	170	12.11
06.40 – 06.45	130	13.80
06.12 – 06.15	110	15.74
21.00 – 21.15	260	11.41
07.05 – 07.10	130	13.50
20.02 – 20.15	220	11.48
21.55 – 22.11	300	11.28
06.20 – 06.23	120	14.18
07.12 – 07.14	140	13.43
16.56 – 17.00	150	13.10
19.15 – 19.26	190	11.62
19.45 – 19.59	220	11.55
20.20 – 20.35	240	11.46
19.01 – 19.12	190	11.64
17.45 – 17.55	180	11.84
22.15 – 22.32	300	11.26
22.52 – 23.07	320	11.13
18.23 – 18.33	180	11.69
16.56 – 17.00	160	12.72
23.10 – 23.18	340	11.10
17.13 – 17.16	160	12.64
21.16 – 21.32	260	11.32
06.00 – 06.10	110	15.62
21.35 – 21.52	280	11.35
16.22 – 16.25	150	13.23
20.39 – 20.54	240	11.44
19.30 – 19.42	200	11.59
17.24 – 17.30	170	12.34
22.35 – 22.50	320	11.23
17.25 – 17.30	150	12.83

Red text: casting shift in overtime period

Instructions:

1. As a consultant, you have to understand the cases and solve them with the 7 Tools / 7 new tools that you have studied before.
2. Pick the tools that you believe are the most appropriate tools to solve the cases and use them to design, measure, and analyze the case.