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MEDICRYSTALS, CO

ASSIGNMENT M7.14

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Stevens Institute of Technology – Spring 2022

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INTRODUCTION

- ⇒ MediCrystals Co. is a renowned German pharmaceutical glass manufacturer, specializing in ampoules, vials, cartridges, and sterile pre-fillable syringes.
- ⇒ They have manufacturing facilities throughout Europe, America, and Southeast Asia.
- ⇒ MediCrystals serves over 120 countries and has customers all around the world.
- ⇒ MediCrystals Co. aims to provide pharma vials for COVID-19 vaccines to Payima Biotec (a global generic and specialty pharmaceutical and vaccine maker) and various other similar entities.
- ⇒ They have signed agreements with major pharmaceutical firms to supply pharma glass products for the packaging of 2 billion doses of COVID-19 vaccines.
- ⇒ The vaccine being developed currently can only be stored in glass vials. When the vaccine is approved globally, manufacturers will struggle to source enough glass vials, syringes, and ampoules to bottle enough for the global immunization drive. MediCrystals manufactures over 8 billion pharma glass containers for drugs annually.
- ⇒ There's a glass shortage currently due to the sudden increase in demand for such products. With many of the suppliers being small and localized, MediCrystals needs to be sure that none of their suppliers are facing business continuity challenges due to the pandemic.
- ⇒ Manufacturers globally are facing financial and operational challenges; the demand is unpredictable, and there are concerns related to shortages and stockouts.

EXECUTIVE SUMMARY 1

PROBLEM STATEMENT

- ⇒ To develop a detailed risk score approach and, using the available supplier data, identify the suppliers who offer the most risk.
- ⇒ The making of Glass vials is time-consuming and difficult.
- ⇒ Analyze change in inventory position and potential obsolete inventory.
- ⇒ There is a sudden increase in MediCrystals products which has caused concern regarding a potential capacity constraint. Assess manufacturing process for the actual capacity constraint and provide improvement recommendations.
- ⇒ Evaluate whether Fabricadas' new plant in Chicago has a genuine capacity restriction and make ideas on how to increase usage to fulfill demand at existing capacity.
- ⇒ To evaluate the working capital impact of one of Switzerland's most critical factories, identify probable obsolete inventory and predict changes in inventory position.

SOLUTION

- ⇒ Factors Affecting Supplier's Risk Score
 - Credit rating – involves ability of supplier to repay debt.
Low credit rating implies high risk and high credit rating implies low risk.
 - Data Security – involves maintaining availability and integrity of data.
Supplier having low data security rating implies data is less secured, poses less faith in supplier's data which is highly unreliable and poses most risk.
 - Single Source – Supplier is only source for products, if a particular supplier disfunctions then company doesn't have alternative supplier to provide products causing more risk.

RISK SCORING METHODOLOGY

- For the significant level risk scoring methodology approaches the financial regulatory factors, we accept the area, cash turnovers, Credit rating, supplier on time conveyance rate, IP insurance and information security or the fundamental elements and furthermore, we rattle off the justifications for why we accept it would be another risk domain and what would it be a good idea for us to focus on.

- The purposes behind every domain factors are as follows:
 - Location is essential for manufacturing plant right now because of COVID-19 pandemic and political impact between nations
 - Cash turnover uncovers the capacity of organization to transform its money into deals income which shows the risk of income
 - Credit score offers the reliable of those providers
 - S-OTD demonstrates on time conveyance rate and the risk of late delivery.
 - IP security means quite a bit to supply with the IP a subbed risk information security is about the respectability and protection of information, the level of information security tells the risk circumstance and potential goes after that could think twice about information.
- To figure out the providers that represent the most risk, we make a positioning technique in light of the data of the provider information. Then we utilize the succeed to rank each organization in light of our chose risk area.
- We previously set up that risk number from 0 to 5 in view of the information, then, at that point, we shot and rank that risk space for every provider.
- At last, we would rank it provider with all the risk space with the considered the significant extraordinary and some of them we will have a risker score for every provider in this manner we figure out which provider has the most noteworthy risk.
- Assuming there is something else and various information this methodology could still be used, all the analysis investigation needs are to recognize and the worth of that risk space.
- What will once the organization figure out the most hazardous provider the organization ought to demand that the provider prescribed the inventory to make some change an improvement in dangerous regions.
- For example, IP assurance information security and seriously obtaining the provider could enlist a lawyer to enroll their IP, select information security IT trained professional or buy an outsider information security organization to safeguard data.
- Also, having more than one obtaining is generally a fair plan for the stockpile to lessen the risk of out of assets. the organization additionally makes support of whether to go on with the stock or observe another provider for the item founded on the philosophy.
- For credit rating and single source, assigning a risk score to suppliers.
- Suppliers with a credit rating of 1->10, 2->20, 3->30, 4->40, 5->50

- If a supplier is a single source, they will receive a score of 20, while those who are not will receive a score of 10.
- To determine the total risk score for each supplier, add the calculated risk scores together.
- Determining which suppliers have a risk score of more than 50

Supplier Name	Location	Revenue	Cash from Operations	Credit Rating	S-OTD	Single Source	IP Protection	Data security	Labour Unrests	Environmental Incidents	Credit Score	Single Source rating	Risk Scoring
Plaxian	US	\$6,040M	\$354M	3	0.91	Y	N	9	Y	N	30	20	50
GutesGlas	Germany	\$8,293M	\$905M	3	0.85	N	N	8	N	N	30	10	40
Boavidro	Brazil	\$9,287M	\$364M	3	0.63	N	N	8	N	N	30	10	40
Saanch	India	\$3,147M	\$436M	2	0.9	N	N	9	N	N	20	10	30
RealGlass	China	\$37,719M	\$3,996M	1	0.82	Y	Y	10	Y	Y	10	20	30
Optikiet	China	\$113M	\$23M	4	0.88	Y	Y	7	N	N	40	20	60
BestOGlass	US	\$5,379M	\$24M	2	0.78	Y	N	10	N	N	20	20	40
MedicMetric	Philippines	\$10M	\$10M	4	0.94	Y	Y	7	N	N	40	20	60
Shale	Saudi Arabia	\$2,431M	\$309M	3	0.86	N	N	8	N	Y	30	10	40
Opticful	Italy	\$95M	\$6M	3	0.92	N	N	5	N	N	30	10	40
basicPharm	US	\$395M	\$9M	5	0.88	Y	Y	7	N	N	50	20	70
PharmyLeaf	India	\$1,431M	\$340M	2	0.79	N	N	8	N	N	20	10	30



VALUE PROPOSITION

- ⇒ Based on the risk score approach, we advise high-risk suppliers such as Plaxian, Optikiet, MedicMetric, and basicPharma to take specific efforts to address the elements that put them at risk.
- ⇒ As data security is a major concern, it must be addressed by utilizing outside resources to develop a safe database system.
- ⇒ Notify suppliers that they must follow the data and IP protection policies to the letter.
- ⇒ Examine and analyze the elements that contribute to poor credit scores and make recommendations for suppliers who might help.
- ⇒ To prevent bankruptcy and the label of debt defaulter, they should work on increasing their credit score.

DATA OVERVIEW

- ⇒ Compare the current month's demand (in APU units) to the following month's demand (estimated from the APU trend).
- ⇒ We can compute the overall inventory cost for each and determine ways to lessen the financial impact on the firm.
- ⇒ We can also phase out some SKUs that have a negative APU trend.
- ⇒ $\text{APU unit} + \text{Standard Price} = \text{Current Month Inventory Cost}$
- ⇒ The cost of inventories this month is \$49.66 million.
- ⇒ $\text{APU Unit from APU Trend} + \text{Standard Price} = \text{Next Month Inventory Cost}$
- ⇒ The cost of inventories for the following month is \$70.71 million.
- ⇒ The difference in inventory costs for the following month equals \$21.05 million.
- ⇒ Items that are $\geq -40\%$ of the APU trend are considered obsolete. This will result in a \$3.36 million save.
- ⇒ Obtain a bank loan.
- ⇒ Sell the out-of-date product as well as the out-of-date raw materials.
- ⇒ Negotiate with suppliers to cut costs as demand rises.

RISK EVALUATION

- ⇒ Extra facility supervisor and supply manager to join the scoring system.
- ⇒ The standard and weight ought to be chosen by totally closely involved individuals.
- ⇒ Month to month reassessment for the lorry supplier, and semi-month to month reassessment for the medium to high-risk suppliers.

RISK MITIGATION

- ⇒ For high-risk suppliers: Start gradually transitioning away and looking for different supplies to guarantee the supply proceeds.
- ⇒ For medium risk suppliers: Investigate the explanation and haggle with the supply to further develop execution. Simultaneously, to support against risk, secure backup suppliers.
- ⇒ For Low-Risk Suppliers: Maintain major areas of relationship. For a smaller supplier there is a possibility to incorporate, team up and uphold them to form into key supplies in the following five years plan.

CONCLUSION

- ⇒ The capacity is insufficient because there isn't much time owing to rising demand (about 400 percent) in Q4 2020.
- ⇒ As a result, the plant manager is most concerned and suggests increasing capacity to meet demand.
- ⇒ The VP decided not to raise capacity in the following quarters (Q1 2021 and Q2 2021) because demand did not increase by more than 15%.

RECOMMENDATION

- ⇒ Reduce long cycle time
- ⇒ Reduce cycle time and contaminant rejection by implementing semi-automation or automation in the washing area.
- ⇒ Implement automation at packing process as it has high cycle time
- ⇒ This will result in a lower rejection rate, shorter cycle times, and fewer accidental shutdowns.

EXECUTIVE SUMMARY 2

EXPLANATORY ANALYSIS

PROBLEM STATEMENT

Complete an explanatory analysis of data using Data-exhibits_project.xlsx [CB: Link to file.]. Craft and executive summary and generate Tableau twbx files.

SOLUTION

SUPPLIER INFORMATION ANALYSIS

The data exhibit 1 has total of 12 suppliers from different countries: US, Germany, Brazil, India, China, US, Philippines, Saudi Arabia and Italy.

- To figure out the providers that represent the most risk, we make a positioning technique in light of the data of the provider information. Then we utilize the succeed to rank each organization in light of our chose risk area.
- We previously set up that risk number from 0 to 5 in view of the information, then, at that point, we shot and rank that risk space for every provider.
- At last, we would rank it provider with all the risk space with the considered the significant extraordinary and some of them we will have a riskier score for every provider in this manner we figure out which provider has the most noteworthy risk.
- Assuming there is something else and various information this methodology could still be used, all the analysis investigation needs are to recognize and the worth of that risk space.
- What will once the organization figure out the most hazardous provider the organization ought to demand that the provider prescribed the inventory to make some change an improvement in dangerous regions.
- For example, IP assurance information security and seriously obtaining the provider could enlist a lawyer to enroll their IP, select information security IT trained professional or buy an outsider information security organization to safeguard data.
- Also, having more than one obtaining is generally a fair plan for the stockpile to lessen the risk of out of assets. the organization additionally

makes support of whether to go on with the stock or observe another provider for the item founded on the philosophy.

	20%	20%	20%	20%	20%
Score	Suppliers Size (\$ million)	Single Sourced	IP Protection	Other Supplier in the Region	Cash Flow to Revenue Ratio
1	5-10	No	No	Over 5	0-5 %
2	11-100			4-5	5-10%
3	101-1000		Yes & no Single Sourced	3	10-15%
4	1001-3000			1-2	15-20%
5	Over 3000	Yes	Yes & Single Sourced	0	Over 20%

Fig: Supplier Impact Scoring Criterion (1 to 5 Scale)

30% (1.75pt)	40% (1.5pt)	20% (1.25 pt)	10 % (0.05 pt)
Operational Risk	Financial Risk	Regulatory Risk/Political Risk	Intellectual property & Technology
Late Delivery	Bankruptcy	Labor unrests	The intellectual property owner prohibits the supplier from continuing to produce
Business Interruption	Low Profitability	Environmental incidents	Loss of revenue and damage to brand reputation due to poor system & data security
Logistic interruption due to COVID-19	Late payment/ Future payment failure	Local epidemic policy/ Resumption of work	

Fig: Risk Likelihood Scoring Criterion

Supplier Name	Impact Score	Likelihood Score	Risk Score
MedicMetric	3.6	3.2	11.5
BasicPharma	3.1	3.6	11.1
Opttikiet	4.2	2.6	11.0
BestOGlass	3.7	2.9	10.6
Plaxian	3.7	2.7	10.1
RealGlass	4.5	1.9	8.6
Boavidro	2.4	2.7	6.6
Shale	2.5	2.6	6.4
PharmaLeaf	2.6	2.2	5.8
GutesGlas	2.6	1.9	5.0
Opticful	1.7	2.7	4.6
Saanch	2.4	1.9	4.4

Fig: Supplier Continuity Risk Assessment

After calculating the standard price and on hand stock we would be able to get the inventory number. with the number of inventories, we could compare it with APU unit. Also, we calculate the new APU with the APU trends.

Based on the APU trending behavior, we also anticipate that the big negative trending of APU, like over 50%, should be considered as a potential obsolete SKU. it has the possibility that SKUs would not be produce anymore, and the raw material cannot be used as a cash.

Moreover, based on the current monthly consumption cost, APU trend, we could understand the new monthly consumption cost. Then, sum of all SKUs, we could find out that there is a \$20,000,000 increase in new APU. that's substantial working capital impact.

RECOMMENDATIONS / CONCLUSION

RISK EVALUATION

- ⇒ Extra facility supervisor and supply manager to join the scoring system.
- ⇒ The standard and weight ought to be chosen by totally closely involved individuals.
- ⇒ Month to month reassessment for the lorry supplier, and semi-month to month reassessment for the medium to high-risk suppliers.

RISK MITIGATION

- ⇒ For high-risk suppliers: Start gradually transitioning away and looking for different supplies to guarantee the supply proceeds.
- ⇒ For medium risk suppliers: Investigate the explanation and haggle with the supply to further develop execution. Simultaneously, to support against risk, secure backup suppliers.
- ⇒ For Low-Risk Suppliers: Maintain major areas of relationship. For a smaller supplier there is a possibility to incorporate, team up and uphold them to form into key supplies in the following five years plan.

CONCLUSION

In order to gain enough capitals for the 20,000,000 gap we recommended to:

- Try to get loan from banking with proper financial calculation and risk assessment.
- Try to sell the obsolete raw material to gain cash.
- Develop internal or external fundraising from headquarter, creditor and investor.
- Negotiating with suppliers with a new contract that has a lower cost due to the increase of demand.

EXECUTIVE SUMMARY 3

PROCUREMENT ANALYSIS

PROBLEM STATEMENT

The manager of the Procurement and Sourcing team has heard from the CPO that some of the critical suppliers are facing operational challenges due to the pandemic. She intends to develop a high-level risk scoring methodology or rationale to score the suppliers and review mitigation activities currently in place. Based on the supplier data available, the Risk Compliance Manager has currently identified two risk domains – finance and regulatory. As part of the regulatory risk domain, she intends to score each supplier based on the risk factors – labor unrests and environmental incidents.

She wants your team to identify other risk domains and factors contributing to the risk domains based on the available supplier data, develop a comprehensive risk scoring methodology, and identify suppliers that pose the most risk.

SOLUTION

- ⇒ Here we find out the rest of the risk domains that we will consider for the rescoring methodology and also create information-based score ranking system that can be defined as the greatest risk supplier.
- ⇒ For the high-level risk scoring technique other than the financial administrative elements, we accept the area, cash turnovers, credit score, provider on time conveyance rate, IP assurance and information security or the primary variables and furthermore, we drill down the justifications for why we accept it would be another risk domain and what would it be advisable for us to focus on.

The reasons for each domain factors:

- Location is indispensable for production line right now because of COVID-19 pandemic and political impact between nations.

- Cash turnover uncovers the capacity of organization to transform its money into deals income which shows the risk of cash flow.
- Credit rating assessment offers the dependability of those suppliers.
- S-OTD demonstrates on time conveyance rate and the risk of late conveyance.
- IP security means a lot to supply with the IP a subbed risk.
- Data security is about the honesty and protection of information the level of data security tells the risk circumstance and potential goes after that could think twice about the data.

- ⇒ To figure out the suppliers that represent the most risk, we make a positioning philosophy in view of the data of the provider information.
- ⇒ Then we utilize the succeed to rank each organization in view of our chose risk area. We initially set up that chance number from 0 to 5 in view of the information, then, at that point, we shot and rank that risk area for every supplier.
- ⇒ At last, we would rank it suppliers with all the risk space with the considered the significant incredible and some of them we will have a riskier score for every provider hence we figure out which supplier has the most noteworthy risk.
- ⇒ Assuming there is something else and various information this procedure might in any case be utilized all the examination need are to recognize and the worth of that risk space.
- ⇒ Once the organization figure out the most dangerous supplier the organization ought to demand that the supplier prescribed the stock to make some change an improvement in risky regions.
- ⇒ For example, IP insurance information security and seriously obtaining the supplier could enlist a lawyer to enroll their IP, select information security IT subject matter expert or buy an outsider information security organization to safeguard data. Furthermore, having more than one obtaining is generally a fair plan for the stock to diminish the risk of out of assets. the organization likewise makes support of whether to go on with the stockpile or observe another supplier for the item founded on the technique.

RECOMMENDATIONS / CONCLUSION

RISK EVALUATION

- ⇒ Extra facility supervisor and supply manager to join the scoring system.
- ⇒ The standard and weight ought to be chosen by totally closely involved individuals.
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- ⇒ For Low-Risk Suppliers: Maintain major areas of relationship. For a smaller supplier there is a possibility to incorporate, team up and uphold them to form into key supplies in the following five years plan.

EXECUTIVE SUMMARY 4

INVENTORY ANALYSIS

PROBLEM STATEMENT

The marketing team has gathered insights regarding the anticipated demand trend for various SKUs based on their product families. Your team, as part of this project, has been requested to estimate the change in the inventory position to understand the working capital impact in one of the most critical plants in Switzerland, GlasWork. Based on the marketing insights gathered, she also wants to understand the potential obsolete inventory that they currently have.

SOLUTION

- ⇒ While we are computing the standard cost and close by stock we would have the option to get the stock number.
- ⇒ With the quantity of inventories, we could contrast it and APU unit. Likewise, we work out the new APU with the APU patterns.
- ⇒ In light of the APU moving way of behaving, we additionally guess that the large negative moving of APU, as more 50% should be considered as a potential old SKU.
- ⇒ It has the likelihood that SKUs wouldn't be produce any longer, and the natural substance can't be utilized as a money.
- ⇒ In addition, in light of the ongoing month to month utilization cost, APU pattern, we could comprehend the new month to month utilization cost.
- ⇒ Then, amount of everything SKUs, we could figure out that there is a \$20,000,000 expansion in new APU that is significant working capital effect.

In order to gain enough capitals for the 20,000,000 gap we recommended to:

- Try to get loan from banking with proper financial calculation and risk assessment.
- Try to sell the obsolete raw material to gain cash.
- Develop internal or external fundraising from headquarter, creditor and investor.

- Negotiating with suppliers with a new contract that has a lower cost due to the increase of demand.

STEPS TO CALCULATE OBSOLETE INVENTORY

1. Calculating available units
2. calculating total demand before expiration for each SKU
3. calculating safety inventory for each SKU
4. calculating obsolete inventory for SKUs with availability surplus before expiration.

ASSUMPTIONS

- Target service level considered as 95%
- The APU trend is assumed to be as average trend of APU consumption forecasted for the entire year for each SKU
- The expiry of all SKU's is one year
- All values calculated after considering the safety stock and the maximum possible demand for the respective SKU.
- It is considered that the demand is variable and lead time is constant in the analysis.

We will need to enhance the expected spending by initial transforming obsolete products into liquidity involving bottleneck procedures or transportation for the benefit of suppliers as well as tracking down new clients by limiting the old items second to cover the deficiencies we can focus on them in light of direness lead time supplier on time conveyance factors or exchanging with obsolete escape.

RECOMMENDATIONS / CONCLUSION

OBSOLETE INVENTORY

1. Selling the obsolete items as group with the hot selling items.
2. Tracking down the new client by giving a particular measure of rebate
3. Haggling with suppliers to deliver the thing to their clients.

SAFETY STOCKING

1. Focusing on required SKUs in light of net revenue.
2. Utilize outright stock as a piece of trade for required SKU.

EXECUTIVE SUMMARY 5

CAPACITY ANALYSIS

PROBLEM STATEMENT

The third area of concern is to identify if there is any capacity constraint for Fabricadas, the new facilities in Chicago, due to the sudden increase in demand for their products in the US. The plant controller feels the current capacity is not adequate to meet his forecasted demand. However, the VP Operations for MediCrystals is certain that there is enough capacity to meet the requirements. Your team needs to evaluate if there is genuinely a capacity constraint for Fabricadas and provide recommendations on how to maximize utilization to meet the demand at current capacity. Based on the operations of MediCrystals, provide recommendations on how it should meet the increase in demand for these products. Explain why the plant manager feels the capacity is inadequate and why the VP Operations feels the capacity is enough.

The products are needed for vaccines for other diseases, too. Glass vials are very hard and time-consuming to make. Sometimes the manufacturing process takes months. Even though coronavirus is the most pressing health issue in the world, MediCrystals wants to maintain a supply of their products for other critical vaccines, which cannot be distorted for COVID-19 vaccine vials supply.

SOLUTION

- ⇒ Assessing the limit of Fabricadas, by analyzing the data we have.
- ⇒ We could ascertain how long they can create for every item to fulfill the needs of the quarter two out of 2021 and afterward we work out the quantity of hours to deliver genuine limit.
- ⇒ Clearly, they need five additional hours to satisfies the need of amount in 2021 and that is the justification for why plan chief feels the limit is lacking then again, the VP activities feels the limit is sufficient, on the grounds that he understood there is an expansion in 25% between the quarters in two years.

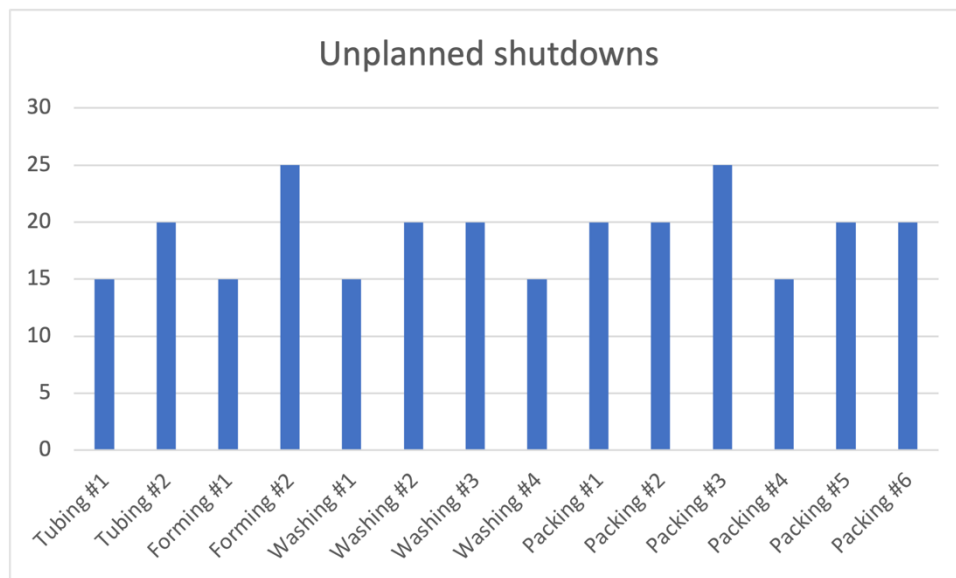
Constraints in the manufacturing process:

- Long cycle time in productions
- Forming #2 and washing#2 have had been undergone heavy process, with 25 and 20 days of unplanned.
- Packing #1 and Packaging #3 cause more days of unplanned shutdown even though they undergone slight schedules.
- High in contamination rejects caused by washing steps.

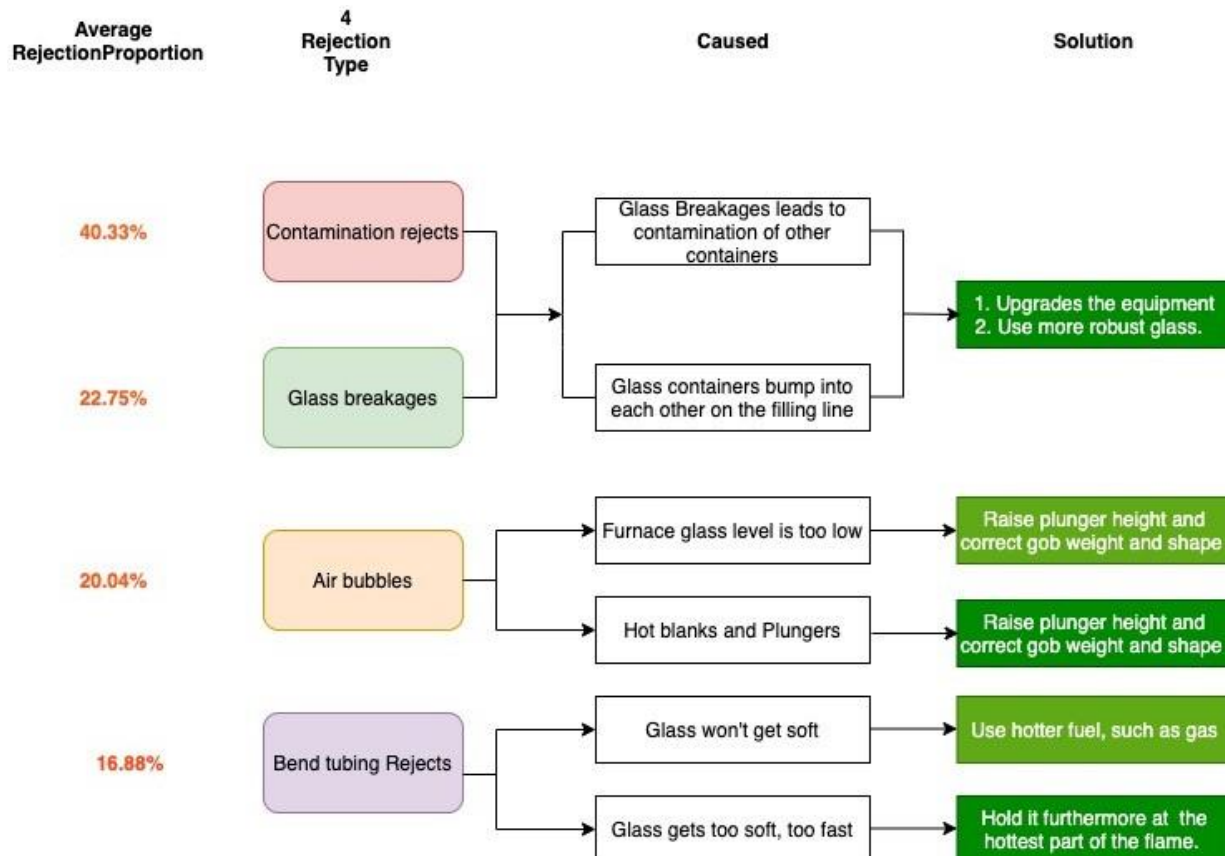
PRODUCTION PROCESS:



UNPLANNED SHUTDOWN



REJECT REASONS AND POSSIBLE SOLUTIONS



RECOMMENDATIONS

- ⇒ Lessening of the times of unplanned closure
- ⇒ Redesigning or updating the assembling system to lessen tension for washing#2 and forming#2
- ⇒ Keeping up with office for the packaging#3 entire washing offices (high in defilement rejects)
- ⇒ Distinguishing potential issue that might cause a closure as well as executing options plan during impromptu closure.
- ⇒ Guaranteeing labor force security.

CONCLUSION

- ⇒ In order to meet the demand, we recommended to increase the pass rate.
- ⇒ To straighten meeting the demand goal we recommended to decrease the unplugged shutdown time.

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