Final Presentation

FMEA for An International Relief Effort (Refugee migration to Europe)

Group 1

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Table of Contents

Overview

- In the last two years, Europe has faced a high number of refugees (600K approximately between 2014 and 2015). Some countries accepted certain number of refugees and other were not able to support the flood of refugees streaming their borders, force them to close their borders.

- Countries that accepts refugees are experiencing problems on integrating and resettling into their societies.

- This study is focused in the Demographic Crisis Management that the European countries are facing when accepting refugees.

- **Problem Statement:** "*Europe is facing high cost and inefficient admission and resettlement process for refugees.*"

Assessment and Analysis of COPQ

Process	Internal Failure	External Failure	Appraisal	Prevention
Start of Journey	Vehicle repair Sickness	Getting Robbed & Killed		Staff Transportation
Customs and Background Check	IT failures Insufficient staff	Transportation		Security & Administrative Staff
Health Screening	Lack of medical equipment		Laboratory Staff Supplies Equipment Temporary Shelter	Training
Sent to Refugee camp	Vehicle repair Sickness	Medical Crime		Security
Culture and language training			Cultural and language Tests	Staff
Housing, Welfare, Clothing & Healthcare	Import			Administrative Staff Food Utilities Clothes
Job Seek	Retraining		Qualification evaluation	Consultants
Provide training				Trainers Credential Evaluations Language

- There is an opportunity in Refugee's resettlement process to simplify several identified processes and make them more efficient.
- Lean tools such as Value Stream Map and Root Cause Analysis will help us to identify waste, reduce processing times and eliminate causes of failures

FMEA – Why this tool?

Project Management

Quality engineers often become involved in project activity—either as a project team member or as a project leader. A number of proven techniques and tools are available to assist in cost-effective project management. The first is proper project selection.

Project Justification and Prioritization Tools. Projects must be prioritized to select those having the most merit. Projects should be evaluated for their fit to overall business needs, financial payoff, and potential risks. Exceptions will be made for legal mandates and customer demands. Only projects that are optional should be prioritized.

Major projects involve risk of loss. Risk assessment involves identifying potential problems that could occur, their impact, and what, if any, actions should be taken to offset them, such as taking countermeasures, purchasing risk insurance, or developing contingency plans. For complex projects, it may be prudent to apply a formal risk assessment tool such as a *failure mode and effects analysis* (FMEA) or simulation. (See Chapter 20 for more details on FMEA.)

If the benefits of a project are uncertain and multiple outcomes are possible, then a decision tree can help to estimate the expected value of gain or loss. A decision tree lists the potential outcomes and assigns a probability to each branch. The

Extract from ASQ CQE Handbook 3rd Edition, Project Management, page 22.

FMEA

- The team created an FMEA based on a process described in the flow chart and COPQ.
- Severity (S) was rated on a scale from 1 to 10, where 1 is insignificant and 10 is catastrophic.
- Occurrence (S) was rated on a scale from 1 to 10, where 1 is extremely unlikely and 10 is inevitable.
- Detection (D) is usually rated on a scale from 1 to 10, where 1 means the control is absolutely certain to detect the problem and 10 means the control is certain not to detect the problem (or no control exists).
- Calculated the risk priority number, or RPN, which equals S × O × D. Also calculated Criticality by multiplying severity by occurrence, S × O. These numbers provided guidance for ranking potential failures in the order they should be addressed.

FMEA template obtained from www.asq.org.

FMEA - Rankings

Effect	Severity criteria	Ranking
Hazardous without warning	May endanger machine or assembly operator. Very high severity ranking when a potential failure mode affects safe operation and/or involves noncompliance with regulation. Failure will occur without warning.	10
Hazardous with warning	May endanger machine or assembly operator. Very high severity ranking when a potential failure mode affects safe operation and/or involves noncompliance with regulation. Failure will occur with warning.	9
Very high	Major disruption to production line. 100% of product may have to be scrapped. Item inoperable, loss of primary function. Customer very dissatisfied.	8
High	Minor disruption to production line. A portion of product may have to be sorted and scrapped. Item operable, but at reduced level. Customer dissatisfied.	7
Moderate	Minor disruption to production line. A portion of product may have to be scrapped (no sorting). Item operable, but some comfort items inoperable. Customer experiences discomfort.	6
Low	Minor disruption to production line. 100% of product may have to be reworked. Item operable, but some comfort items operable at reduced level of performance. Customer experiences some dissatisfaction.	5
Very low	Minor disruption to production line. Product may have to be sorted and a portion reworked. Minor adjustments do not conform. Defect noticed by customer.	4
Minor	Minor disruption to production line. Product may have to be reworked online, but out of station. Minor adjustments do not conform. Defect noticed by average customer.	3
Very minor	Minor disruption to production line. Product may have to be reworked online, but out of station. Minor adjustments do not conform. Defect noticed by discriminating customer.	2
None	No effect.	1

Derived from Technical Standard SAE J 1739.
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Table 20.6 Process FMEA occurrence criteria.

Probability of failure	Possible failure rates	Ranking
Very high: Failure almost inevitable.	> 1 in 2 1 in 3	10 9
High: Generally associated with processes similar to previous processes that have often failed.	1 in 8 1 in 20	8 7
Moderate: Generally associated with processes similar to previous processes that have experienced occasional failures.	1 in 80 1 in 400 1 in 2000	6 5 4
Low: Isolated failures associated with similar processes.	1 in 15,000	3
Very low: Only isolated failures associated with almost identical processes.	1 in 150,000	2
Remote: Failure is unlikely. No failures associated with almost identical processes.	< 1 in 1,500,000	1

Derived from Technical Standard SAE J 1739.
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Table 20.8 Process FMEA detection criteria.

Effect	Detection criteria	Ranking
Absolutely impossible	No known controls to detect failure mode.	10
Very remote	Very remote likelihood current controls will detect failure mode.	9
Remote	Remote likelihood current controls will detect failure mode.	8
Very low	Very low likelihood current controls will detect failure mode.	7
Low	Low likelihood current controls will detect failure mode.	6
Moderate	Moderate likelihood current controls will detect failure mode.	5
Moderately high	Moderately high likelihood current controls will detect failure mode.	4
High	High likelihood current controls will detect failure mode.	3
Very high	Very high likelihood current controls will detect failure mode.	2
Almost certain	Current controls will almost certainly detect a failure mode. Reliable detection controls are known with similar processes.	1

Derived from Technical Standard SAE J 1739.
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Source: ASQ Certified Quality Engineer Handbook, 3rd Edition, ASQ Quality Press

FMEA

FAILURE MODE AND EFFECTS ANALYSIS

Item: Resettlement process | Responsibility: Jorge | FMEA number: MFE 634 Group 1
Model: Current | Prepared by: Jorge | Page : 1 of 1
Core Team: Alekhya, Vushnu, Jorge, James, Meng, Hui | FMEA Date (Orig): 4/20/2016 | Rev: 1

Process Function	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occur	Current Process Controls	Detec	RPN	Recommended Action(s)	Responsibility and Target Completion Date	Action Results				
												Actions Taken	Sev	Occ	Det	RPN
Start of Journey	Vehicle repair	Trip delay	2	2	Poor maintenance	5	PM Once per year	3	30	Implement PM by millage	Department of Transportation	Implemented PM by millage	2	2	2	8
	Sickness	Cross contamination	6	2	Lack of control of deseases	8	Assigned areas for sick regugees	2	96	Controlled environment area and sanitation process.	Department of Health	Implemented a controlled environment area and sanitation process.	8	2	1	16
	Getting robbed and killed	Injured	5	2	Lack of staff	6	100 officers assigned to refugees zone	2	60	Determine a ratio of officers per every 100 people and implement accordingly.	Police department	Hired 1 police officer per the 1:100 ratio.	5	3	2	30
Customs and Background Check	IT Failures	Process delay	3	2	Poor maintenance	8	Quarterly PM	4	96	Reducing PM and implement a PC performance monitor that helps to predict failures.	IT	Installed a remote monitor to every PC and server to monitor performance.	3	1	3	9
	Insufficient staff	Process delay	5	2	Unanticipated flow of requesters	6	None	2	60	Partner with an agency to hire temporary workers	IT	Implemented pertnership with University and an agency to hire temporary workers	5	3	2	30
Health Screening	Lack of Medical Equipment	Process delay	1	1	Unanticipated flow of users	2	None	4	8	Establish a supply chain program	Department of Health	Hired a supply chain Manager.	1	1	4	4
Sent to refugee camp	Vehicle repair	Trip delay	2	2	Poor maintenance	5	PM Once per year	3	30	Implement PM by millage	Department of Transportation	Implemented PM by millage	2	2	2	8
Job seek	Retraining	Cost	3	2	Inadequate training	7	Basic training	4	84	Create a job description and training needs.	Department of Labor	Create da job description and training needs.	3	3	1	9

FMEA template obtained from www.asq.org.

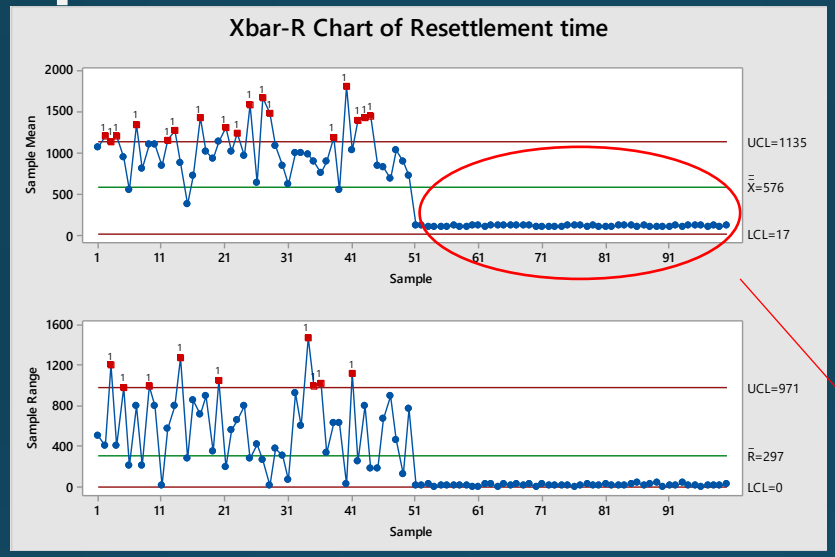
Inputs:

- Process flow chart
- Cost of Poor Quality
- Failures
- SPC process.

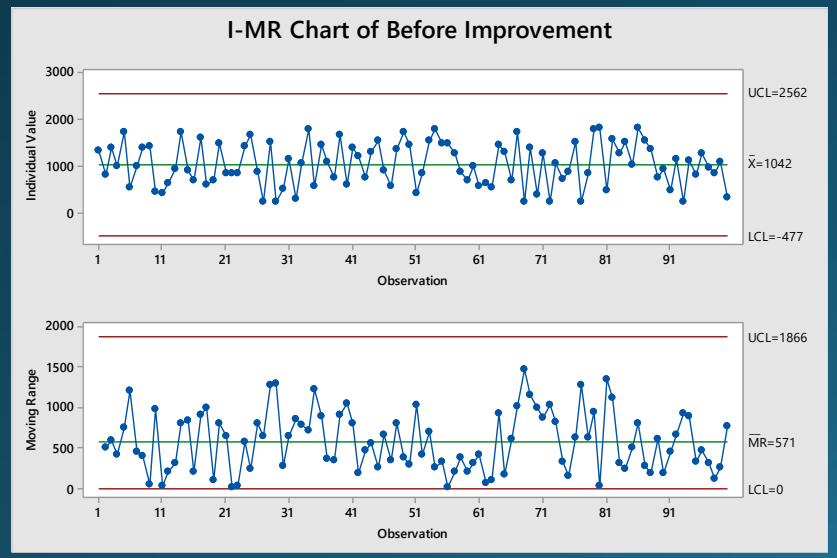
Outputs:

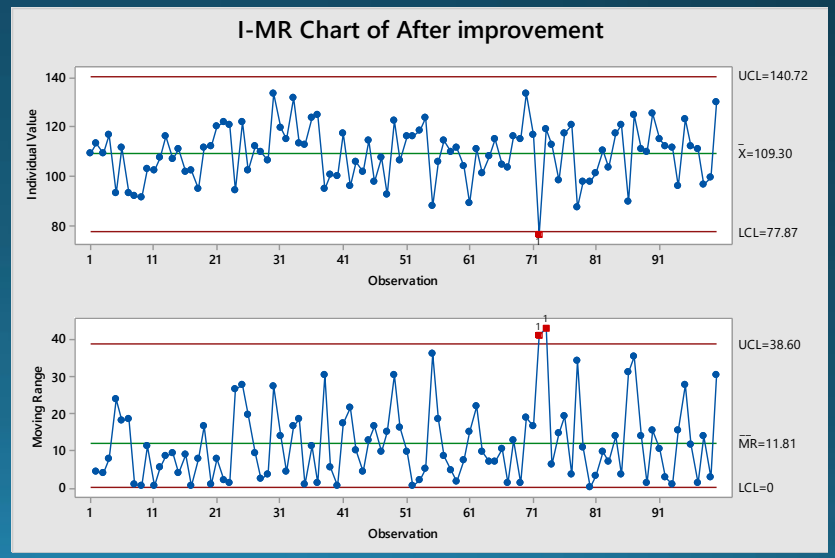
- FMEA documentation.
- Corrective Action Reports.
- Process improvements.

FMEA – Improvements after FMEA



- An X/R chart was implemented to display the resettlement processing time. These charts includes the processing time for before and after the improvement. It is evident that there was an extreme improvement.
- Average dramatically improved after change.





Conclusion

- There was an opportunity of improvement identified in Refugee's resettlement process to simplify several identified processes and make them more efficient.
- Lean tools such as Value Stream Map and Root Cause Analysis helped us to identify waste, reduce processing times and eliminate causes of failures.
- This proposal serves an a proof that Quality Engineering tool are not only limited to the industry. They can be widely used to analyze and solve social problems.

References

- *Juran's Quality Planning & Analysis for Enterprise Quality, Fifth Edition, F.Gryna, R. Chua, Mc Graw Hill.*
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- *www.asq.org*
- *ASQ Certified Quality Engineer Handbook, 3rd Edition, ASQ Quality Press*