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Rethinking Digital Customer Complaints' Problem Solving: The Synchronous Model

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Abstract. *In the current business environment, problem-solving remains a critical and highly relevant skill for achieving customer satisfaction especially in the context of digitalization and industry 4.0 and a strong requirement from IATF 16949. In the present paper, a comprehensive analysis of existing problem-solving models is conducted, examining their strengths, limitations, and applicability in the manufacturing companies. By drawing insights from traditional methodologies, as already addressed in the scientific literature, such as Six-Step Model A3 methodology, 8 Disciplines, Six Sigma, the Cynefin Framework, Kepner-Tregoe Methodology and 5P (Principles) for Problem Solving, a new and integrative model designed to address the shortcomings identified in current approaches is created. This innovative framework, named "Synchronous Model" (Greek word for modern) synthesizes key elements from diverse models, offering a more adaptable solution to complex and modern problem-solving challenges. Emphasizing its potential for business digital transformation, we discuss how the proposed model fosters efficiency, agility, and strategic decision-making within organizational settings. This research not only contributes to the theoretical understanding of problem-solving methodologies but also provides valuable insights for practitioners seeking innovative approaches to address challenges in their respective industries, for which the current methods are either not sufficient or too complex. The integration of "Synchronous Model" is meant to elevate problem-solving practices, offering a transformative impact on business operations and strategic decision-making, all in the benefit of the customer.*

Keywords: Customer Complaints, Problem Solving, Digital Business, Comparative Analysis, Quality Management Tools, Synchronous Model

Introduction

We are living fast changing times in the business environment, which forces us to adapt with a higher speed than before. In today's digital world, customer satisfaction has a more significance

DOI: 10.2478/picbe-2024-0241

for the business enhancement than in the previous years, and a fast and structured answer to customer complaints plays a key role in achieving their satisfaction. But are the old, traditional models for problem solving currently in use still sufficient and efficient for the modern problems we are facing?

Daily, companies encounter challenges that must be solved, ranging from minor to significant ones. Whether it's navigating through problematic stages of new product development, managing mass production with quality issues, or addressing challenges in the market post-product launch, a numerous and diverse set of problems may arise.

This article aims to highlight the differences of some of the highly appreciated and commonly used approaches for problem-solving in customer complaints, with their advantages and drawbacks. From this starting point, an enhanced, simpler, faster, but still complex enough model, based on several specialists' experience with customer needs will be developed.

The efficiency and sufficiency of traditional models for problem solving will be analyzed from Manufacturing complaints point of view, as well as the new model aims to fit Manufacturing related customer complaints, but its scope can be extended for all type of customer complaints.

Literature review

Defining Problem Solving

Problem Solving, as it can be easily anticipated by its name, represents a process of finding the deepest root cause of a problem and implement appropriate solutions using certain tools. To implement it, a systematic, well-structured, and multi-steps approach must be pursued (Maharshi, 2019). Within a Manufacturing environment, where everything is dynamic and having control over all processes is difficult, a "real problem" to be solved is "when learned behaviors are not sufficient to solve the problem" you are facing (Robertson, 2017, p. 3).

Structures Problem-Solving appeared and was established by some of the major companies in the Automotive industry, who created the bases of now-days problem-solving methods in use. From Toyota's A3 model to Ford's 8 Disciplines and Motorola's Six Sigma, all industry (and not only) uses their models or similar models, with each company's particularity. From that point, many variants and models appeared, and established companies have taken and adapted them to their needs.

In addition, problem-solving represents a strong requirement of the OEMs (Original Equipment Manufacturers), as IATF (International Automotive Task Force) 16949:2016 presents. Chapter 10.2.3 from the standard describes the expectations of the customers from their suppliers to have a documented process for problem solving, which clearly addresses prevention of recurrence. Items such as containment and interim actions, root cause analysis, verification of the effectiveness of the corrective actions etc. are clearly illustrated.

An overview of Structured Problem-Solving methods in use

In this section, the most common, well-known, and traditional problem-solving models which will stand as a basis for the new model proposed will be listed and shortly described, as presented in other various publications.

Six-Step Problem Solving Model may not seem to be highly sophisticated and technical, as it only has six simple steps. Despite the appearances, this model is complex and complete, suitable for addressing technical problems and not only. The advantage of this model stands exactly in its simplicity. What is particular about this model is its cyclical and continuous nature of the steps presented above. It's not only allowed but encouraged to repeat the steps for an accurate result.

However, moving forward from one step to another should only happen once the step is completed, and the clockwise order is followed, so no step can be skipped. The steps of this model are described in Figure 1. Tools such as the Fishbone diagram, or Pareto analysis are used within this model (Qureshi, 2008). The approach involves ongoing enhancement, and the objective is not to necessarily to resolve issues, but to adapt and refine the solution continuously in response to emerging challenges, by iteratively following the Six Step Process.

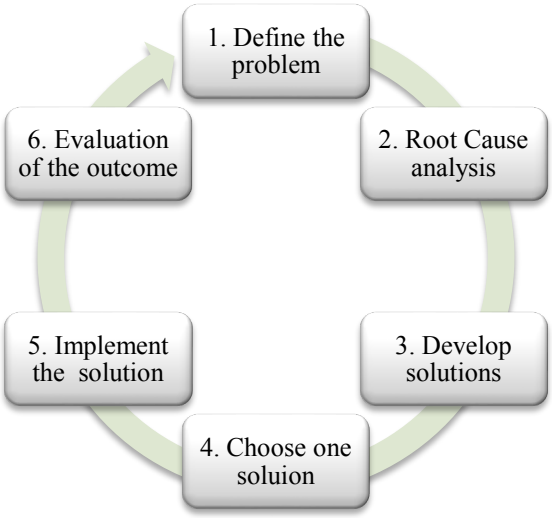

Figure 1. Six-Step Problem Solving Model

Source: Qureshi, 2008.

Eight Disciplines of Problem Solving (8D) stands out as a fundamental troubleshooting approach used especially in the automotive industry when addressing customer complaints. This method was conceived during War World II and was applied initially by the military and later it was promoted by Ford Motor Company, reinvented however with a personal touch of the company (Kaplík et al., 2013; Šolc et al., 2018). 8D report is usually applied as soon as a problem or complaint with unknown causes appears, to protect from further consequences (Šolc et al., 2018). The report must be fulfilled in teamwork, by making use of Lessons Learned. Although the two articles present the methodology with 8 steps (easily deducted from the name), there are many variants used by companies having 9 steps, where D0 is included for planning. Many tools are used when applying the Eight Disciplines such as Ishikawa, 5 Whys, Failure Tree Analysis, Process Flow etc.

Table 1. Eight Disciplines of Problem-Solving steps

Step	Description
D0	Symptom Description & provide emergency response action(s) – ERA (only in tailored models used in companies)
D1	Establish the team
D2	Describe the problem
D3	Interim containment actions
D4	Determine and verify Root Cause(s) and Escape Point(s)
D5	Choose and verify corrective actions
D6	Implement and validate permanent corrective actions (PCA's)
D7	Define actions to prevent recurrence
D8	Recognize team, final approval and closure

Source: Kaplík et al., 2013; Šolc et al., 2018.

A3 methodology was initially developed on A3 paper, and this is how the method gained its name. The goal of the A3 report is to fully document the problem-solving process on only one side of the paper. The model is founded on the PDCA (Plan-Do-Check-Act) cycle, and it was developed by the Toyota Motor Corporation (Bassuk, 2013). The model has 4 steps (PDCA), where multiple tools are used: background, current condition, goals, root cause analysis, countermeasures, action plan, Ishikawa, 5 why, brainstorming, and many others, as presented in Figure 2. The A3 methodology can be applied in multiple areas outside problem solving, such Saad et. al presents in their article (2013) "used as a tool for idea generation, knowledge communication, lessons learnt, visualization and sharing knowledge re-use for new projects".

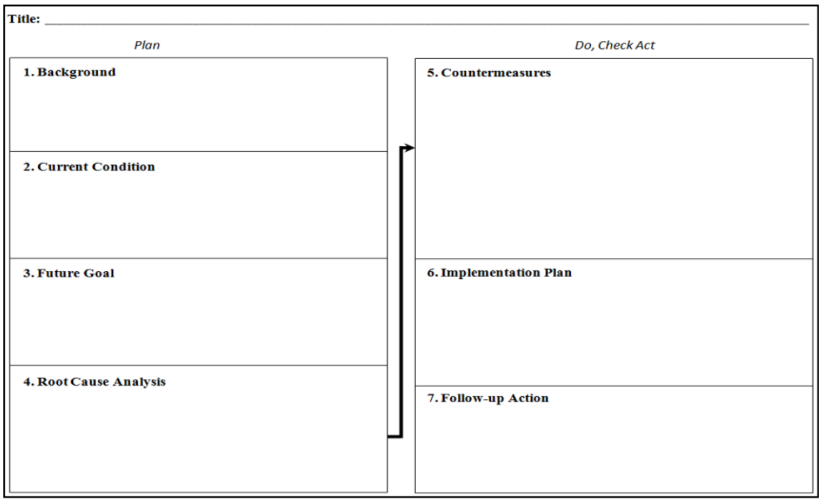

Figure 2. A classical approach for A3 methodology

Source: Sobek and Smalley, 2008.

The Cynefin Framework is often used as problem-solving tool, developed by Dave Snowden and Mary Boon. "Cynefin" is a Welsh term that can be traduced either as "habitat", "acquainted" or "familiar.", or if we want to be more specific, it can mean "one's environment, or place of comfort or birth" (Snowden, 2003; Browning & Boudès, 2005). In this framework, problems are categorized into five domains: simple, complicated, complex, chaotic, and disorder, based on their causality (Shao, et al., 2022). To simplify the complexity, a problem can be placed into different domains while adhering to distinct constraints, providing a standardized method for approaching problem-solving, as Shao presents in Figure 3.

Different from the other tools presented, that offer a problem-solving plan, the Cynefin Framework assists you in understanding the appropriate mindset for approaching the problem in the first step. This method can also be combined with another problem-solving approach, the Cynefin being used for the deep understanding of the problem and another tool for solving it.

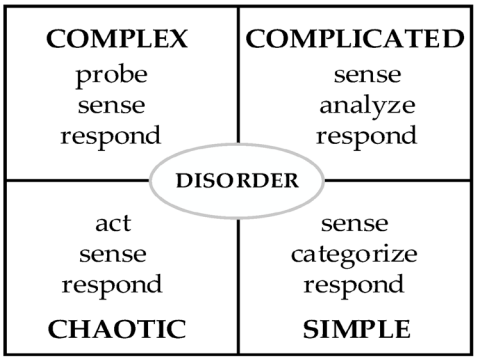

Figure 3. The Cynefin Framework

Source: Shao et al., 2022.

Six Sigma emerged as a component of TQM (Total Quality Management) and serves as a strategic approach aimed to highlight and eliminate defects leading to customer dissatisfaction or complaints (Gupta et al., 2018). Notable companies, such as General Electric and Motorola, are known to have successfully establish and implement Six Sigma. Narula and Grover (2015) deeply analyzed Six Sigma applications in manufacturing environment and confirmed that the overarching goal of Six Sigma is to attain perfection in all company's processes. The method implies achieving less than 3.4 defects per million opportunities (DPMO) or a success rate of 99.9997%. What defines Six Sigma is the "Define–Measure–Analyze–Improve–Control (DMAIC)" methodology, which is a highly disciplined approach that enables the industrial sector to concentrate on developing flawless products, processes, and services. (Gupta et al., 2018) What is different from all the other methodologies is the process capability analysis (MINITAB is used to collect data), but common tools are also used, such as Ishikawa.

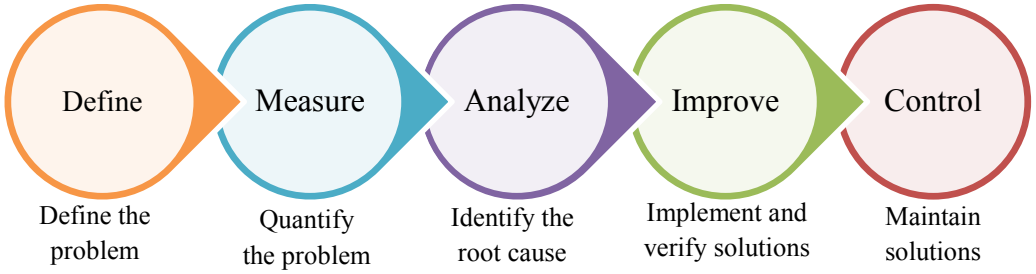

Figure 4. Six Sigma - DMAIC

Source: Gupta et al., 2018.

Kepner-Tregoe Methodology constitutes a systematic approach to gather information, decide the importance grade, and assess it. This highly detailed method finds application across various domains. Referred to as both a root cause analysis and decision-making technique, it provides a step-by-step framework for methodically addressing problems, making decisions, and scrutinizing potential risks. The methodology appeared as an output of Dr. Charles Kepner and Dr. Benjamin Tregoe research in the 1950s and addresses the following steps: Situation Appraisal, Problem Analysis, Decision Analysis and Potential Problem/Opportunity Analysis (Markopoulos, et al., 2022).

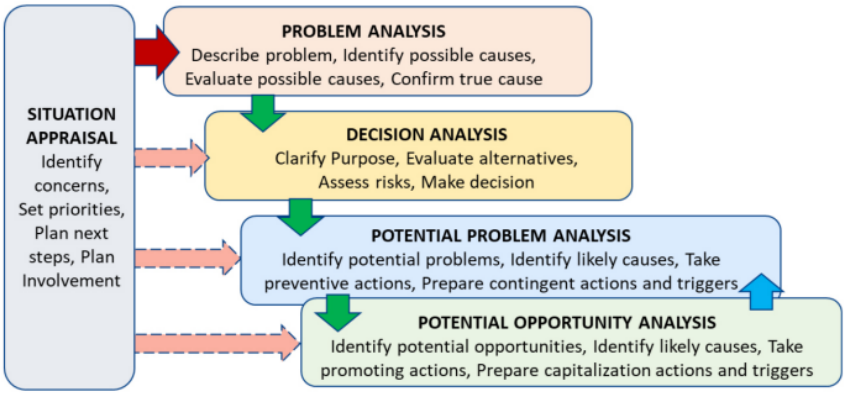

Figure 5. Kepner-Tregoe Method

Source: Markopoulos, et al., 2022.

5P (Principles) for Problem Solving is used by Honda and their suppliers. The basis of the method is similar the Kepner-Tregoe methodology. The particularity of the method is its simplicity, reducing the necessary steps to be followed to a one-page questionnaire: "what happened?" (where problem description should be done), "why it happened?" (the root cause analysis part), "what will be done about it?" (Corrective actions to be proposed), "are the countermeasures working to resolve the problem?" (measure the effectiveness of the actions implemented), "how can we prevent any recurrence of the same kind of the problem in the future?". Despite its simplicity being an advantage, this could become its drawback due to misinterpreting or not fully comprehending each section, which may lead to ambiguity and confusion concerning both the problem and its solution. (Lim, 2020)

Methodology

The present study is a combination of existing literature review on problem-solving approaches and a comparative analysis between them, highlighting the drawbacks and shortcomings identified for each. Similar case studies, incorporation all these methodologies have not been identified.

The models presented in the literature review have been chosen in this study as all of them provide a structured and systematic methodology for approaching and solving problems, guide users through defined steps or stages to ensure a logical and organized problem-solving process and are well established and traditional models, used since many years now by most of the well-known companies (such as Motorola, Ford, Toyota etc.). Each method has been categorized in terms of number of steps followed, advantages and disadvantages and the type and number of tools used in each step, revealing both a qualitative analysis and quantitative comparison analysis.

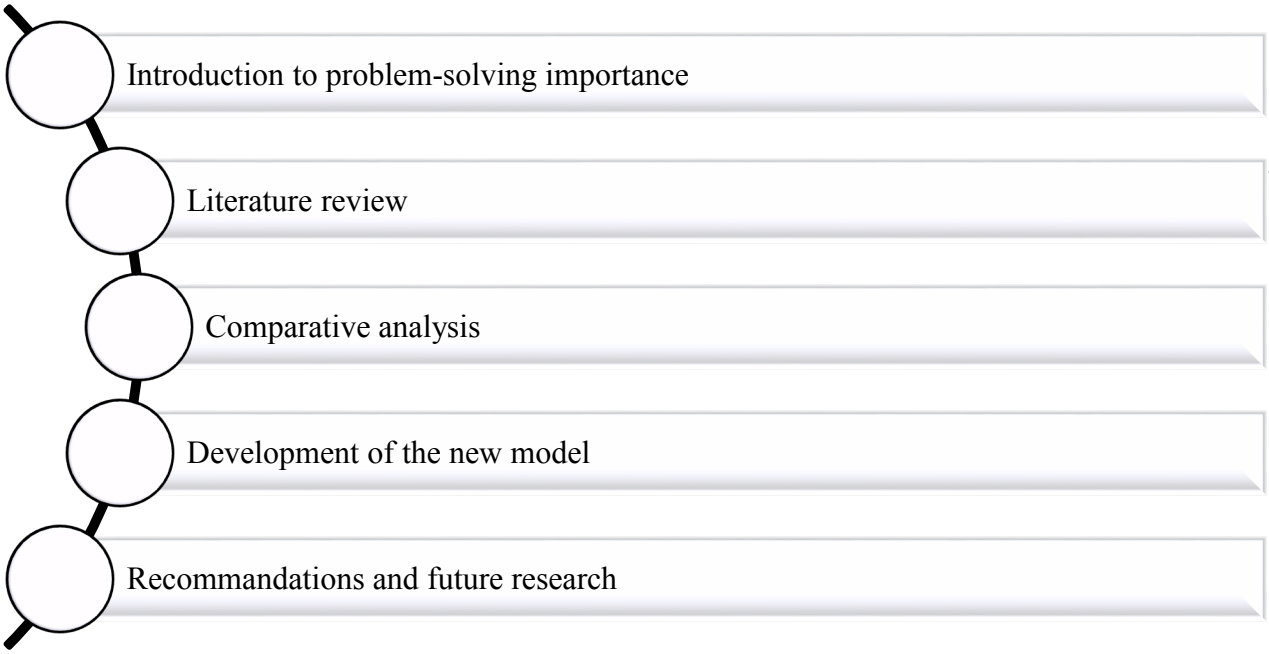

Fig. 6. Stages of the methodology for developing the Synchronous model

Source: author's own research.

New Model Development

Comparative analysis

All the models previously presented in the literature review section are compared in Table 2, in terms of number of steps used, tools each methodology uses, and their advantages and disadvantages.

Table 2. Comparative analysis between seven traditional problem-solving methods

Method	Number of steps	Tools used	Advantages	Disadvantage
Six-Step Problem Solving Model	6 steps	-Ishikawa -5 Why -Scatter Diagram -Pareto Analysis -Histogram	-Each step has a defined purpose -Flexibility and adaptability -Cyclical and continuous nature of the steps -Analytical and reliable -Systematic and logical progression in addressing the problem	-Not the best fit for situations that require "out-of-the-box" thinking -Not enough tools used for a very technical issue -Time consuming
Eight Disciplines of Problem Solving (8D)	9 steps	-4W2H -Fault Tree Analysis -Ishikawa -5 Why -Decision Matrix -Cost-Benefit Analysis -Failure Mode and Effects Analysis (FMEA) -Control Plan	-Implies strong team collaboration -Suitable for customer reporting -Verification of each proposed solution -The final step D8, "Congratulate the Team," acknowledges and	-Too complex for smaller issues -40 days needed for completion is too much for the customer. -Many tools, but not all used

Method	Number of steps	Tools used	Advantages	Disadvantage
		-Lessons Learned -Flow chart -Brainstorming	celebrates the efforts of the team	
A3 methodology	4 steps	-4W2H -GEMBA -Is-is-not Analysis -Lessons Learned -PDCA -SIPOC -Fault Tree Analysis -Ishikawa -5 Why -Decision Matrix -Cost-Benefit Analysis -Failure Mode and Effects Analysis (FMEA) -Control Plan -Pareto -Histogram -Brainstorming -Benefit-Effort chart	-Strong visual representation -Facilitates communication due to its template	-Time consuming, not suitable when a fast response is expected -Effective implementation requires training and skills
The Cynefin Framework	4 steps	-Checklists - SWOT Analysis -Decision tree	-Helps decision-making in complex and uncertain areas -Adaptable to different problem domains	-The categorization of problems into the framework's domains can be subjective and open to interpretation -More conceptual than practical application -Time consuming
Six Sigma	5 steps	-SIPOC -Process Map -Ishikawa -Histogram -Control Chart - Scatter Diagrams -Pareto -5 Why -Regression Analysis	-Focus on reducing defects, leading to a higher quality -Cost savings in terms of rework, scrap, and resource utilization -Measurable output	-Requires expertise in statistical methods -Hard to implement by small businesses -Not suitable for customer reporting - Six Sigma may not be suitable for every type of problem or organization (software for example) -Time consuming
Kepner-Tregoe Methodology	4 steps	-Situation Appraisal (SA) -Problem Analysis (PA) -Decision Analysis (DA)	-Encourages critical thinking -Decision based on data -Efficient resource allocation (prioritizing)	-Not suitable for highly creative problems -Time-consuming

Method	Number of steps	Tools used	Advantages	Disadvantage
		-Potential Problem Analysis (PPA) -Is-is not		
5P (Principles) for Problem Solving	5 steps	-Ishikawa -5 Why -Histogram -Scatter Diagram -Decision Matrix -Process Flowchart -Control Chart -Risk Matrix -Brainstorming -PDCA	-Proactive, preventing problems -Efficient resource prioritization	-May lack specificity for certain industries -Limited focus on industry-specific challenges

Source: author's own research.

Each problem-solving methodology offers a different set of steps and tools, each with its own advantages and disadvantages. For instance, the Six-Step Problem Solving Model provides a systematic and flexible process, while the Eight Disciplines of Problem Solving emphasizes multi-step and complex approach. The A3 Methodology offers a visual representation but may be time-consuming, and the Cynefin Framework aids decision-making in complex scenarios. Six Sigma focuses on defect reduction and measurable output but requires expertise and it's not suitable for all type of industries and companies. Kepner-Tregoe promotes critical thinking and resource efficiency but may not be suitable for highly creative problems. The 5P Principles prioritize proactive problem prevention but may lack specificity. Ultimately, all these methodologies must be combined for the outmost efficiency.

In terms of tools used, the comparative analysis shows that methodologies such as A3 and 8D utilize a wide range of tools, addressing multiple facets of problem-solving, but as shown by the disadvantages highlighted, a high number of tools incorporated in a method does not assure its success. The Six-Step Problem Solving Model and the Cynefin Framework, while effective, utilize a more concise set of tools. Six Sigma and the Kepner-Tregoe Methodology strike a balance, using a moderate number of tools.

A3 Methodology and Six-Step Problem Solving Model tend to be simpler and straightforward, suitable for usual problems. In contrast, methodologies like 8D and Six Sigma are designed to handle more complex issues and are usually used for highly technical problems. In terms of visual depiction, A3 and Six Sigma place a strong emphasis on visual representation through tools like charts and diagrams. In contrast, the Cynefin Framework is more focused on narrative and understanding the context of the problem and 8D methodology would stand somewhere between them all.

Compared to all the other methodologies, 8D and A3 places a significant emphasis on documentation, Lessons Learned and prevention recurrence, tools highly appreciated by the customers.

All these methodologies have been analyzed from a particular perspective: addressing complaints from Original Equipment Manufacturers (OEMs) as a supplier of car parts. In these cases, problem-solving must not be time consuming, as the models presented are, considering the goal and customer's priority is to minimize production downtime at their site. Within the problem-solving methodology chosen to answer the complaint, is should be addressed how the company is equipped to handle urgent issues promptly, providing solutions that minimize disruptions to the

OEM's manufacturing processes. Additionally, the problem-solving process must be flexible, which with the current models is not, with tailor solutions to meet specific needs of the customer, because they do have specific requirements and needs. Lastly, what is also missing from the problem-solving approaches is a visual, easy to understand report for customer communication. OEMs are extremely knowledgeable in technical processes, and it's important they are presented figures and tools used, rather than sentences to explain the problem-solving process.

Ultimately, as a conclusion to this comparison analysis, all these methodologies must be combined for the outmost efficiency, and a new, modern, easy to integrate in the industry 4.0 needs to be created and adopted, as the one proposed in the next subchapter.

The Synchronous Model

The new proposed model aims to align with today's customer needs and expectations, and especially to fit in the context of digitalization and industry 4.0 we are facing. The name of the new model is "Synchronous" which in Greek would mean "modern".

As it was depicted during the comparative analysis, the problem-solving models are all time consuming, and the customers do not have the time and patience anymore to wait too long for an answer to their complaint. No more than five steps are necessary for the new model proposed, and the number of tools used is not limited, but they should be used only if they bring value to the analysis. The five steps, illustrated in Fig. 7., are the reflecting exactly the OEM specific requirement in terms of problem-solving, as depicted in IATF16949:2016.

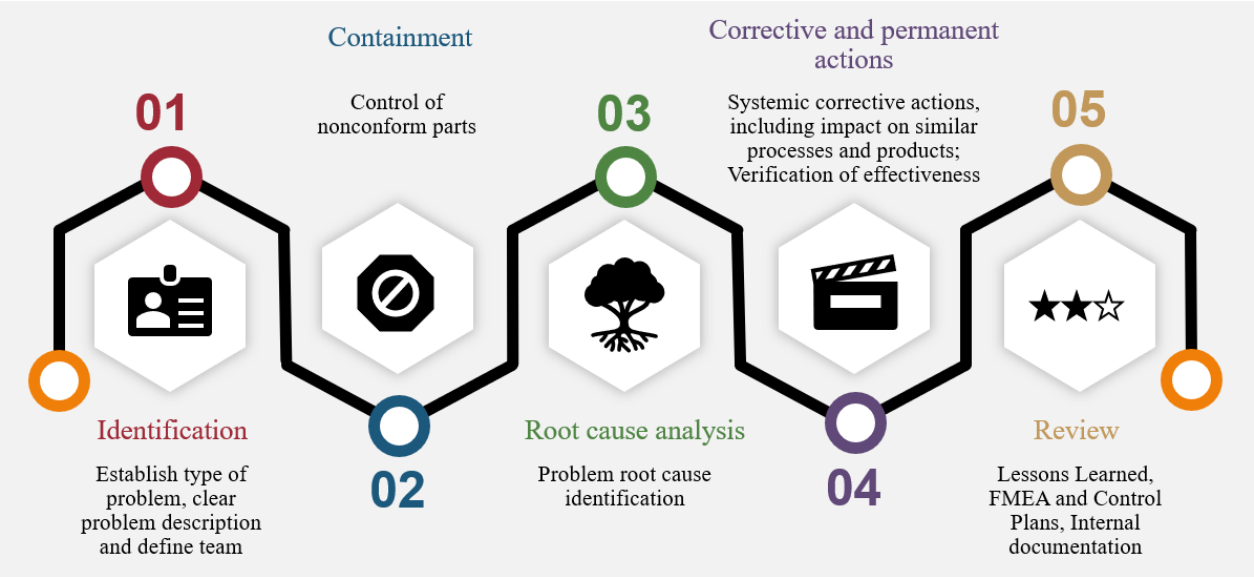

Fig. 7. The Synchronous Model Steps (author's own research)

Source: author's own research.

The Synchronous Model offers flexibility and aims to reduce the time spent on problem-solving but assuring the same efficiency as the traditional models. It is tailored upon customer expectations, but at the same time it's supposed to identify to solve not only the customer's complaint, but also the company's problem and to prevent recurrence, this is why step five is not to be forgotten.

Step 1 implies identifying what type of issue is about to be tackle within the report and clear description is needed. 4W2H tool and pictures (preferably a comparison between the nonconform

situation and the normal situation) are mandatory in this step, and so is naming the leader and team for the analysis (functions and departments to be used, due to GDPR). Another important check in this step is the recurrence of the event, meaning that some of the complaints care repetitive, illustrating a systematic issue.

Within Step 2 containment actions must be implemented, such as blocking the possible affected production, secured deliveries and quality sorting both at customer premises and internally. In this step, a Quality Alert should be issued in the company, to raise awareness.

Root cause analysis is due in Step 3, where the real problem must be identified. For simpler cases, where Lessons Learned showed that the company faced the same issue in the past, Ishikawa (for both detection and occurrence) and 5 Why analysis must be used. If the case is more complex and more information is needed to conclude the root cause, then tools such as Is-is not, SIPOC, Fault tree analysis (FTA), Pareto, Flow Chart, Histogram or Control Charts can be used, prior to Ishikawa and 5 Why. In this step, the Fishbone diagram must be done on the same working file for both occurrence and detection, and to distinguished them for occurrence hypothesis blue color will be used and for detection the blue color will be used.

Corrective and permanent actions are expected in Step 4, meaning that for each verified root cause an action must be implemented, for both occurrence and detection. Cost-Benefit Analysis is recommended in this step, as not all actions can or should be implemented with high importance. A clear action plan must be the output of this step, with action defined, responsible assigned and deadline for implementation, actual date for implementation (part of verification) and effectiveness.

Last step, number 5 is supposed to ease the customer's most aching pain – recurrence. By standardizing the lessons learnt during the analysis. In this step FMEA must be revised, and the issue arising from the complaint must be addressed there as a risk.

In Figure 8 a sketch of how the Synchronous Model Report will look is presented. The customer needs to easily understand the content, so an approach alike A3 is applied, meaning the Synchronous Model is extremely visual, easy to understand through multiple image representations. Besides the first page presentation, multiple "backstage" files are meant to be used.

Flexibility is one of the strong points of this new model, meaning that additional tools than the standard ones in the template can be used, if required, for the complex issues. But to optimize the time needed to complete the report for the simpler cases, the model presented has a balanced number of mandatory tools, which cover the standard requirements of the customers.

In the future research, what is to be tackled is the road to digitalization and use of online data, which are part of Quality 4.0. mentality. The next steps for the development and adjusting of the Synchronous model would be a link to a complaints database, where based on the problem description undertaken in Step 1, an older or similar case would be suggested. Then, for Step 2, predefined containment actions could be chosen from an online list (such as blocking of the stock). For Step 3 the Ishikawa could already generate some brainstorming ideas based on the description of the problem. In the same manner, after Step 4 is completed, in Step 5 a Lessons Learned Alert could be already generated, to share with others what happened and what others could benefit as an outcome of the problem-solving.

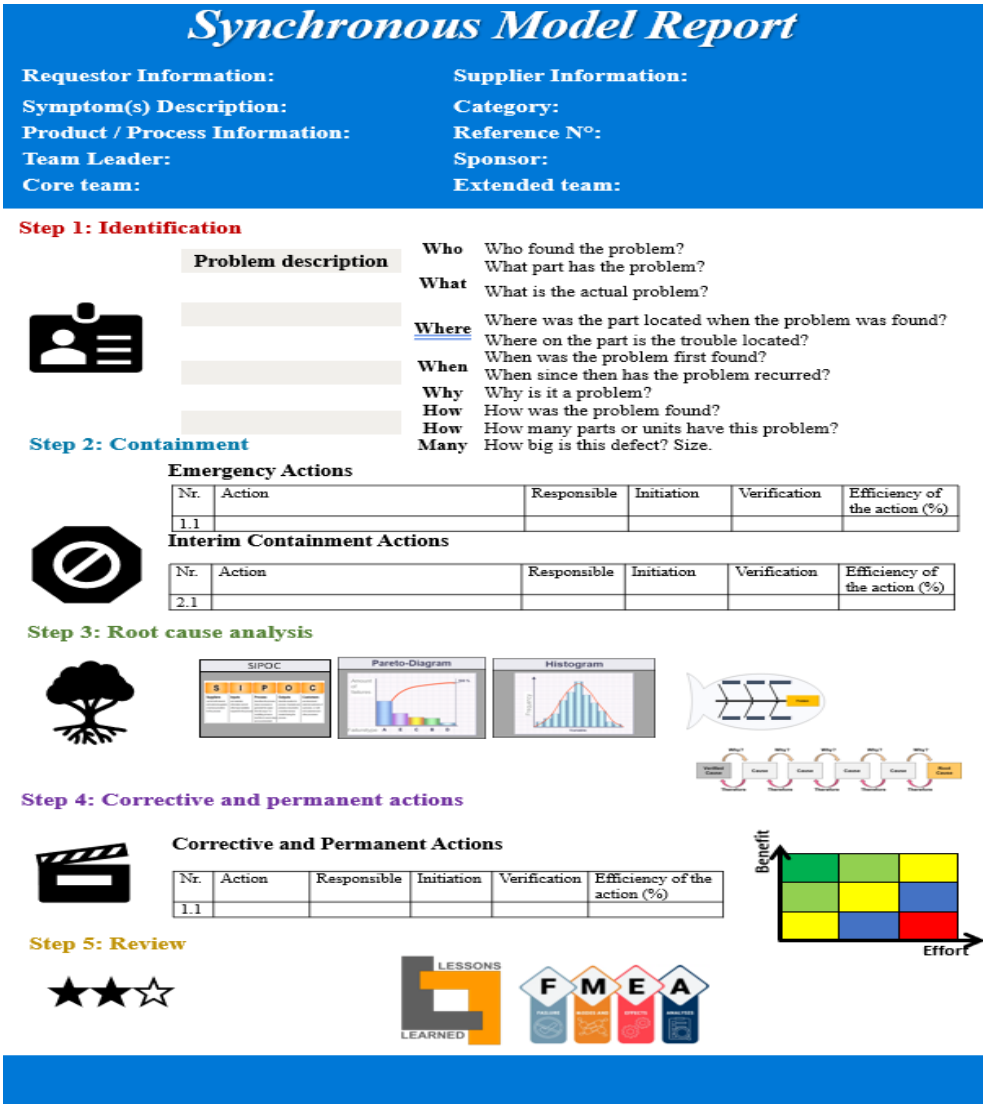

Fig. 8. Representation of the Synchronous Model Report

Source: author's own research.

Conclusion

The present study has highlighted the current situation of problem-solving approaches, as mentioned in other articles, such as A3 and 8D methodology, the Cynefin Framework, Six Step Problem Solving, Six Sigma, 5P and Kepner-Tregoe Methodology. With this starting point, a comparative analysis was undertaken, brining to light the advantages and disadvantages they have, especially in the context of digitalization and problem-solving process of OEMs complaints.

The new model proposed, names "Synchronous" to point out the need for modernization, takes all the advantages from the traditional models and aims in the future research to comply with Quality 4.0. methodology. Customer satisfaction is expected to be achieved using this problem-solving approach proposed, which finally leads to an enhanced business. However, further research needs to validate the model on several case studies and a new design of the model's platform aims to be designed.

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