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Complaints management: quality of response to customer complaints in an automotive company

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Abstract: Complaints management is an essential process of customer service by providing valuable information to review organisational performance and to support decision-making, holding accountable different stakeholders, including suppliers of product parts and services. The automotive industry requires high-quality standards and internal compliance procedures to assure the reliability of manufacturing processes and quality of product parts, even though with these stringent measures complaints are issued, and they must be promptly handled and solved. This article analysis the processing time of customer complaints, to figure out, the causes leading an automotive industrial unit to not comply with internal and customer response time targets, proposing improvements to minimise the cost of contractual fines. To accomplish these outcomes a top-bottom approach was used, detailing critical factors to describe and analyse the complaints handling process and to identify the underlying problems to advance improvement opportunities that can enhance the efficiency and effectiveness of the complaints management system.

Keywords: complaints assessment; 8D process; continuous improvement; quality.

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1 Introduction

Quality in the automotive industries is assured by several quality standards and specific internal and client requirements, presenting companies with unique challenges to ensure customers satisfaction, loyalty and to recommend the purchase to others.

Dimensions, such as, reliability, the ability of a product part to perform as intended without failures (O'Connor and Kleyner, 2012), durability, the ability to withstand wear and tear over the course of the product part life cycle (Stylidis et al., 2015), safety, the structural and assistance features ensuring the safety of the product parts constituents and also its safety in case of accident (Xiuli et al., 2012), and performance, the ability to meet the needs and expectations regarding the work and purpose that it was designed for (Steven et al., 2012), are examples, of dimensions that play a major role in customer satisfaction and perceptions of quality, and resulting divergences between the actual outcome and the expected outcome may result in customer complaints.

Effective customer complaints management systems are a crucial aspect to promptly address customer questions and issues guaranteeing timely and relevant responses to assure the customers perceive the organisation as being supportive and proactive in addressing and solving their concerns and issues. This customer-centric approach must

consider the customer needs and expectations, as well as the companies' objectives, including the reduction of costs with the complaints process (Sheth et al., 2011).

An effective handling complaint system must respond promptly and in an objective way to solve the customer claims in a fairly and confidential manner, and there must be accountability for complaint handling to devise not only product part improvements but also improvements to the complaint management process (CGO, 2009). Companies with clear and transparent complaint management processes have higher levels of customer satisfaction and trust (Cai and Chi, 2020).

In this article, the complaints management process of one industrial unit of an automotive company is analysed, focusing on the processing times of customer complaints. This automotive company industrial unit is in Europe and has more than 3,000 employees and worldwide the company has more than 400,000 employees.

The analysis aims to expose the causes leading to deviations from the target objectives in terms of time compliancy with internal procedures and contractual deadlines, to propose improvements to limit the overall cost of contractual fines resulting from customer complaints.

The complaints process analysis aims at figuring out the route-cause of the problem, to assign responsibilities and to define mitigation and improvement measures within the defined timeframe or contractual deadlines.

Given the importance of meeting deadlines to mitigate contractual fines, cases in which they have not been met have been identified and analysed to determine factors at the origin of these occurrences, and to detect areas of improvement and intervention.

The data has been filtered to focus on complaints resulting from contractual fines. From these, the most influential factors have been identified for further analysis, reducing the granularity in the most relevant themes to reach greater specificity.

This article is structured as follows:

- 1 introduction, giving context and presenting the focus of the article, which is on managing the processing times of customer complaints given internal standard timeframes and procedures and contractual deadlines
- 2 literature review on managing customer complaints
- 3 methodology, presenting the approach to address the processing times of customer complaints
- 4 presentation and discussion of results
- 5 conclusions, summarising gained knowledge and future work recommendations.

2 Literature review

The automotive industry requires high quality standards in a very competitive environment, with manufacturers constantly seeking ways to improve customer satisfaction, loyalty and purchase recurrence (Morgeson et al., 2020). One key aspect is effective complaint management, which involves the processes of receiving, handling, investigating the complaint, responding to the complaint, and resolving the customer complaints in a satisfactory manner (Gustafsson et al., 2005).

Effective complaint management is a key factor in customer satisfaction, and satisfied customers are more likely to recur in purchases and to recommend it to others (Cai and Chi, 2018). This highlights the importance of resolving complaints in a timely and satisfactory manner, as it can have a positive impact on customer loyalty and on the complaints cost reduction (Carlson et al., 2022; Cambra-Fierro et al., 2015).

One widely used method in the automotive industry for managing customer complaints is the eight disciplines (8D) process, developed by Ford Motor Company in the 1980s, at the time it was known as team oriented problem-solving (TOPS) (Kumar and Adaveesh, 2017). The 8D process is also used under the IATF 16949, a standard from the International Organization for Standardization, developed to enhance automotive quality management systems and the quality compliancy of automotive suppliers of product parts (Laskurain-Iturbe et al., 2021). In 2022, the ISO released a revised version of IATF 16949, further emphasising the importance of customer satisfaction and the role of 8D in achieving it.

The 8D process is a continuous improvement and systematic approach to problem-solving focusing on identifying, addressing and overcoming the root-causes to prevent future recurrences (Reinsenberger and Sousa, 2010).

This process applied to complaints management in the automotive industry, helps to improve customer satisfaction by quickly and effectively addressing complaints and concerns, it can also be helpful in reducing costs by directing the process of identifying, investigating, addressing, and fixing problems, mitigating them, and minimising the possibility of becoming widespread (Sourdin et al., 2021). The 8D process streamlines the problem-solving approach increasing its efficiency and effectiveness.

To implement an 8D complaint management process the organisation must ensure that the team is properly trained and has the necessary skills and expertise, and all relevant stakeholders, including customers and suppliers, are involved in the process to ensure that factual and relevant information and perspectives are being considered (Chlpeková et al., 2014).

The 8D process includes the following steps (Kumar and Adaveesh, 2017; Phanden, 2018; Kaplík et al., 2013):

- D1 Assemble a team: A cross-functional team with the necessary skills and expertise to analyse and solve the problem. The 8D encourages participation, sharing ideas and perspectives, to reach comprehensive and effective solutions (Realyvásquez-Vargas et al., 2020).
- D2 Describe the problem: Thoroughly describing the problem, including the causes and effects, and any relevant data or information that may help in quantifying, locating, and measuring the problem, this may include using tools such as statistical analysis and process mapping (Nagi and Altarazi, 2017).
- D3 Immediate containment action: Taking immediate actions to contain, the problem. This may involve temporary fixes, isolation measures, or recalling products from customers to stop the problem.
- D4 Identify the root-cause: Identify the underlying cause of the problem, different tools can be used, including the fishbone diagram, the five why method, the Pareto chart, the 5W2H technique, and the FMEA (Banga and Peddireddy, 2023).

- D5 Devise permanent corrective actions: Develop permanent corrective actions to stop the problem, based on the root-cause analysis in Step D4, this may involve redesigning parts, reviewing processes, or implementing control plans (Kumar and Adaveesh, 2017).
- D6 Implement permanent corrective action: Implementing the permanent actions, testing, and verifying if it effectively stops or prevents the problem.
- D7 Prevent recurrence: Involves taking steps to ensure that the problem does not recur, including updating procedures, defining control plans to monitor, control and detect any issues, ensuring that employees are trained to sustain procedures and good practices.
- D8 Celebrate and communication: Celebrate and recognise the team's success and communicate the results to give visibility of the achievements to relevant stakeholders.

One of the key benefits of 8D is its emphasis on teamwork and collaboration (Realyvázquez-Vargas et al., 2020), bringing together a diverse and cross-functional team with multiple skills, expertise and experience, encouraging participation, sharing of ideas and approaches to come up with a comprehensive and feasible solution.

Its focus on continuous improvement, identifying and addressing the problem root-causes, and proactively directing teams to stop or prevent issues from recurring, results in more efficient and effective processes, operations, and monitoring and controlling systems (Kumar and Adaveesh, 2017), leading to increased customer satisfaction and reduced complaints costs (Carlson et al., 2022).

The 8D process is valuable for complaint management driving continuous improvement and solving customer complaints, leading automotive industries to significantly improve quality and the reliability of products, services and operations, resolving customer complaints and preventing future issues from occurring (Gustafsson et al., 2005).

Effective complaint management can also be achieved by automating certain tasks by using technology to facilitate the complaint resolution process. Automation of certain aspects of the complaints handling process, such as tracking and reporting using, and using online platforms, can decrease the time, effort and resources required to address and solve the customer complaints (Sunny, 2016). A customer relationship management (CRM) platform can be configured and used to favour the between the customers and the company to track and manage the sequence of sets taken to solve the complaint.

To support complaint management in the automotive industry, artificial intelligence (AI) is gaining increased focus, chatbots are one example, they can be very effective in receiving and handling customer complaints, including the initial triage, and in generating and providing fast and rather accurate responses (di Castri et al., 2020; Banga and Peddireddy, 2023). AI can also be applied to generate predictive models of future complaints considering available data, enhancing the ability of companies to proactively act on potential issues (Xu et al., 2019; Roschk et al., 2021).

Chatbots, as an example, can reduce response times, provide a personalised assistance, and improve customer satisfaction (Ledro et al., 2012). Natural language processing (NLP) can be used to analyse and interpret customer complaints, extracting relevant information to personalise responses on specific needs and preferences in a timely manager (Piris and Gay, 2022).

AI by using, analysing, and processing customer feedback and complaints can provide relevant inputs to identify trends, tendencies and patterns, companies can make decision based on facts and data-driven outputs to improve products and services reducing the likelihood and costs with complaints (Piris and Gay, 2021).

The use of AI in complaint management can also support companies reducing operational costs, by automating parts of complaint management and resolution process freeing up people, time and resources from the company's customer support services, which can be allocated for focusing on actually solving the problems at hands, resulting in cost savings and increased productivity (Roschk et al., 2021).

Using AI in complaint management can bring numerous benefits in addressing issues efficiently, saving time and resources, improving the accuracy and reliability to decision-making, and increasing customer satisfaction, loyalty and recurring sales (Banga and Peddireddy, 2023), building the foundations for a more responsive and proactive organisation on answering to the customer requests.

In the automotive industry, that must excel in complying with normalised quality standards, and requirements from business and clients it is essential to have an efficient and effective complaints management system with clear and responsive mechanisms to receive, investigate and respond to customer requests, concerns and complaints, using best practices, techniques and technologies, such as the 8D process, and CRM technologies, and AI systems must be considered to continuously improve operations productivity and customers satisfaction.

3 Methodology

The automotive company understudy uses several compliancy follow-up indicators, such as: 0-km ppm (defects found in customer factories per million opportunities), 3 MIS ppm (defects found in the field with a maximum of three months in service), response time of complaints, number of open complaints, among others. After reviewing these indicators, the research team selected the indicator 'complaints response time' as its research target, due to its relevance to understand the factors that influence the response time performance and how it translates in terms of costs for the organisation.

To proceed with the complaints response time analysis, the research team was provided with a complete database directly from the SAP-based complaints management system, from January 1st, 2019 to April 30th, 2022. This database included all complaints created in this period, which totalled 9,373 unique complaints.

From this number and given that we were going to carry out an analysis of the influential factors in the complaints process, it was necessary to create a series of filters to ensure that the data to be used was reliable to perform the analysis. Therefore, from the original complaints list, the following filters were made:

- 1 We only considered complaints of '0-km' or 'field' type (we do not considered complaints related to logistics).
- 2 Only complaints issued by costumers ('official' complaints).
- 3 Only complaints that have completed the complaints process (the database included complaints still under analysis).

- 4 Only complaint units analysed at the manufacturing plant.
- 5 Only complaint units that arrived at the manufacturing plant to be analysed (there may be units lost in the logistics process).

After performing the filters, 6,883 complaints were left for the analysis.

Having the complaints ready for analysis, we did not select a sample, all data was used. Complaints were analysed considering the requirements internally defined by the automotive company regarding the maximum response times that each phase of the complaints process may take, as well as the different actors in the process, the characteristics of the defects claimed, and finally, the inherent company cost for not-complying with the complaints response time deadlines. Finally, opportunities for improvement have been identified.

4 Presentation and discussion of the problem and results

The automotive complaints management process is defined by the company internal directive CDQ – *Complaint Process (Central Directive Quality)*.

This directive describes the maximum response times for each phase of the process, as follows:

- 1 Two calendar days to send the first report to customer, confirming the complaint acceptance and presenting the steps to contain the problem (8D methodology – Step D3).
- 2 Fourteen calendar days to send the second report to the customer, with the fundamental problem described and responsibility for the root-cause of the problem (8D methodology – Step D2).
- 3 Sixty calendar days to send the final report to the customer (complete report following the 8D methodology).

These maximum response times encompass several phases of the process, which can be divided into three main phases:

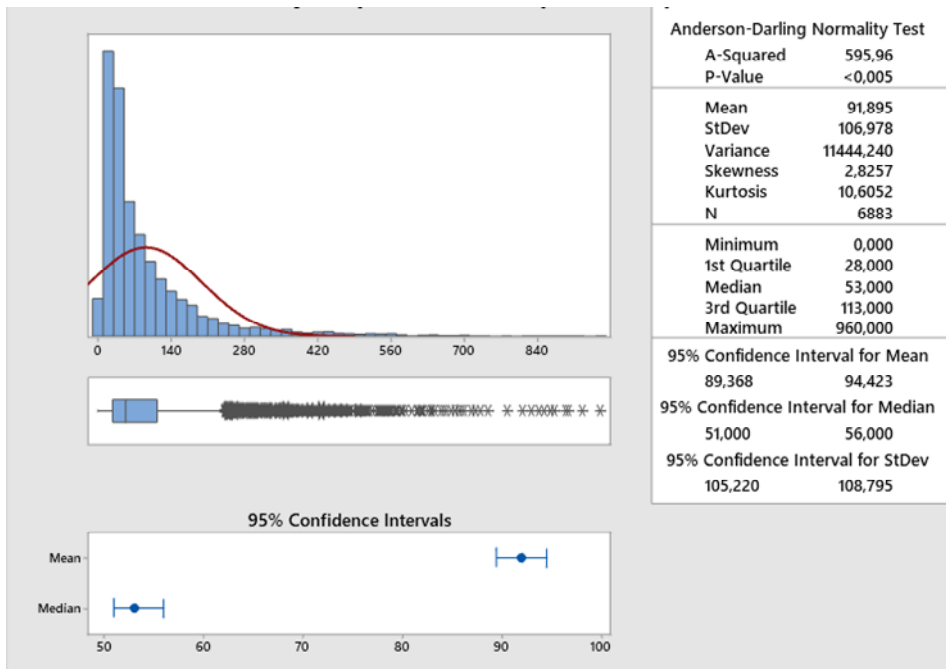
- 1 In transit (2 days) – From the moment the complaint is created in the system, until the unit is received at the automotive company, it includes the transport phase and has an internal target defined of 3 days for the unit delivery.
- 2 Under analysis (14 days) – From the moment the unit is received at automotive company until phase D2 of the 8D methodology is completed, that is, a conclusion has been reached regarding the fundamental problem and responsibility for the defect, which may have three different results: Automotive company liability, customer liability, or specification (product is compliant with the specification). This phase has an internal target of 11 days, and together with the 3 days defined for the ‘in transit’ phase, it signals the need to send the second report to the customer, within the 14 days defined as the target in the above-mentioned directive.
- 3 Creation of the 8D report (46 days) – After phase D2 of the 8D methodology is completed, the next phase is to proceed with the root-cause analysis and with the identification of corrective actions, by the department responsible for the root-cause

identified in phase D2 (there are three possible responsible departments: development, production or supplier – product parts or services supplier). This phase includes the completion of all the other steps of the 8D methodology and ends with the final report sent to the client, with an internally defined target of 46 days. This phase, together with the previous ones, makes up the 60 calendar days to complete the complaint.

As mentioned in the methodology, a total of 6,883 complaints were selected for the analysis.

To have a global perspective of the response time indicator, we carried out a graphical analysis including basic information regarding the sample distribution (Figure 1). The time to solve a complaint has a high variability, with an average of nearly 92 days and a standard deviation of 107 days. Despite this, most complaints are solved within the defined target of 60 days, as evidenced by the median value of 53 days, but there are numerous outliers.

Figure 1 Graphical summary of the total processing times of 6,883 complaints (see online version for colours)



It is important to figure-out complaints processed outside and within the target response time of 60 days, knowing that there are three possible responsibilities for the claim, automotive company liability (B), customer liability (C) or within specification (S). Customer liability claims and claims in which no defects were found have a short processing time compared to claims where the automotive company is the liable part, this is the case, because they do not include a root-cause analysis and the definition of corrective actions. A bar chart was created (Figure 2) displaying the number of complaints outside and inside the target processing time by liable part.

Figure 2 Number of complaints outside and inside the target by liable part (see online version for colours)

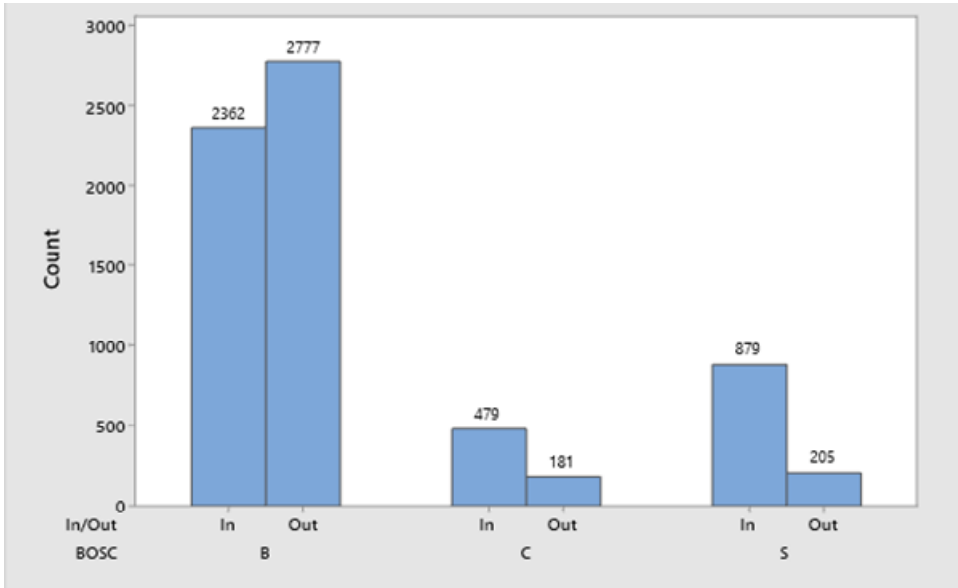
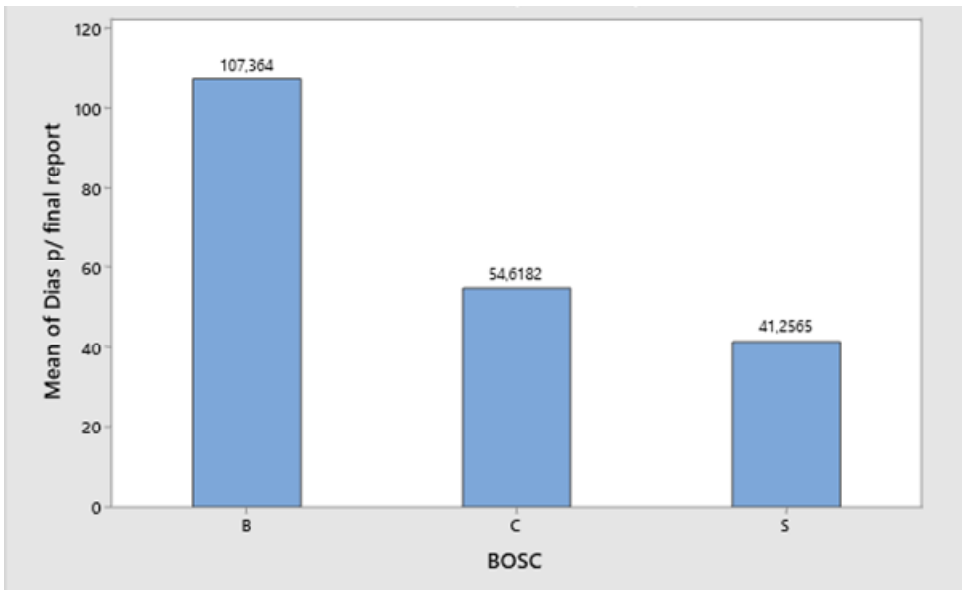


Figure 3 Average response time by liable part (days to deliver final report) (see online version for colours)



Customer liability (C) and within specification (S) have much lower values of non-compliance when compared to the Automotive company liability (B), only 386 (181 C + 205 S) complaints outside the target when compared to the 2,777 complaints outside the target being processed by the automotive company, and there are more

complaints outside the target than complaints within the target [negative difference of 415 (2,362 in – 2,777 out) complaints].

As for the average response time per liability (Figure 3), both customer (C) and within specification (S) liability claims are within the target of 60 days (55 and 41 days, respectively), while the automotive Company (B) liability claims are well above the defined target (107 days on average).

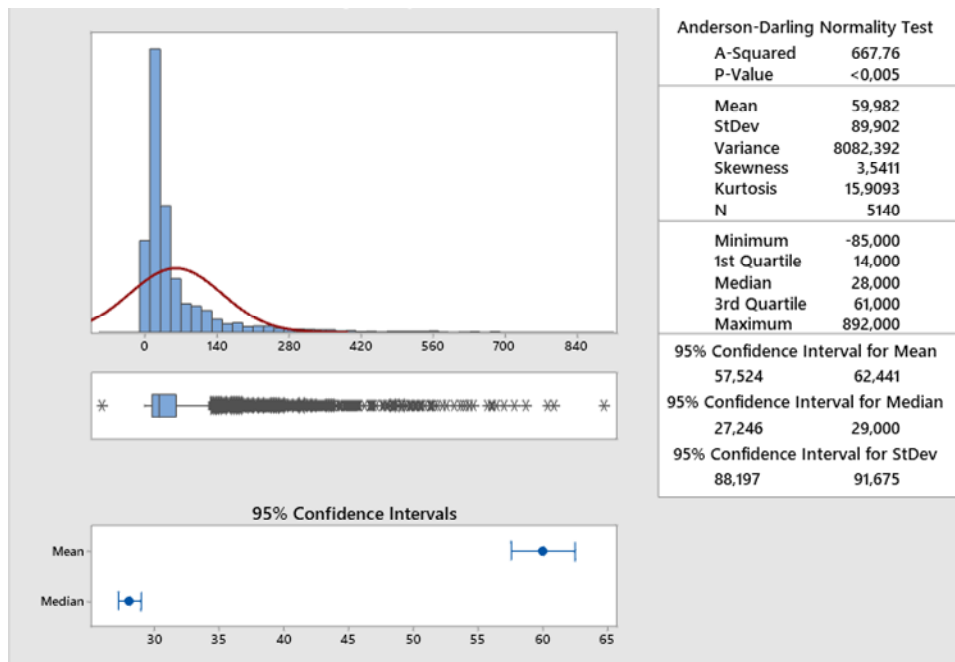
The automotive company liability complaints are the most frequent negatively affecting the complaints response time indicator (87.8% of out-of-target complaints).

Having identified the main liable part affecting the response time indicator, we can analyse the different stages of the complaints process, with the pretext of considering complaints within the automotive company responsibility to get a better understanding of the issues influencing the response time.

4.1 First customer report (2 days)

The first customer report must be issue in a period of 2 days from its arrival. This phase is a process that is completely automated by the automotive company complaints management system, which automatically signals the report in the system after 2 days and generates the report automatically to be sent to the customer. Therefore, the compliance ratio for this phase is 100%.

Figure 4 Graphical summary of the 14 days report response time for all the automotive company liability complaints (total 5,140) (see online version for colours)



One could question the content of these reports, their usefulness by those responsible for the quality at each client, or even if it is even a report requested by the clients themselves,

but we believe that for the purpose of this article this analysis would bring little benefit, therefore, given that it fully complies with the internal requirement, we did move forward with the discussion of this phase.

4.2 Second customer report (14 days)

The next phase to be analysed is the second report, which has a defined target of 14 days to be sent to the customer, the fundamental problem and responsibility for the complaint must be identified and described at this stage.

First, we can extract the dates when the D2 step (corresponding to the 8D problem description and responsibility definition for the root-cause of the problem) was completed for each complaint and compare it to the 14-day target (Figure 4).

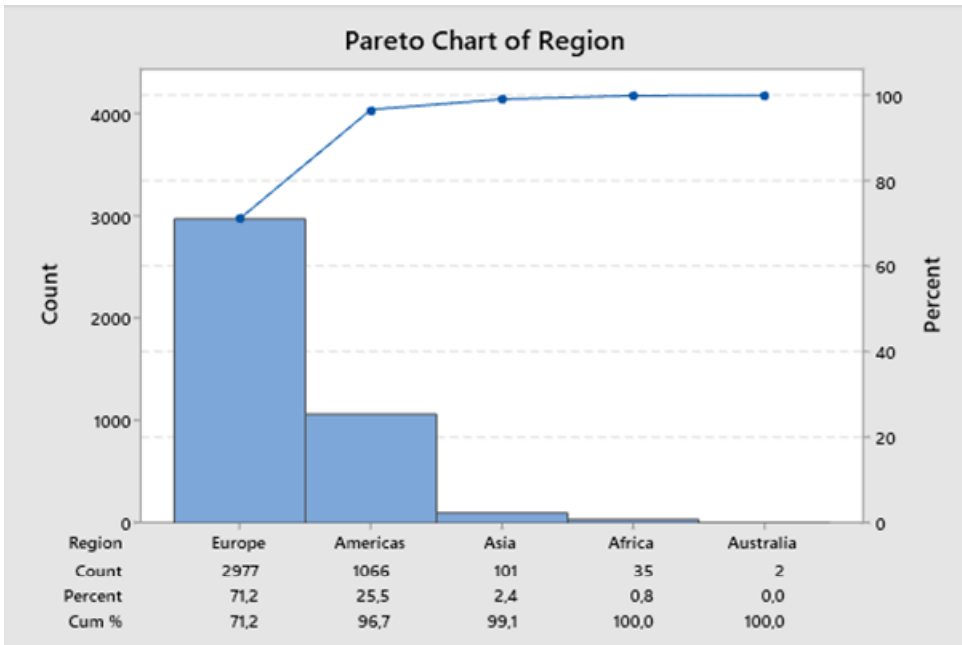
We can see that the response time average is quite high in relation to the defined target (60 days for a 14 days target) and that only 25% of complaints meet the defined target.

To analyse in greater detail the causes of this deviation, two phases of this process must be reviewed: the ‘in transit’ phase and the ‘under analysis’ phase.

4.2.1 ‘In transit’ phase (3 days)

This phase comprises the duration from the moment the complaint is created in the automotive company system, until the moment the unit is actually received at its manufacturing plant.

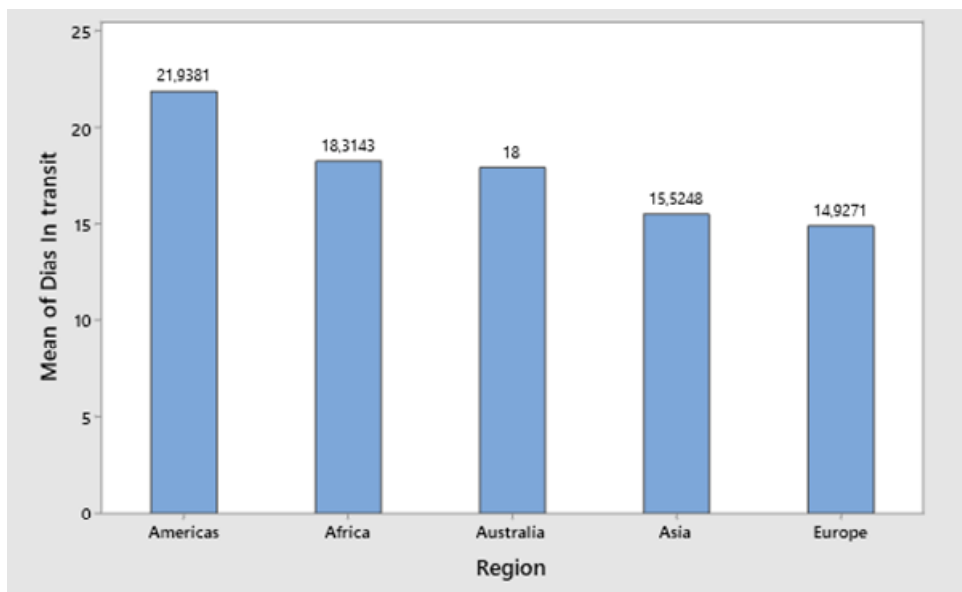
Figure 5 Pareto analysis of the origin of the claimed devices (see online version for colours)



To analyse this phase, a Pareto graph was used to categorise the device complaints origin by continent (Figure 5). Along with this analysis, we also proceeded to calculate the average transport time for each of these regions (Figure 6).

The vast majority of the devices come from the European continent (71%), the set of devices from North and South America makes up a total of almost 97% of the complained devices (Figure 5). Comparing the averages there is a difference of 7 days in the average transport time between the devices claimed in Europe (15 days) and those claimed in the USA (22 days) (Figure 6). The large gap between the defined target of 3 days and the operational reality is notorious, especially in the complaint devices in Europe, which leads us to suspect, there might be a high degree of errors in the information system regarding the arrival dates of the devices, unfortunately, it was not possible to further explore this issue.

Figure 6 Average transport time by region (see online version for colours)



Even though, this is a process phase in which the influence of the automotive company is practically null, the current device delivery time-spans makes it very difficult to meet the target of 14 days to deliver the second report to the customer, since the ‘under analysis’ phase is expected to have a much larger duration than this one.

4.2.2 ‘Under analysis’ phase (11 days)

This phase comprises the time from the moment the complaint unit is received at the automotive company until the D2 step is completed. The type of defect complained can have a lot of influence on the duration of the analysis related to D2, we analysed the average duration of the analysis time, categorised by types of defects complained and responsible department, for determining their root-cause (Figure 7).

Figure 7 Average analysis time, per responsible department, for determining the defect root-cause (see online version for colours)

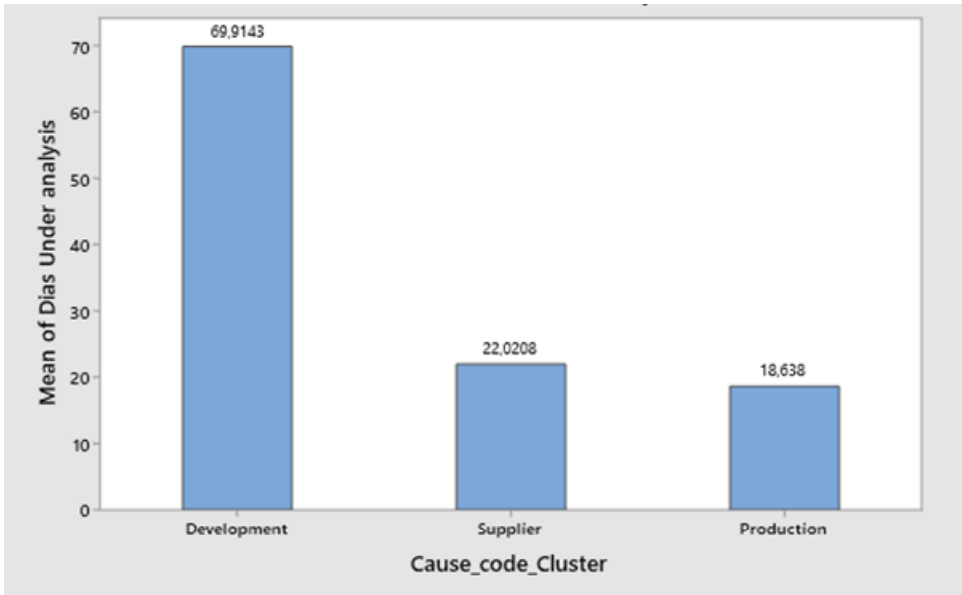
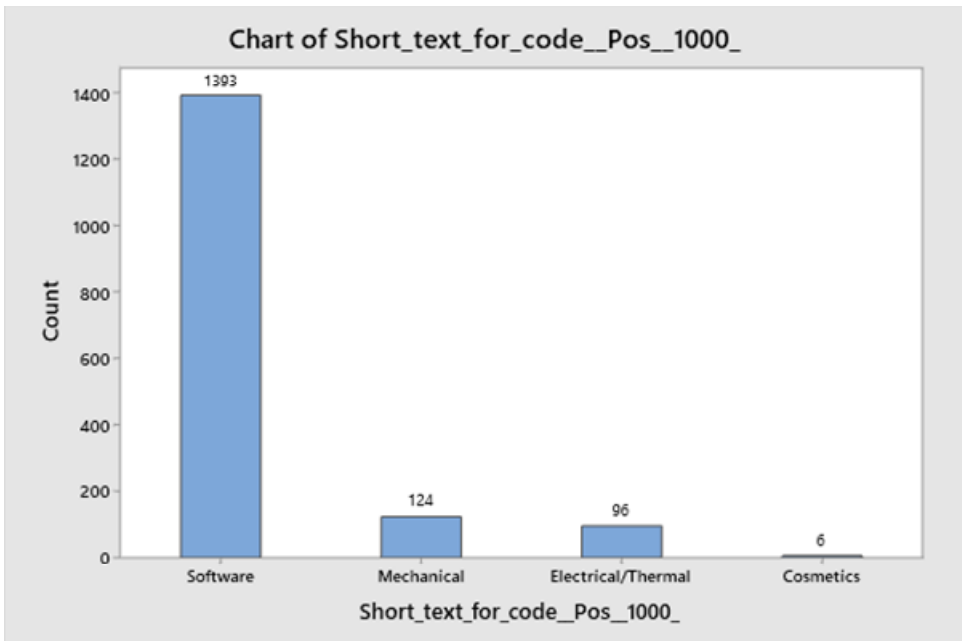


Figure 8 Types of conceptual defects and their frequency (see online version for colours)

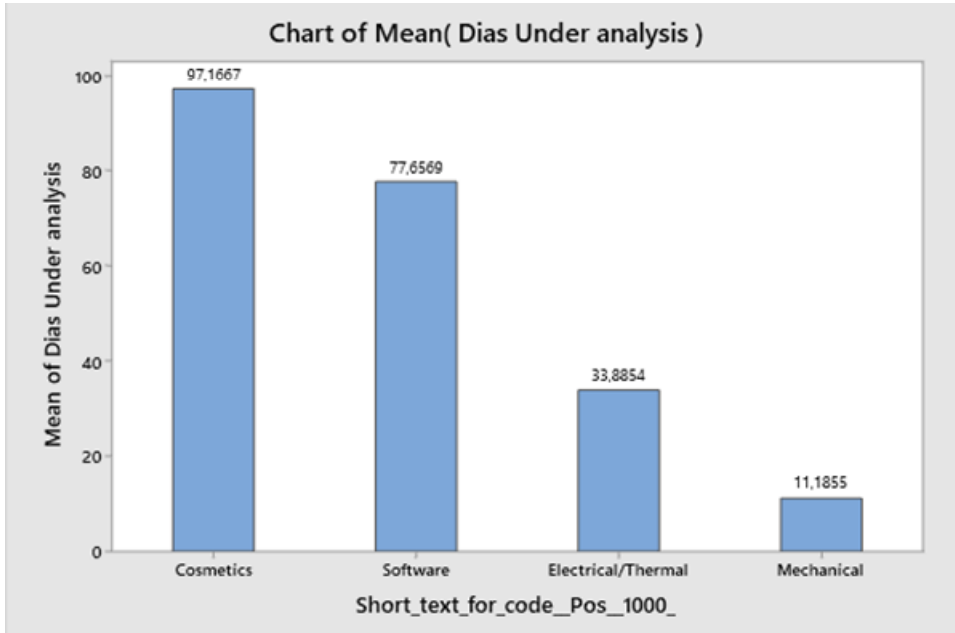


The defects with a root-cause related to the ‘development’ department, that is, products with concept problems, are the main influencers of the average response time of this phase (41 days in total). It is important to note that, although they are not the defect type

with the highest rate of occurrence (39%) compared to the other two types (51% due to supplier defects and 10% related to production defects), they have a strong influence derived from their much longer average duration.

It is important to analyse in further detail the causes of complaints coming from the ‘development’ department. For this, an analysis was carried out on the types of conceptual defects (Figure 8 and Figure 9).

Figure 9 Average number of days by type of conceptual defect (see online version for colours)



Cosmetic defects are the ones taking on average the longest time, however, the number of defects analysed is almost irrelevant (only six complaints), 86% of the conceptual problems analysed refer to software, with an average analysis time of 78 days, which translates into a clear problem that greatly influences this indicator. Mechanical conceptual problems (11 days) are the only ones being analysed within the defined target of 14 days.

The delays due to ‘software’ issues are mostly explained by the complex nature of this type of defects, and due to the fact that the Software Development Team, entrusted for the complaints analysis, is practically all centralised in the Software Development Teams located in India. In addition to communication difficulties due to time differences, there is also a lack of resources allocated to these teams for the investigation of defects, which makes this process quite slow and long-lasting, as evidenced by Figures 8 and 9.

4.3 ‘8D report’ phase (46 days)

This phase comprises the time from the D2 completion until the 8D report is prepared and sent to the customer, this phase involves an extensive analysis of root-causes and the identification of corrective and preventive actions, it has the largest response time target slice (46 days out of 60 days to respond to the complaint).

Figure 10 Average 8D creation time by responsible department (see online version for colours)

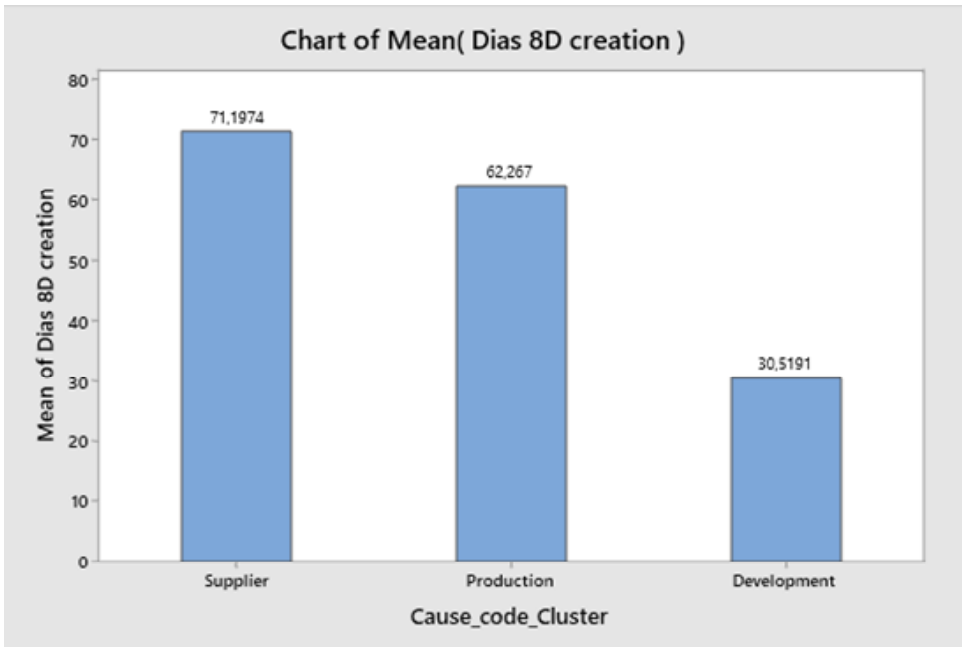
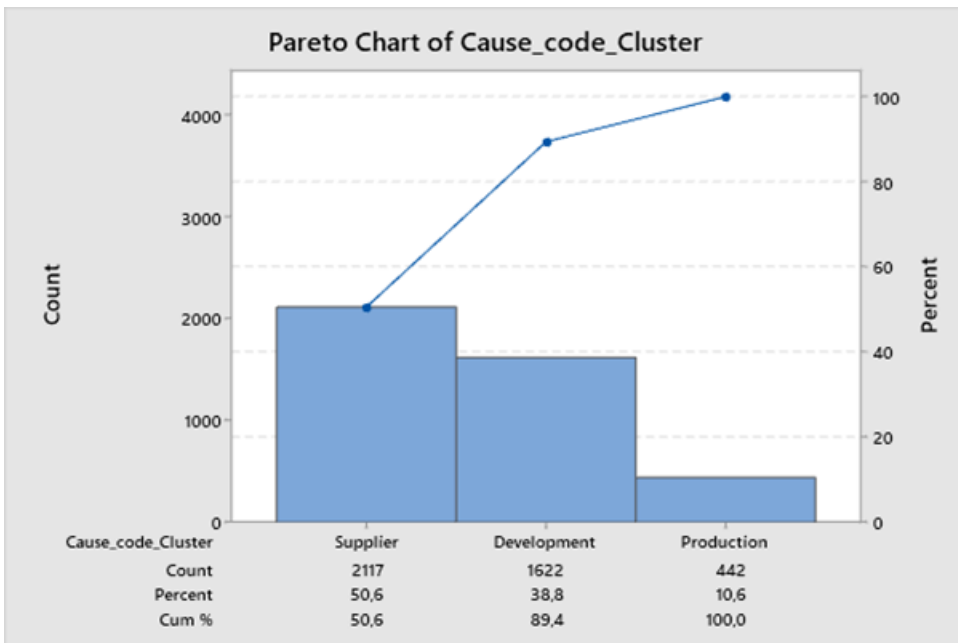


Figure 11 Pareto analysis of the number of complaints analysed by each department (see online version for colours)



Similar to the methodology used to analyse the ‘under analysis’ phase, the response time at this stage largely depends on the type of defect of each complaint, that is, the department responsible for the root-cause and the capacity of its problem-solving teams. As such, it is important to have an overview of the average response time of each department and the number of complaints it analyses (Figure 10 and Figure 11).

Contrary to the previous phase, conceptual problems are the ones taking the least time on average to be analysed and remain well below the defined target (average of 31 days for a target of 46 days), perhaps explained by their greater involvement in the D2 phase.

Therefore, the defects whose responsible is the ‘supplier’ and the ‘production’ are the ones with higher influence on the overall average, which is above the target (average = $71,197 + 62,267 + 30,519 / 3 = 54,552$ days, for a target of 46 days), with ‘supplier’ defects having the highest average, 71 days for the analysis, and they represent 51% of the overall defects. ‘Production’ defects, although having a high average, 62 days, they only represent 10.6% of the total defects claimed.

The ‘supplier’ high average response time is mainly due to the fact that most of the automotive company suppliers are located on Asia, and the defective parts must be transported to the supplier location for analysis. Based on the analysis of the devices transport time, from the automotive company to the suppliers, it takes on average 15 days. In addition, and especially with defective electrical components, sometimes there are difficulties in reproducing the failure-mode, which often results in the component being returned to the automotive company, in Europe, to retest the component and send it back to the ‘supplier’ for analysis (which triples the transport time of the analysis process).

Regarding ‘production’ defects, the average response time indicator is often negatively influenced due to high bureaucracy and the need for written approvals by the heads of the production department. This often leads to delays of several days and sometimes weeks if there is a need to make any change to the 8D report.

4.4 Cost analysis

In addition to the analysis of the complaints processing times, it is relevant to have information on the complaints costs for not meeting contractual deadlines.

In an internal study carried out by the automotive company in 2020, it was concluded that the average cost associated with exceeding the deadline for responding to a complaint is €5,192.76 (our research team was unable to have access to most recent financial data, this value has been considered as a reference for the unit cost of not meeting the complaints response deadline).

Table 1 Comparison of out-of-target complaints according to the automotive company requirements and the deadlines defined by the customer

<i>Responsibility</i>	<i>Quantity out of target (internal requirement: 60 days)</i>	<i>Quantity out of target (customer requirement: response time differs)</i>
Automotive company	2,777	1,982
Customer	181	113
Specification	205	184

The automotive company has defined internal deadline requirements to respond to the complaints, but in this case, to assess the costs, it was also necessary to compare the response time for each complaint with the deadline established by the customer.

Therefore, a comparison was made for each possible liability (automotive company, customer and specification), the number of complaints answered outside the target, taking into account the automotive company internal target (60 days) and the deadline established by the customer (differing by complaint considering several factors, such as the customer, type of complaint, etc.) (Table 1).

There is a considerable discrepancy between the number of out-of-target complaints considering the automotive company internal requirements and the deadlines established by the customer. This is because the deadline for each complaint can be negotiated directly with customers and can be extended several times, resulting in a more flexible deadline time-span.

After this analysis, the total cost of complaints answered outside the target was calculated considering the deadlines established by the customer (Table 2).

Table 2 Cost of complaints

<i>Responsibility</i>	<i>Quantity out of target (customer requirement: response time differs)</i>	<i>Total cost for the automotive company</i>
Automotive company	1,982	€10,292,050.32
Specification	184	€955,467.84
Customer	113	€586,781.88

The results show a total cost of almost 12 million euros related to complaints answered outside the deadlines defined by the customer. The automotive company responsibility totalises more than 10 million euros, due to inherent costs and compensations to be paid to customers for the defective parts and its repercussions. In the case, of customer responsibility (customer is liable for the defect) and specification (product is compliant with the specification), there is a high potential for savings as it is a cost paid by the automotive company that would be minimised if the complaints were answered within the deadlines.

4.5 Problems identified

In summary, we were able to identify several problems in the various stages of the complaints process:

- 1 The average transport time is quite high compared to the defined target (about 17 days for a target of 3 days), which makes it almost impossible to meet the deadline defined for the second report to be sent to the customer.
- 2 There is a lack of resources in the Software Development Teams to efficiently proceed with the defects analysis.
- 3 In some cases, suppliers have difficulties reproducing the defects claimed by the automotive company, which results in a return back and forth of the claimed components between the automotive company and the suppliers.

- 4 High bureaucracy in the problem-solving process of internal production defects at the automotive company leading to delays in the delivery of the final report to the customer.
- 5 Several complaints answered outside the target, whose liability is deemed as customer responsibility, and complaints in which the product is within the specification, creating unnecessary added costs for the automotive company.

4.6 *Improvement opportunities*

To minimise the average complaints response time, the following improvement opportunities have been advanced:

- 1 Complete digitisation of the production-related defect troubleshooting process. The creation of a digital platform where the problem-solving output was maintained and used as a basis for investigation would be beneficial for the agility in sending final reports to clients, this platform should also allow the digital approval of the complaints report.
- 2 Improve the communication with external suppliers to make it easier to reproduce the failure-modes of defective parts claimed by the costumers to minimise time and cost wastages due to the transport of the components.
- 3 Focus should be given to the negotiation of deadlines to respond to customer complaints. Emphasis should be redirected from internal target deadlines towards the accomplishment of the customers deadlines, as non-compliance with those timings translates into increased costs for the company.
- 4 Priority should be given to respond to complaints with customer and specification responsibility to avoid added costs only for non-complying with customer response deadlines, which can lead to cost saving of about 1.5 million euros.
- 5 Resources must be invested in developing and implementing an AI chatbot using NLP to handle customer inquiries and complaints, freeing up people, time and resources from customer support services, which can be allocated to focus on solving the actual problems at hands. Chatbots can increase responsiveness and resolution of basic complaints (Adam et al., 2021), they can also support the identification of trends, tendencies and patterns by analysing data from customer interactions (Ngai et al., 2021), which can provide relevant inputs to identify and fix problems, reducing customer complaints.
- 6 Development and implementation of intelligent agents, based on classification and statistical analysis, mapping and prediction, to relate several inputs, such as questions, problems and occurrences, to outputs, such as failure category, ownership assignment, handling time and cost estimation. Intelligent agents would be convenient to make classifications, assigning ownership for the complaints handling process, and to make predictions concerning, potential failure-modes and improvements to be implemented (Roschk et al., 2021).
- 7 Focus must be given to develop predictive analytic systems, to identify potential issues before they occur, to take proactive steps to prevent customer complaints

(Alarifi et al., 2018), as an example, the Toyota Motor Corporation, in 2018 announced the launch of its 'Toyota connected' platform, using AI and machine learning to run and analyse data, including customer feedback, customer complaints, activated warranties and maintenance service records, to identify issues and trends to implement actions to prevent complaints (Toyota Motor Corporation, 2022).

5 Conclusions

To effectively manage complaints in the automotive industry, there are several challenges to be overcome, including the need of reaching a timely complaint resolution within internal timeframes and contractual deadlines, ensuring the transparency of the complaints management process and a proactive communication with the customer.

Promptly addressing customer questions and issues, from a customer-centric perspective will not only serve customer satisfaction but will also result in cost reductions from contractual fines, when they are dealt within the contractual timeframes.

Although complaints management is a crucial aspect for sustained business success, automotive industries, must not only prioritise complaints resolution, but they must also ensure that the knowledge gained and deployed solutions are incorporated to improve and enhance products, services, and business processes, driving continuous improvement and innovation and ultimately improving the organisation long-term sustained success and customer quality perceptions and experience.

The key issues, identified in this study, that were leading to delays in the response to customer complaints were derived mainly from logistical issues associated to the transport and movement of the claimed components that were defective or with defects, from the unclear definition of responsibilities and allocation of resources to a specific department entrusted to carry out the analysis of the problem root-causes, and also from the high bureaucracy of the complaints handling process.

To minimise some of these issues, improvement opportunities have been advanced, including, digitisation of complaints related to production defects to automate the reporting, analysing options with service suppliers to reduce transport costs, negotiation of contractual deadlines fitting both parties interests, classification and prioritisation of complaints when the customer is liable for the defect and when the claimed defect is actually within the part specification tolerance, and implementation of intelligent agents, including chatbots, and classification and predictive analytic systems, capable of handling customer inquiries and complaints, freeing up people, time and resources, and making classifications to assign complaints handling ownership, and to make predictions concerning, potential failure-modes and improvements to be implemented.

Handling complaints in a timely, efficient, and effective manner is a mark of good business government, and automotive industries must invest in people, systems, processes and techniques to gain credibility and customer trust and satisfaction, and to reduce costs either from the complaints management process or from missing contractual deadlines.

This study provided evidence of relevant differences between the internal defined targets and the actual times necessary to process the complaints, highlighting the main problems in this process, and improvement opportunities have been advanced to minimise costs, but it is unrealistic to think we can drastically avoid costs with complaints, nevertheless it is a worthwhile effort, and as future work, a more specific

approach must be conducted to focus on the types of complaints and customers with higher costs to improve internal quality compliancy processes and to define priorities for good governance in handling customer complaints.

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