Reduction of the Number of Reworks in the Exchange of Screen Throught the Tools on the Quality in a Small Business of Maintenance of Cellphones

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Abstract

The reduction of the reworks carried out by the enterprises is a factor for the reduction of the costs of the products and increase of the profit. The objective of the present work is to introduce improvements with the help of the tools of the quality with the intuited of reducing the number of reworks, consequently reducing also the expense with same. With that there was carried out an analysis based on all the stages of the MASP, in which, the first one would be in the identification of the problem if she used Pareto's diagram to identify the main target of the reworks, on Monday in the observation of the problem applying the flow chart based on the stages of the exchange of screen, the third one is the analysis of the problem carrying out the diagram of cause and effect to identify the main causes of the rework, Wednesday the action plan carrying out it 5W2H for preparation of the projection of the activities to be carried out and in the last stages being the action, checking and standardization. The checklists were introduced and when trainings were carried out for the technicians and also they were created five management indicators the sight, demonstrating a reduction of the reworks in the exchange of screen of 14 (fourteen) in a month for an average of 2 (two) in a month representing so a reduction for R$ 747.00 in each month in the expenses with these reworks.

Keywords - *Rework, checklist, quality, cost.*

I. INTRODUCTION

In passing of the years the term quality it has been getting a more and more important place inside the great and small organizations. The methodologies or tools of the quality represent essential techniques for the improvement of the quality, being able to include for several stages of the process.

The tool Method of Analysis and Solution of Problems - MASP is one of several techniques, which it manages to use many tools of the quality, obtaining the systematization of the ending of the problem. Extremely easy, practical and of great range, same it supplies the finality of the tools of solution of problems of organized and concrete form, making easy the analysis of problems, recognition of his causes and creation of plans of action for mitigation of these causes in the most varied situations organisational.

According to Teixeira (2012) the MASP it is an appropriate method put right in order to distinguish and demonstrate the problems solution or improve a process. It proceeds in the form building the beginning, way and end of a corrective action, given that an information problem can wrap many sectors and persons, being the primordial organization for the success of the work. It is prejudiced of being put in all and any segment, being able to sectors be used in one or more and, for that, there is primordial the participation of all the persons who collaborate with the process up to the stage where there is an effect not satisfactorily or acceptable improvement.

The general objective of the work is the reduction of the costs of the reworks in the execution of services of maintenance in cell phones appliances, through the application of the MASP together with the tools of the quality.

The specific objectives, aiming to reach the general objective, consisted in identifying the types of fulfilled reworks and the respective costs, more impact analysed the causes of the reworks, to propose blockade measures to remove the causes, to check and to accompany the results of the introduced measures.

II. LITERATURE REVIEW

A. Quality concept

The quality started to be basic for all the types of enterprises to grow in the market looking to carry out products or services that attend the demand of the clients, guaranteeing so the satisfaction of same. “With the Quality, you will maintain the already existent clients and they will conquer others, so operating with the least risks and bigger volume of business” (MARANHÃO, 2006).

Complementing, the author Slack (2009) speaks what will learn as manage processes, as will reduce costs and as it will guide the collaborators interfere straightly in the conquest of the clients, “good quality reduces costs of rework, garbage and

devolutions and, more important, good quality produces satisfied consumers" (SLACK, 2009).

B. Tolls of the quality

The tools of the quality are an efficient way and with low cost for improvement of the processes and mitigation of the mistakes, increasing the attention and competence of the team.Godoy (2009) points like tools of the quality to all the processes used in getting improvements and resulted. Among the tools they stand out:

1. Pareto's diagram

Rodrigues (2010) speaks that Pareto's diagram is used to identify the priority problems in a process and today it is widely used in all the levels business. It is shown by vertical printers of bar that puts in order the frequency of the incidents.

2. Checklist

The checklist is considered a tool of easy understanding and with a high effectiveness. Switch (2002) says to be a list or definite relation of activities or items that need to be checked in each process. Being able to be used so much individually how much collectively. There are not definite models, are built and adapted to the necessities of a user.

3. Brainstorming

"Brainstorming or Cerebral Storm is a technique to help a team to produce / create several ideas in the least space of possible time" (RODRIGUES 2010). The focus of this tool is to manage to hear all the ideas, guaranteeing so the participation of all in the process.

4. Diagram of cause and effect

This diagram is used to visualize the main causes of the problem, to make his analysis rich and to identify solutions aiming and supported his search for improvement. To prepare a diagram of cause and effect it is necessary to carry out previously a brainstorming or some another technique that wraps teams of work. (RODRIGUES, 2010).

C. MASP - Methodology for Analysis and Solution of Problems

It is a tool used with the intention of acting against a situation or to improve the current condition of an activity or item.

It stands out still, what should adapt Arioli (1998), the MASP is an efficient method to promote improvements wrapping groups of persons and taking decision based on the solution of problems, generation of apprenticeship and improvement in the quality in his products and processes.

Nevertheless, this scientific tool proposes to act satisfactorily from the identification of the problem even in the actions and measures that must be taken.

III. METHODOLOGY

The typology of this work open to question is of nature exploratory, it takes as an objective the "ramification of ideas and the lifting of more correct hypotheses for a more precise study" (HONORATO, 2014). Based on the technical proceedings classify this article like case study, given that for Gil (2008), one bases on the specific study of one or more objects, allowing an analysis it specifies of his characteristics. To shape as case study was collected the data of the small business to manage to identify the problem.

To analyse and to solve the observed problem there were used the tools of the quality presented in the revision of literature, with the application of the MASP based on all the stages of the cycle PDCA.

In the stages of identification of the problem and observation Pareto's diagram was used aiming at the characterization of the problem, identifying the type of maintenance that more produces cost with the reworks. In the analysis stage, was carried out brainstorming together with the diagram of cause and effect presented in the figure 1, aiming to lift the causes of the reworks in the screen exchange. In the stage of plan of action of the MASP, with the help of 5W2H when was presented in the figure 2, there were found the causes and proposals measured to remove same. For the stages of action, checking and standardization they were put in practice the action plan, demonstrating so the change occurred in the routine of maintenance, aiming at the blockade of the problem, and already in the last conclusion stage the attendance of the data was carried out collected initially, in the period from 01st of August till 31st of October of 2018, aiming to check so a significant reduction of the reworks in accordance with the planned.

IV. RESULTS AND DISCUSSION

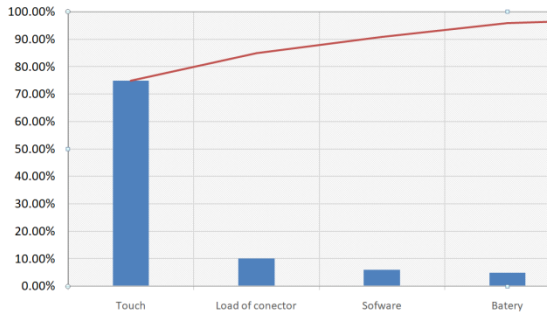
As presented in the methodology, the execution of the MASP in the present work it will be on basis of the phases of the Cycle PDCA, where six stages will be followed: identification of the problem, observation of the problem, analysis of the problem, preparation of the plan of action, checking and standardization

A. Identifications of the Problem

Carrying out meetings with the proprietary and technician of the small business, and due to the enterprise to be recent in the market and without presenting straight contestants in the city it was identified what same was carrying out very much reworks, producing so the dissatisfaction of the clients and increase of the costs of the maintenances.

In order that we managed to visualize the type of maintenance that more produces income and that

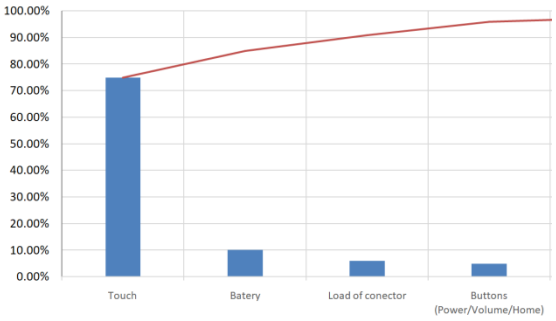
more has demand in the small business a data collection happened in (order of service) of the enterprise between the May the July of 2018. For to manage to expose and to analyse these data was prepared Pareto's diagram (profit x frequency). It happened like reference of the middle profit of the maintenance of four models of more apparent cellphone in the shop. When as was shown in the graph 1.



Graph1 – Pareto's diagram (frequency x Profit)

It is possible to observe for the graph 1 what the service of exchange of screen they represent the biggest volume of the services carried out in the shop, signalling initially that the attention should be concentrated in this type of service.

To analyse the impacts in the cost the same time interval was used of printer above, there happened another Pareto's diagram (Rework x cost) for to identify if the branch of activity that demands the biggest rework volume also demands the biggest cost.



Graph2 – Pareto's diagram (frequency x Rework)

Happened for the graph2 that the screen exchange represents the biggest cost of the reworks confirming which actions must be taken to this type of rework.

Confronting the results obtained in the specified months, one identifies that the screen exchange demands the biggest profit with maintenances of the shop, when R$ 43,762.50 are approximately according to graph 1. Analysing the reworks we know already that same they presented an expense of approximately R$ 5288.00, having in mind that the screen exchange is responsible for R$ 4900.00 of these reworks when are representing an expense of 12 % of the profit in accordance with the graph 2.

B. Observation of the Problem

The process of exchange of screen happens in the very simple form, the appliance of the entry in the shop where in the first contact (o) attendant it them does opening of and passes the budget for the client, after this opening the telephone is identified and taken to maintenance area together with the screen that is to be substituted. Brought near to the hour of the disassemble there is done any process of opening of the appliance, some longer processes different quicker because of each appliance has his peculiarity, as it happens in all the electronic appliances. When after that one was carried out it exchanges, the screen is glued again in such a way that to open again it would run a high risk of break of this screen, if it lost the mixed up screen and if it took risk of damaging component. When after the substitution was carried out the appliance waits for the drying process and later turn for attendant where same he gets in touch with the client to do the devolution of the appliance.

C. Analysis of the problem

They basing in the knowledge and experience were carried out brainstorming to prepare and to explain ideas, problems or questions, in order to identify the possible primary and secondary causes of the reworks in the screen exchange. For better visualization and identification of the causes was carried out the diagram of cause and effect in the figure 1.

Graph2 – Pareto's diagram (frequency x Rework)

For the diagram of cause and effect we identify that the main causes are made a list to the suppliers, services used of the technicians and the used material. On basis of these main causes an action plan can be prepared aiming to blockade them.

D. Action plans for resolution of the problem

After the definition of the probable causes of the analysed problems, an action plan was prepared 5W2H, as shown down, prioritizing the main questions lifted in the diagram of cause and effect so that the process of corrective action obtained a

positive result, because of understanding that the mitigation of these possible causes would provide a significant benefit in the reduction of the numbers and expenses with reworks.

Rework							
Causes	What	Why	How	Where	Who	When	How Much
	O que	Porque	Como	Onde	Quem	Quando	Quanto?
Supply of similar materials lowers quality	To look for other suppliers of better quality	To avoid the assembly of matters that will be going to present defects	Investigating in the Internet and checking evaluations and contacting	In the shop	José Guilherme Andries - Owner	Until 01/01/2019	x
Damages in the transport	To carry out selection of the received commodity	To detect possible damages when the transport was owed	Checking state of the packing and carrying out visual inspection in the component one	In the shop	Ana Luiza Almeida - general office	Until 01/07/2018	x
t fails in the component lodgers and Not realization of appropriate tests	To carry out tests to check the perfect functioning of the component ones	To avoid the appearance of the defects after the assembly of the appliance	When the check-list is preparing for realization of test before the assembly of the appliance	In the shop	Gabriel - technician	Until 01/07/2018	1 day = R$ 55,00
Quality of the component ones	To carry out quality control for manufacturer	To guarantee the quality of the component one	Creating control of faults for manufacturer	In the shop	José Guilherme Andries - Owner	Until 01/01/2019	x
I wander in the assembly	To carry out trainings for the maintenance technicians	To avoid assembly mistakes	Doing online courses	In the shop	Gabriel e Andre - technician	Until 01/07/2018	R$ 650,00 x 2 = R$ 1300,00

Figure 2 – 5W2H

The prepared action plan defined measures determining persons in charge and terms for blockade of each one of the identified causes, allowing the attendance and effectiveness of each one of them through the creation of the specific indicators when it is the case.

E. Action

The action stage was carried out basically in what was planned, the attendance was done through periodic meetings, when there are aiming at the effectiveness of each fulfilled change, such as the difficulties that appeared for the execution. In these cases, additional actions also were defined to guarantee the continuity of the realization of the actions.

For the compromising and involvement of the team, the planned actions had a very low cost, as soon as the persons in charge looked for the forms of executing those using internal resources and times of the enterprise, respecting the requisites of the tasks and the stipulated terms. The main fulfilled actions went to realization of trainings for the technicians with the intention of reducing the mistakes in the process and also the preparation of two types of checklists, being the first one to help to solve the reworks made a list to the arrival of the component ones and another checklist turned in order that the component favourable ones tested all to mistakes so that the technician does not glue the screen without before testing them, aiming so at the reduction of the costs of the reworks. Both checklists were prepared together with the proprietary and technicians of the establishment, collecting technical information and experiences so that the same thing attacked straight in the occurred mistakes.

Check-list Touch		
Client:	OS	
Date:	Model:	
Testar	☺	☹
Proximity sensor		
Camera frontlet		
Speaker		
It fails in the touch		
Buttons power/volume		

Check-list Receiving of Orders		
Verificar	ACCEPT	REFUSE
Is addressee correct?		
Is packing damaged?		
Does packing present signs that it wetted?		
Is content the same that it was asked? (to tally with the NF)		
Does not content present damage?		

Figure 3 - Checklist

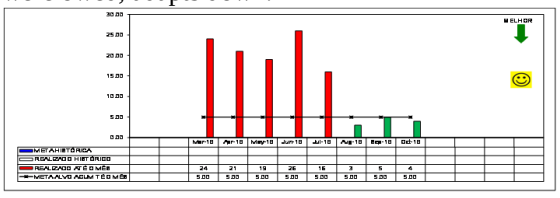
Two new stages were introduced, being the first one to realization of the selection together with the orders checklist after it brings the commodity near in the shop, and the realization of the checklist of exchange of screen before the technician to begin gluing the screen, looking to solve the problems before the screen to be glued, both aiming at the reduction of the expenses with reworks in the screen exchange.

F. Checking

To carry out the attendance of the plan of action and to check his effectiveness they were that we prepare 3 (tree) indicators with data collected in the orders of service between the 01st of August to the 31st of October of 2018, which integrated the management the sight of the shop. These indicators are detailed following.

1. General Rework

Number of reworks carried out to each month, for which it was defined the initial mark of 5 (five) reworks, since it would be impossible in the first moment to reduce the mark for 0 (zero), when the faults that could take place in component someone that are besides the capacity of control of the shop were owed, adapts down.



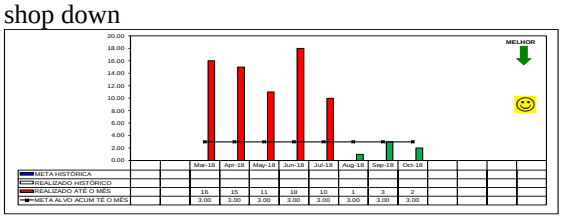
Graph 3 –General rework

Through the analysis of printer above that represents the total of reworks carried out to each month, happened a significant reduction of the total number of rework, proving the effectiveness of the introduced measures.

2. Exchange touch Rework

One checks that the screen exchange represents the biggest percentage of the reworks (66

%), so, an indicator special for her was prepared, when there are defining like mark 3 (three) reworks, since there would be impossible there establishes a mark 0 (zero) owed the faults that could happen and what are not of graphic control of the conformable shop down

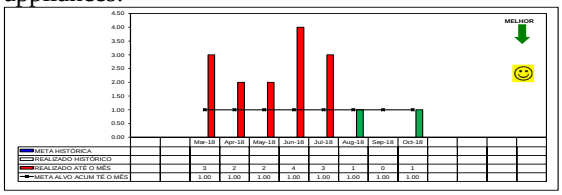


Graph4–Exchange touch rework

According to the printer above that represents numbers of reworks in the screen exchange happened an expressive reduction of the numbers of reworks, impacted straightly in the reduction of numbers of reworks general. Confirming that his identification as main cause of the reworks was correct and that the measures introduced for his blockade were efficient.

3. Assembly mistake

In order that we managed to carry out the attendance for actions when it was proposed for the blockade in the fault in the assembly, there was created this indicator that writes up monthly the number of occurred mistakes attributed to fault of the technician in the execution of the assemblies of the appliances.



Graph5–Assembly mistake

Printer above showed that after the training the number of mistakes reduced contributing to the reduction of the general reworks.

G. Standardization

Carrying out the attendance of the indicators a significant reduction was noted in the reworks and his respective costs, representing an economy for R$ 747.00 at home month. Due to the positive result, these actions were integrated in the routine of the shop to guarantee the continuity of the effectiveness of the actions (checklists, alteration of the flow chart and periodic training). Also when the management practice is adopting the sight of the indicators.

V. CONCLUSION

This work was developed in the concepts of the management of the quality, and it obtained significant profits, since it prepared processes and introduced same. The study took the reduction of the reworks as an approach in the main branch of activity practised by the shop that went to screen exchange, the methodology MASP was integrally worn-out like base to carry out and to prepare analysis and identification of the causes of the problem. From the stage projection prepared a plan of action that allowed the reduction of the reworks through introductions of the tools of the quality.

I ended what from the actions prepared in the plan of action, like the checklists and trainings, obtained a reduction in the costs of the reworks of 76 %, increasing so the profit and clever time of the shop. We can, since, besides the work benefit also economically the enterprise; also it observed a profit in the satisfaction of the clients, since same they would not need to return to the shop to point to the rework.

With the intention of 0 (zero) looks for the mark for the indicators of rework made a list of the quality of the component ones, it recommends in order that future work carries out a detailed evaluation of the suppliers and the thorough attendance through the creation of another indicator of faults in the component ones.

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