

Impact of Electricity and Availability of Spare in servicing Electronic Devices

Project submitted by:

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Executive Summary:

One of the important fields that exist today is Electronics. It plays a key role in the development of technology and communication. Some of the electronic devices include televisions, computer, laptops and mobile phones. These electronic products can be damaged in time. Hence the repairing firms are way more needed for the people as same as manufacturing firms. The firm which I have taken for study is J. Y. M. Electronics which is an electronic servicing company. They service LED and LCD televisions at low cost. There are several problems which are existing in this firm. Two of those problems are taken to study. The first problem is the decrease in efficiency of the firm due to the frequent power cuts. The second problem is the decrease in profit of the firm due to petrol charges that is wasted due to unavailability of spare parts nearby. In the first part of the report, the analysis process of the data obtained is discussed. In the second part of the report, the result and findings from the data is discussed. In the final part of the report, detailed explanation of the result and the recommendation for the business is provided.

Brief introduction of the Organisation:

Name of firm : J. Y. M. Electronics
Owned by : Mr. Y. Manikandan
Location : Railway Station road,
Mathilakam, Marthandam,
Kanya kumari,
Tamil Nadu - 629165.
Contact : 9444573332

J. Y. M. Electronics is an electronic servicing company which is situated in Kanyakumari district. owned by Y. Manikandan. The company services electronic devices like LED and LCD televisions. They service at a very low cost in faster time. It belongs to B2C type of business. If the serviced product comes back with same complaint within one month, they service the device at free of cost.



Analysis process:

The analysis process deals with 5 steps.

- Collection of data
- Cleaning data
- Manipulating data
- Analysing data
- Visualizing the data

Collection of data:

The data is collected is the observational data which is collected by open survey and recording information. The data such as number of LED and LCD TV's, number of TV's serviced, and service charge earned are from the bills obtained from firm and the data such as number of working hours because of problems are obtained from separate collection of data through meetings. The data is collected for a period of four months. The data of the month of October, 2022 is collected on November 1, 2022. The data of the month of November, 2022 is collected on December 4, 2022. The data of the month of December, 2022 is collected on January 2, 2023. The data of the month of January, 2023 is collected on February 1, 2023

The firm charges ₹350 for TVs less than 32 inches and ₹ 600 for the TVs above 32 inches. Some of the problems in the TV's are power supply problem, backlight problem, display problem, software issues and motherboard problem.

| Week | Period of time | Balance no, of TV's pending from the previos week | No. of LCD TV's | No. of LED TV's | Total no. of TV's | No. of TV's serviced within the week | No. of working g days | No. of working hrs | Obtained no. of working hrs because of problems(app x.) | Service charge earned | Loss due to petrol charges (appx.) | Balance profit earned(appx.) |
|------|----------------|---|-----------------|-----------------|-------------------|--------------------------------------|-----------------------|--------------------|---|-----------------------|------------------------------------|-------------------------------|
| 1 | Oct 02-Oct 08 | 0 | 5 | 12 | 17 | 10 | 4 | 44 | 22 | 4750 | 500 | 4250 |
| 2 | Oct 09-Oct 15 | 7 | 0 | 20 | 27 | 22 | 6 | 66 | 50 | 10700 | 700 | 10000 |
| 3 | Oct 16-Oct 22 | 5 | 1 | 15 | 21 | 16 | 6 | 66 | 47 | 8100 | 650 | 7450 |
| 4 | Oct 23-Oct 29 | 5 | 7 | 10 | 22 | 15 | 5 | 55 | 38 | 7750 | 600 | 7150 |
| 5 | Oct 30-Nov 05 | 7 | 2 | 15 | 24 | 20 | 5 | 55 | 40 | 9500 | 500 | 9000 |
| 6 | Nov 06-Nov 12 | 4 | 3 | 13 | 20 | 18 | 6 | 66 | 55 | 8800 | 700 | 8100 |
| 7 | Nov 13-Nov 19 | 2 | 8 | 10 | 20 | 17 | 6 | 66 | 50 | 8450 | 850 | 7600 |
| 8 | Nov 20-Nov 26 | 3 | 6 | 12 | 21 | 16 | 6 | 66 | 53 | 8100 | 650 | 7450 |
| 9 | Nov 27-Dec 03 | 5 | 1 | 17 | 23 | 19 | 6 | 66 | 51 | 9150 | 1000 | 8150 |
| 10 | Dec 04-Dec 10 | 4 | 5 | 9 | 18 | 16 | 6 | 66 | 38 | 8100 | 650 | 7450 |
| 11 | Dec 11-Dec 17 | 2 | 4 | 14 | 20 | 17 | 6 | 66 | 47 | 8450 | 700 | 7750 |
| 12 | Dec 18-Dec 24 | 3 | 3 | 16 | 22 | 18 | 5 | 55 | 40 | 8800 | 500 | 8300 |
| 13 | Dec 25-Dec 31 | 4 | 1 | 13 | 18 | 15 | 6 | 66 | 53 | 7750 | 800 | 6950 |
| 14 | Jan 01-Jan 07 | 3 | 0 | 20 | 23 | 17 | 5 | 55 | 43 | 8450 | 700 | 7750 |
| 15 | Jan 08-Jan 14 | 6 | 3 | 17 | 26 | 21 | 5 | 55 | 42 | 11100 | 900 | 10200 |
| 16 | Jan 15-Jan 21 | 5 | 5 | 12 | 22 | 16 | 5 | 55 | 44 | 8100 | 500 | 7600 |
| 17 | Jan 22-Jan 28 | 6 | 8 | 16 | 30 | 20 | 6 | 66 | 55 | 9500 | 650 | 8850 |
| | | | | | | | | 1034 | 768 | 145550 | 11550 | 134000 |

Table 1: Collected data

Cleaning data:

The data collected from the firm is the bills of service. These are basically raw data and they are cleaned and organized in an Excel sheet. The name of the customers, address and phone number details are not included because they are highly confidential. The TV's which are serviced daily are combined to weekly data for easy analysis.

Manipulating the data:

The obtained data is manipulated by adding the information like balance number of TV's pending from the previous week, total no. of TV's number of working days and hours. Balance number of TV's indicate the TV's which cannot be serviced with a week due to the problems. Total number of working days and hours are added to compare the decrease in working hours between total number of working hours and working hours actually obtained due to problems.

Analyzing data:

Here the analysis is done in two steps.

1) The first step of analysis is done by interview with the business person.

- Here the analysis of the firm and the problem is done by discussing with the business person.

2) The second step of analysis is done with the help of analysis tools.

- Here the data is analyzed with the help of analysis tools.

Analysis by interview:**Analysis of firm:**

To analyze the firm, first the firm is chosen. Then the chosen firm is visited for further analysis. The analysis of the firm is done by finding the type of firm. Then the source of income is analyzed. Then how the work is done is analyzed. After analyzing the firm, the problem is analyzed. During analysis of the problem, the nature of the problem, the background of the problem and the impact of the problem on the income of the firm is analyzed. Then the data is collected related to the

problem. The nature of the data is obtained and it is analyzed further. As the final step, solution is provided and then the impact of the solution if implemented for increasing the profit and efficiency is analyzed.

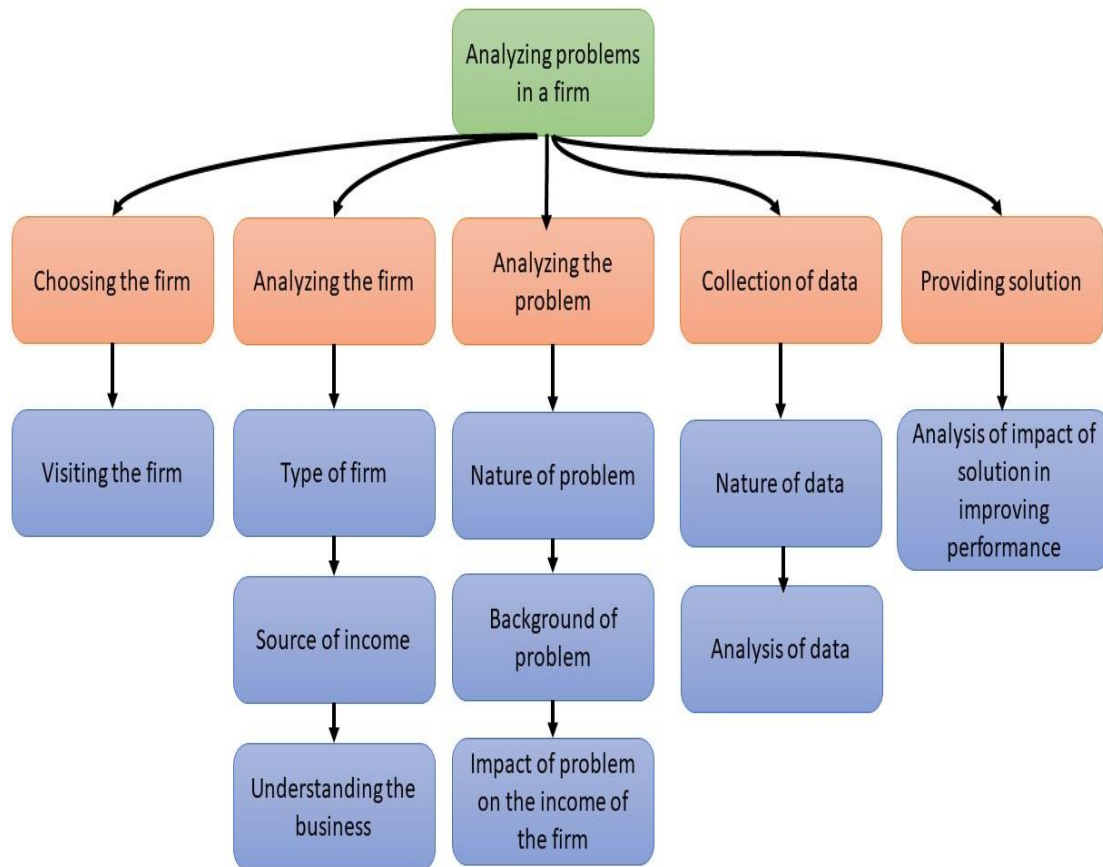


Fig 1: Work breakdown structure of the project

Problems found:

Electricity:

Electronic Servicing is completely based on electricity. When the power is cut for a whole day or for few hours, the work cannot be done in the period and decreases the performance of the firm.

Unavailability of spare parts:

For an electronic device to be serviced, there is a need for replacement of damaged parts. Since the firm is situated in rural area, most of the spare parts are unavailable in the locality which decreases the profit of the firm

Analysis of problems:

Electricity:

Electricity is used in various stages of servicing the televisions. It is used to check the problem, soldering the components, software installation using computer, desoldering the components, BGA rework station, observation of the television after servicing. In the Marthandam where this service centre is located, the power cut is scheduled on first Thursday on every month. Also during rain and even wind can make the power shut in this area. When the power is cut, no servicing can be done in this time and the time required to service the televisions are increased. This decreases the performance of the firm

Unavailability of spare parts:

Spare parts used to replace the damaged parts in television are display, motherboard, powersupply board, backlight, capacitor, resistor, IC's, MOSFET, adapter, etc.. Spare parts are rarely available within a short distance of 2 kms. Most of the spare part are to be bought from the shops situated in Nagercoil, Balaramapuram, Thiruvananthapuram which are at a distance of more than 25 kms. So the cost for travelling lost due to petrol charges is high. This cannot be charged from the customers. So this decreases the profit of the firm.

Analysis by analyzing tools:

What-if analysis is used by the use of Microsoft Excel for the analysis of data. The total number of working hours, the total obtained number of workings hours because of problems, the total service charge earned and the total balance profit earned are calculated using SUM function. Other functions like AVERAGE, MEDIAN, MODE.SNGL AND STDEV functions are used to analyse the data in Excel.

Size of the sample:

The size of the sample, $N = 17$

Measures of central tendency and dispersion:

| | Obtained no. of working hrs. | Balance profit earned |
|---------------|------------------------------|-----------------------|
| Mean | 45.18 | 7882.353 |
| Median | 47 | 7750 |
| Mode | 50 | 7450 |

Table 2: Mean, median and mode of the data

Spread of the data:

The spread of the data can be analysed by measuring the standard deviation

| | Obtained no. of working hrs. | Balance profit earned |
|---------------------------|------------------------------|-----------------------|
| Standard Deviation | 8.34 | 1315.525 |

Table 3: Standard deviation of the data

The distribution of balance profit earned and obtained working hours is given below.

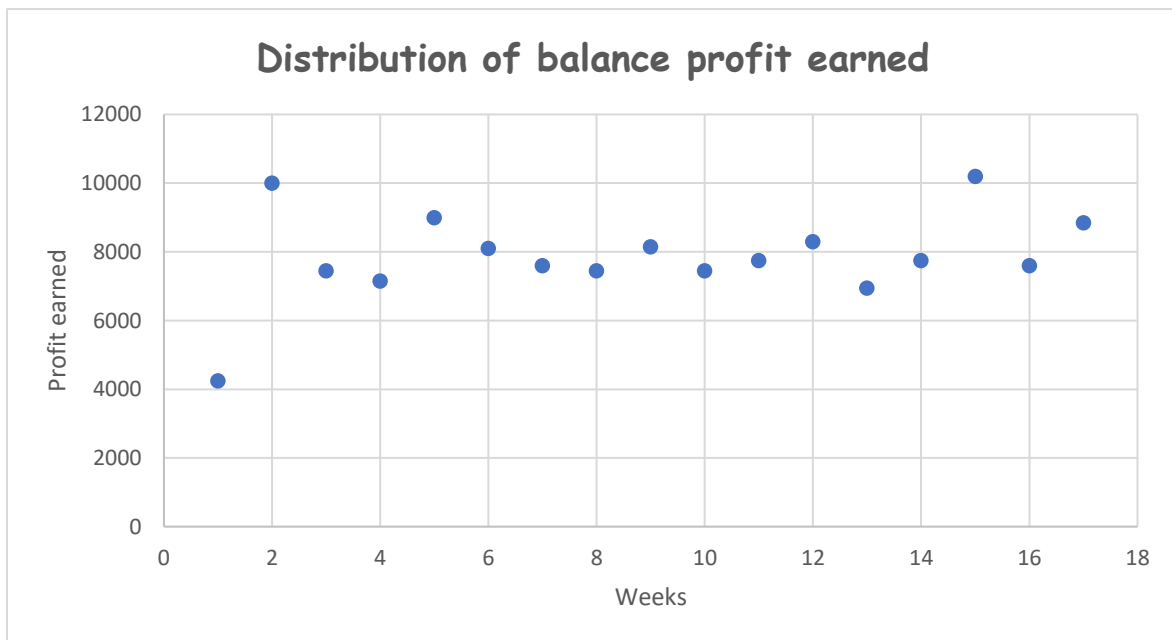


Fig 2: Graph of distribution of balance profit earned

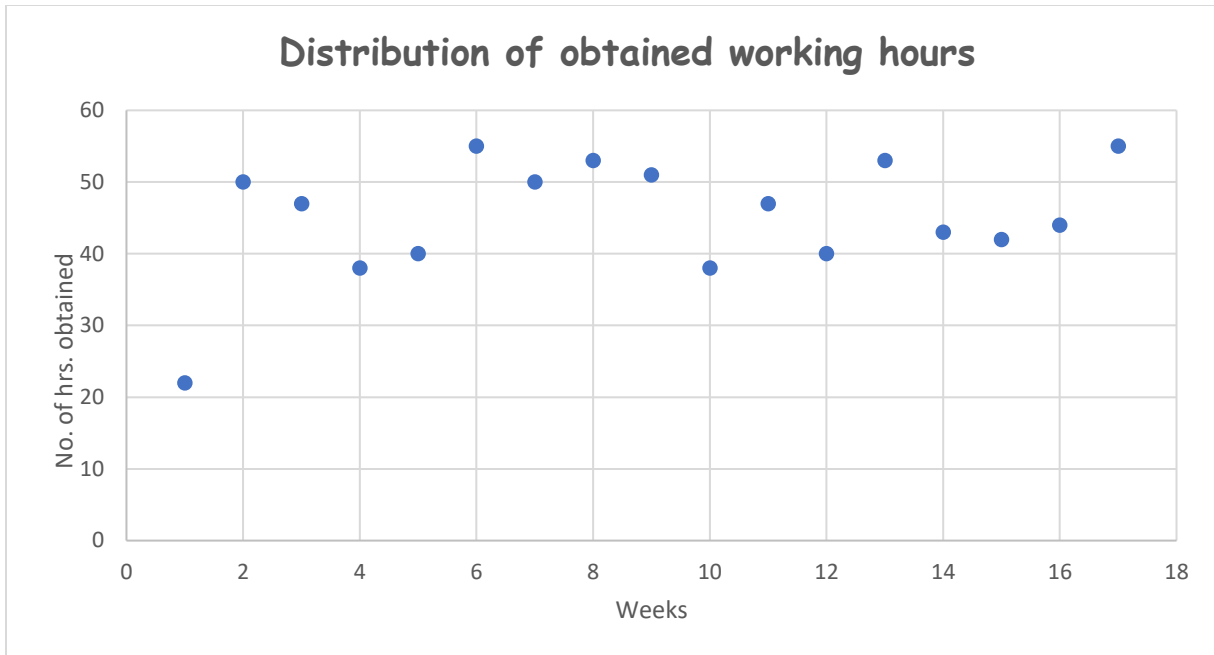


Fig 3: Graph of distribution of obtained working hours

Visualizing data:

For visualizing the data, line charts are used. Since this is a small data, line charts can be used for analyzing and understanding the variations and trends in the data at equal intervals. Pie charts are also used in a single step to analyze the share between LED and LCD televisions.

Here two data are visualized. They are visualizing the income obtained during the 4 months and visualizing the number of days required to service the televisions..

1) Visualization of income obtained:



Fig 4: Graph of decreasing level of service charge earned

Here the visualization is done by line chart. It is plotted against weeks and income obtained in the period of 4 months.

2) Visualization of number of days:

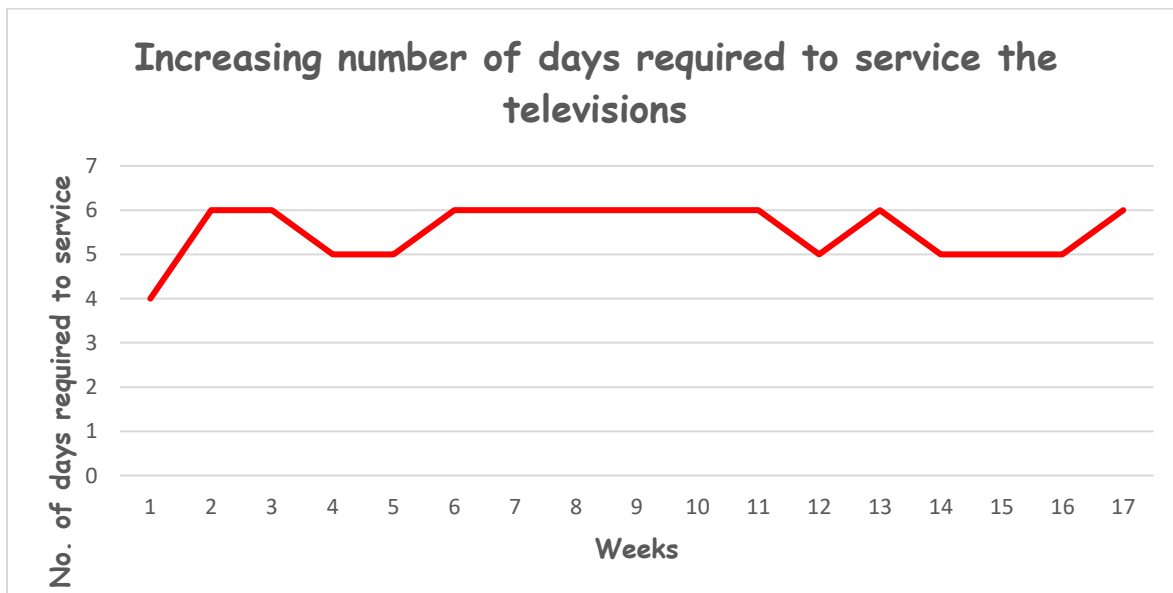


Fig 5: Graph of increasing level of number of working days required for servicing

Here the visualization of data is done by line chart. It is plotted against weeks and number of days required to service the televisions which arrive for service for a week.

Theoretical analysis of data:

1) Efficiency of the firm:

The efficiency of the firm is obtained as

$$Efficiency = \frac{\text{Expected no. of days which actually take to service televisions}}{\text{No. of days taken due to problems}} \times 100$$

$$Efficiency = \frac{56}{94} \times 100$$

$$Efficiency = 59.57\%$$

Explanation:

By calculation, the efficiency is obtained as 59.57% which is a huge decrease. This parameter is very important in this firm because efficiency is the measure of satisfaction of the customers. It is obtained by servicing the televisions are a faster time. Hence step must be taken to increase efficiency of the firm.

2) Decrease in profit:

The percentage decrease in profit is obtained as

$$\% \text{ decrease in profit} = \frac{145550 - 134000}{145550} \times 100$$

$$\% \text{ decrease in profit} = 8\%$$

Explanation:

By calculation, percentage decrease in profit is obtained as 8%. This parameter is also very important because profit is the main reason for a business. 8% of decrease in profit seems to be a moderate loss but steps should be taken to decrease this loss.

Results and findings:

Findings of number of televisions:

| Average number of televisions obtained for repair | Average number of televisions repaired within a week |
|---|--|
| 22 | 17 |

Table 4: Average number of televisions

The above table shows two values. They are average number of televisions arrived for repair and average number of televisions repaired within a week.

- Average number of televisions arrived for repair : 22
- Average number of television repaired within a week : 17

A television can be serviced within 2 or 3 hours based on its complexity in the problem of the television. On total in a week with the average number of televisions obtained for servicing as 22, only 17 televisions are serviced due to lack of time. The remaining televisions are kept bending for the next week.

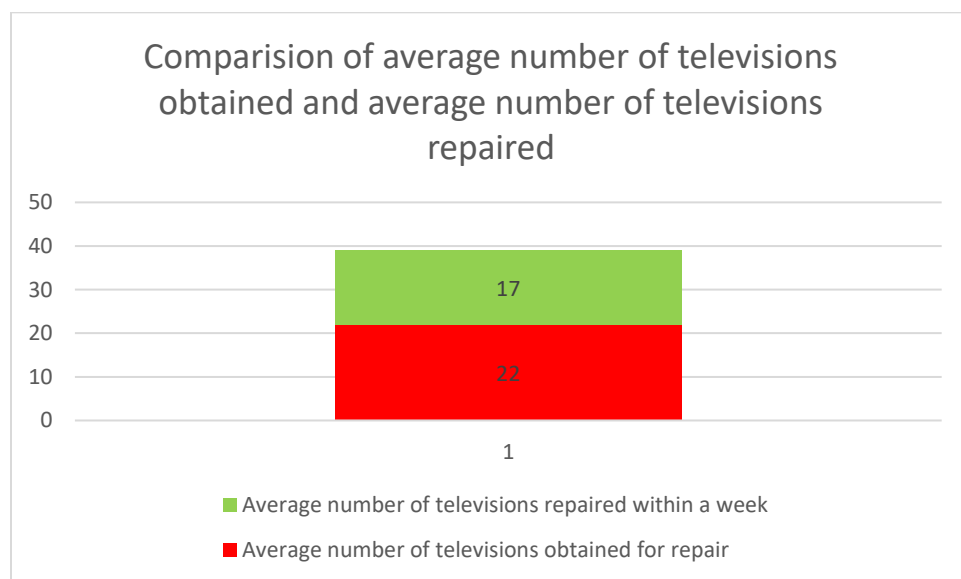


Fig 6: Graph of comparision of average number of televisions

Findings of number of days:

| Average number of days required to service the televisions | Average number of days actually needed to service the televisions |
|--|---|
| 5.5 | 3 |

Table 5: Average number of days

The above table shows two values . They are average number of days required to service the televisions and average number of actually needed to service the televisions

- Average number of days required to service the televisions : 5.5
- Average number of actually needed to service the televisions : 3

The number of days actually required to service the televisions obtained on a whole week is only 3 days. But these days are delayed due to the problem. The monthly powercuts, the powercuts due to wind and rain are the problems due to electricity which delays the number of days. The travelling for spare parts requires a whole day in a week. This highly increases the number of days.

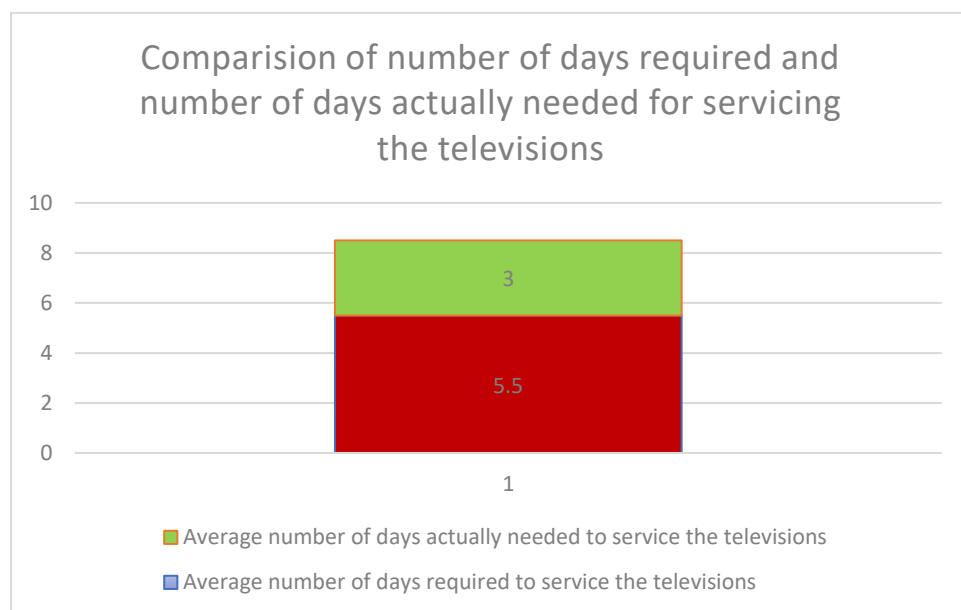


Fig 7: Graph of comparison of number of days

Findings of income:

| Average income with loss due to problems | Average income without loss if there is absence of problem |
|--|--|
| 7747 | 8427 |

Table 6: Average income

The above table shows two values. They are average income with loss due to problems and average income without loss if there is absence of problem

- Average income with loss due to problems : 7747
- Average income without loss if there is absence of problem : 8427

The average income if there is no loss due to problems is Rs. 8427. But this income is reduced by 8% to obtain the income of Rs. 7747. This decrease in profit is due to the petrol charges due to the travelling for spare parts.

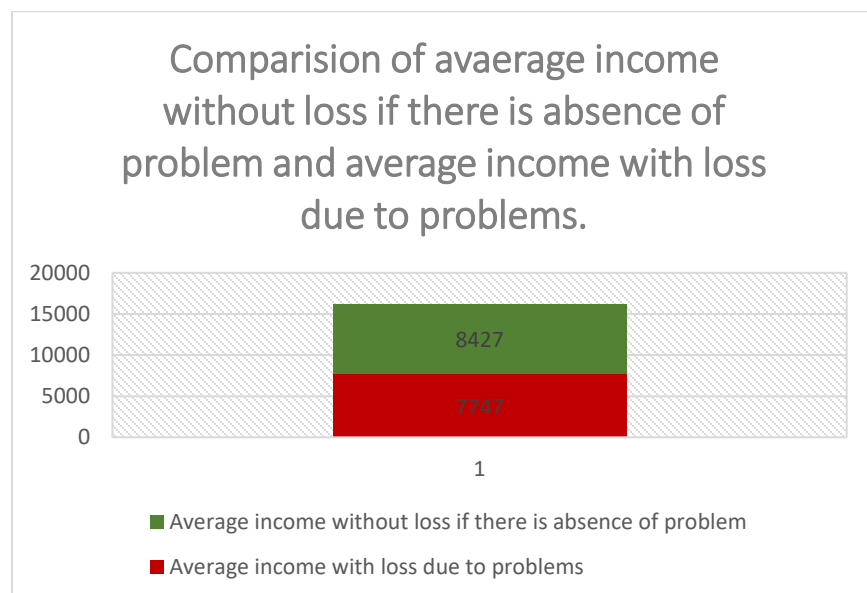


Fig 8: Graph of comparison of average income

Findings of share of number of televisions arrive for servicing:

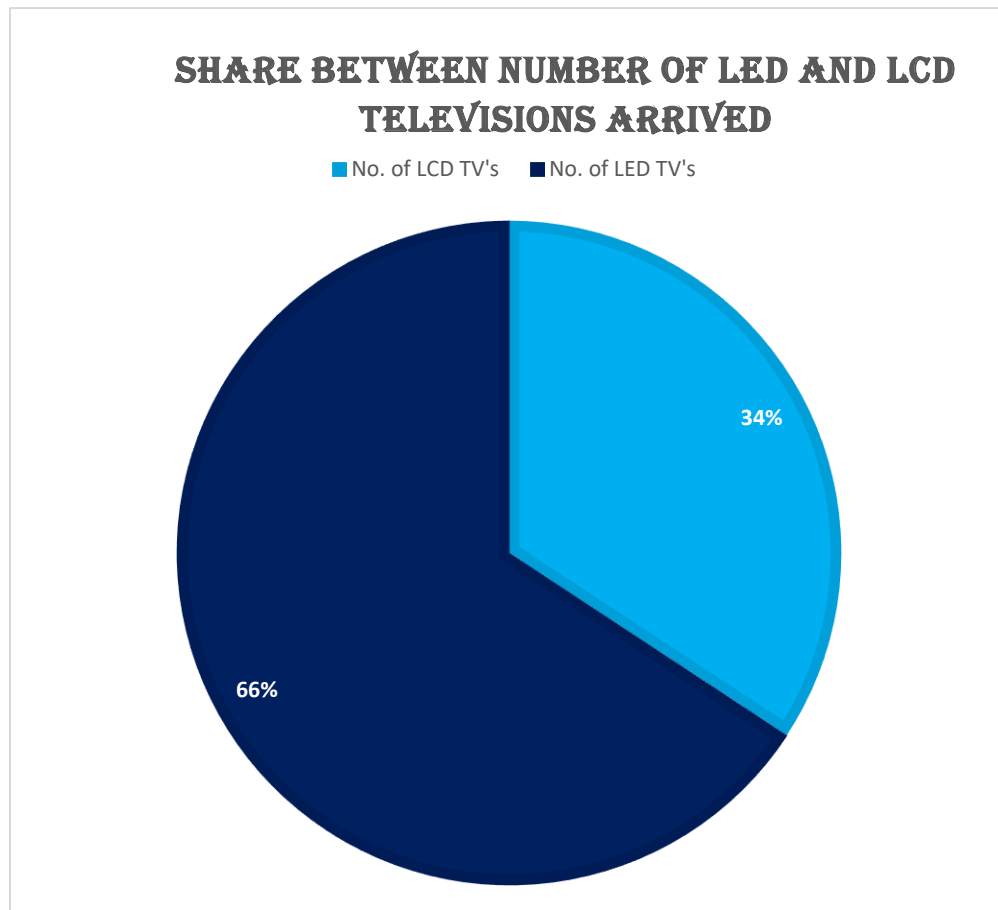


Fig 9: Pie chart on share between number of LED and LCD televisions arrived for service

From the pie chart, it is clear that 66% of the televisions that arrive with problems for servicing are LED televisions and 34% of the televisions that arrive with problem for servicing are LCD televisions. From this it is clear that most of the people are using LED televisions rather than LCD televisions. Hence increasing scope in that area can earn more profit.

Steps to be taken to solve the problem:

To solve the problem of electricity: The use of inverter or solar power can be used to supply electricity during power cuts. Since the cost of solar power is high, the use of inverter can be very effective. This reduces the time period required for a television to be serviced. Hence the performance of the firm is increased.

To solve the problem of unavailability of spare parts: To solve the problem of unavailability of spare parts, simple initiatives can be implemented. One of the initiatives is that the most required spare parts can be bought extra and kept in stock. Another initiative is that the unavailable spare parts which are not available at a circle more than 25 kms can be bought using online marketing rather than travelling. This can reduce the loss due to petrol charges and the time wasted during travelling. Thus it improves the performance and increases the profit of the firm.

Findings after using the solutions:

Findings of increasing income:

| | | | | | | | | | | | | | | | | | |
|------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|------|
| Income with loss | 4250 | 10000 | 6450 | 6850 | 9000 | 8100 | 7600 | 7450 | 8150 | 7450 | 7750 | 8300 | 5950 | 7750 | 10200 | 7600 | 8850 |
| Income without loss | 4750 | 10700 | 7100 | 7450 | 9500 | 8800 | 8450 | 8100 | 9150 | 8100 | 8450 | 8800 | 6750 | 8450 | 11100 | 8100 | 9500 |

Table 7: Income with loss and income without loss

The loss of income due to problems and the income if there is no problem is clearly depicted in the above table

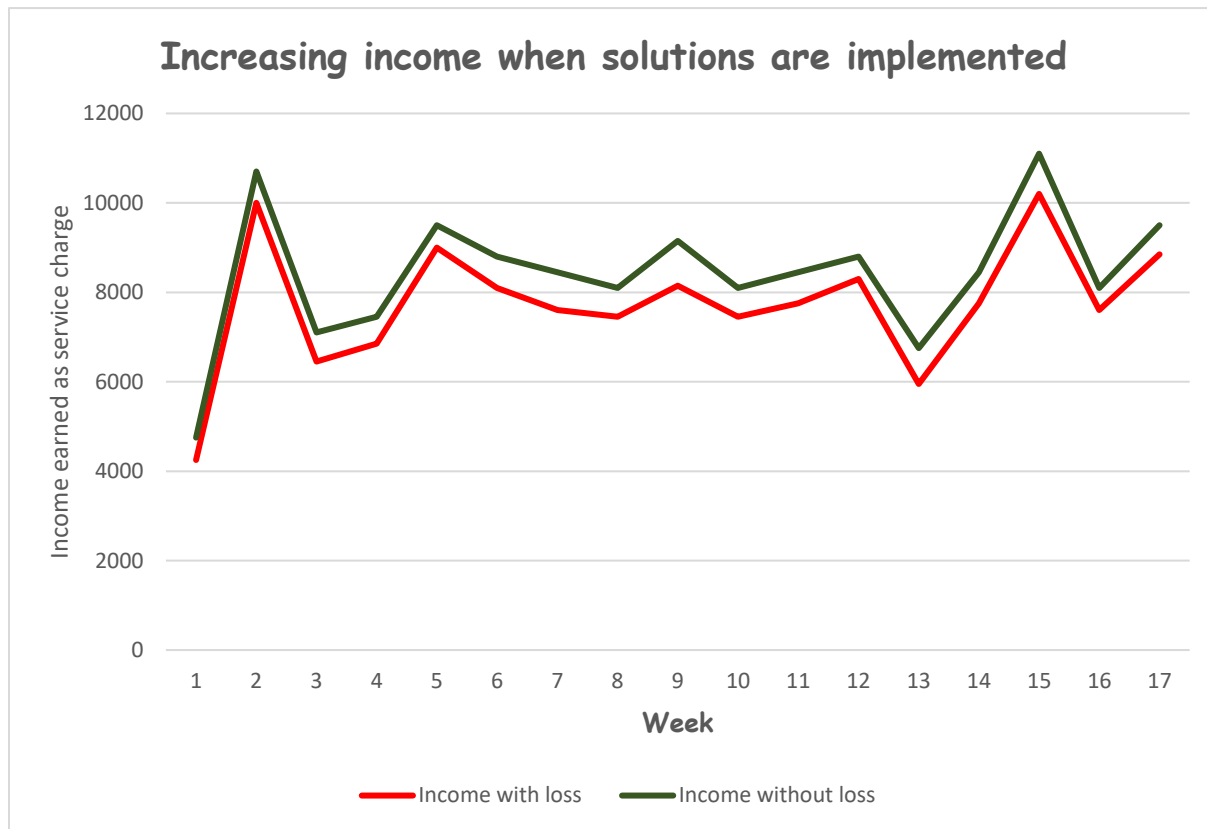


Fig 10: Graph of increasing income

The graph clearly shows the increasing income when the solutions are implemented. When the solutions are implemented, there is a shift in income above the original income. This is due to the fact that when solutions are implemented, there is decrease in loss due to petrol charges.

Findings of decreasing number of days:

| | | | | | | | | | | | | | | | | | |
|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. of days taken due to delay because of problems | 4 | 6 | 6 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 5 | 5 | 5 | 6 |
| Expected no. of days actually needed for service | 2 | 4 | 3 | 3 | 4 | 2 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 4 |

Table 8: Number of days taken

The increasing number of days due to problems is clearly depicted in the above table

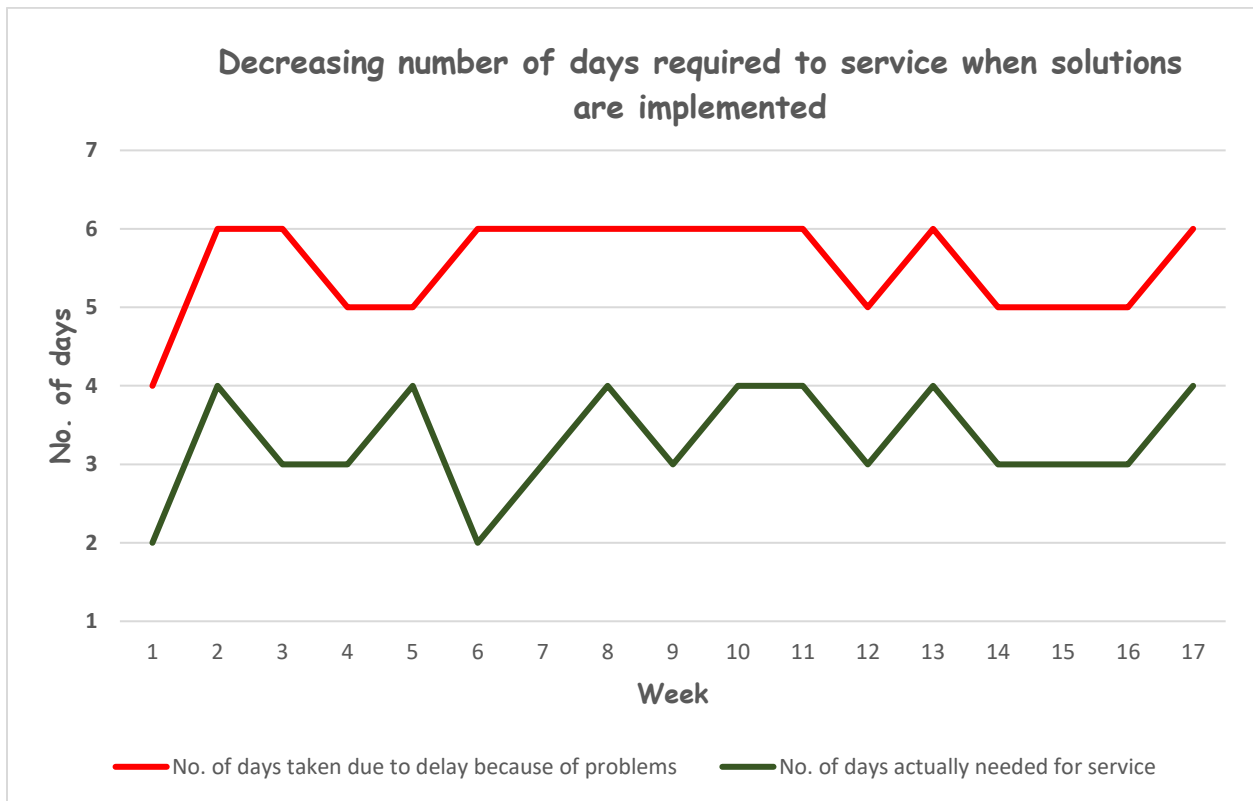


Fig 11: Graph of number of days taken

The above graph clearly shows the decrease in number of days to service the obtained number of televisions when the solutions are implemented. This is due to the fact that when solutions like use of inverters and buying the most wanted spare parts are implemented, this actually decreases the time. The businessman gets more time to service the televisions and they are serviced within the stipulated time. Hence customers are highly satisfied with the service.

Interpretation of results:

When the problem is solved by the given solution, the loss due to travelling for spare parts is reduced and the number of days taken to service TV's is also reduced.

Recommendations:

1) Inverters can be used

The use of inverter can be used to supply electricity during power cuts. Since the cost of solar power is high, the use of inverter can be very effective. This reduces the time period required for a television to be serviced. Hence the performance of the firm is increased.

2) Solar power can be used

The use of solar power does the same effectiveness as the use of inverters. This can reduce the time taken to service a television

3) Keeping in stock of most required spare parts

The most required spare parts can be bought extra and kept in stock. These parts are mainly the spare parts which are universal. The universal spare parts are the spare parts which can be used in many brands of the television irrespective of the brand.

4) Online purchase of spare parts:

Another initiative which can be taken for solving the problem of spare parts is that the unavailable spare parts which are not available at a circle more than 25 kms can be bought using online marketing rather than travelling. This can reduce the loss due to petrol charges and the time wasted during travelling.

5) Charging from the customers:

A small amount of charge can be charged from the customers to compensate the loss of income due to travelling to buy the spare parts at longer distance.

6) Increasing the scope towards LED televisions

From the pie chart, it is clear that most of the people are using the LED televisions than LCD televisions. Hence increasing the scope towards the LED televisions can increase the arrival of more LED televisions.

Conclusion:

To be concluded, efficiency is highly reduced and 8% of the profit is lost. By the use of inverter, buying the most used spare parts to keep in stock and using the recommended points, the loss is eliminated and efficiency is highly improved.