Impact of Electricity and Availability of Spare in servicing Electronic Devices

Project submitted by:

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Roll No : 21F3001238

Executive Summary:

The field of Electronics is an important field. Some of the electronic devices are LED and LCD televisions, computer, laptops etc. The firm which I have taken for the study is an electronic servicing firm. The firm deals with the servicing of electronic devices such as LED and LCD televisions. The proof of originality of the data and the proof related to problems in the business are enlisted here. The detailed process of data collection, cleaning and analyzing the data is discussed here. The metadata and descriptive statistics of the collected data is provided here. The effect on profit and efficiency of the firm due to problems is analysed.

Proof of originality of the data:

Short video of interaction with the business person:

The video of one of the meeting with the business person is given below.

https://drive.google.com/file/d/1J-EISJ7Z75FgzybVtkjpDHJmIvrzcemq/view?usp=drivesdk

Meetings with the business person;

The meetings with the business person were conducted on November 1, 2022, December 4, 2022, January 2, 2023 and February 1, 2023**.** The data about the particular month and the progress or loss in business is discussed in respective months**.**

Letter from the organisation:

J. Y. M. ELECTRONICS

(GOVT REG NO: 180344473. Date – 19/06/2000. Directorate of Industries)

LED, LCD TV Service Centre

Y. Manikandan. Contact No: 9444573332

No: 114G, Railway station Road, Mathialakam, Marthandam, Kanyakumari, Tamil Nadu-629165

Date: 20.03.2023

It is to confirm that ***M. P. Shri Veena***, Roll No: ***21F3001238***, a diploma level student of ***B. Sc in Programming and Data Science*** at ***Indian Institute of Technology, Madras*** has requested the data of our business for doing the ***BDM Capstone Project***. The data of 4 months has been provided in the form of bills to the student. This data is provided **only for the purpose of doing project**. Hence it **should not be shared with others** other than the institution.

Y. Manikandan 20/3/2023

Signature of the owner

Photos related to the problems:

Problem of electricity:

The electricity is used for the purpose of using ht air blower, soldering machine, checking the televisions and for software purposes.

Fig 1: Hot Air Blower

Fig 2: Soldering Machine

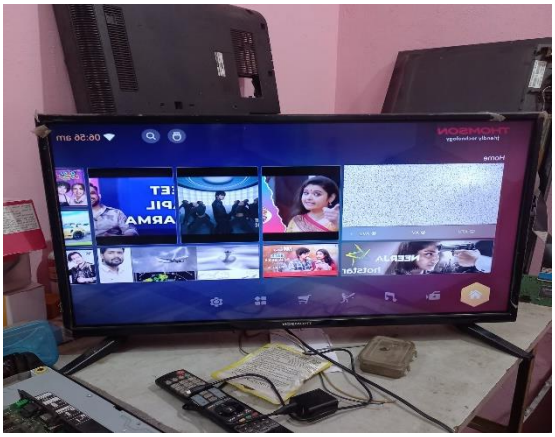


Fig 3: Checking televisions

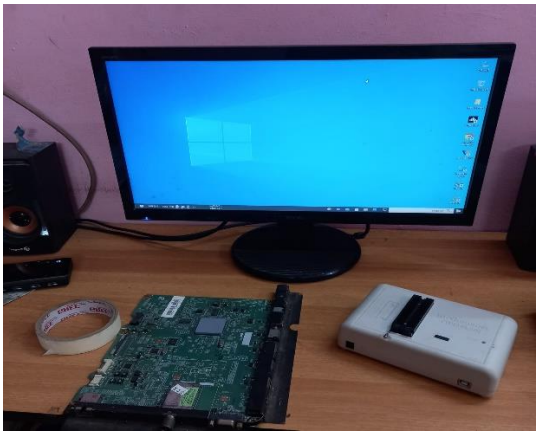


Fig 4: Software purpose

Problem of spare parts:

The spare parts which are used to rectify the various problems in the televisions are backlight, motherboard, IC's fuses, transistors, resistors, ceramic capacitors, speakers, Zener diode, diode, electrolytic capacitor, MOSFETS, STR, T – Con board, LVDS cable and display. Some of these components may available nearby. But many other components are to be bought from distant places of about 25 Kms.

Fig 5: Backlight

Fig 6: Motherboard

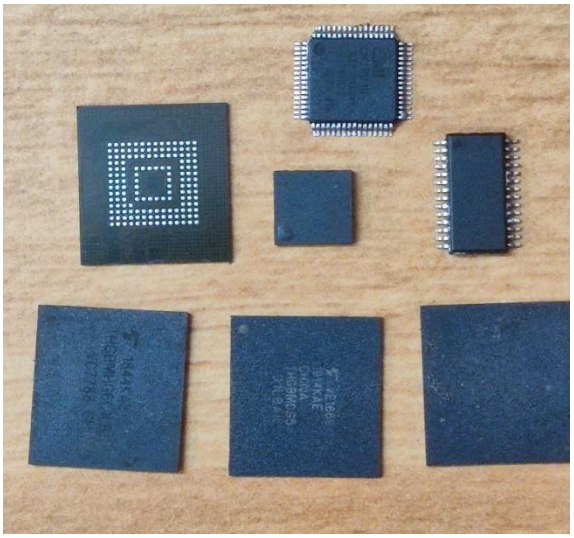


Fig 7: ICs

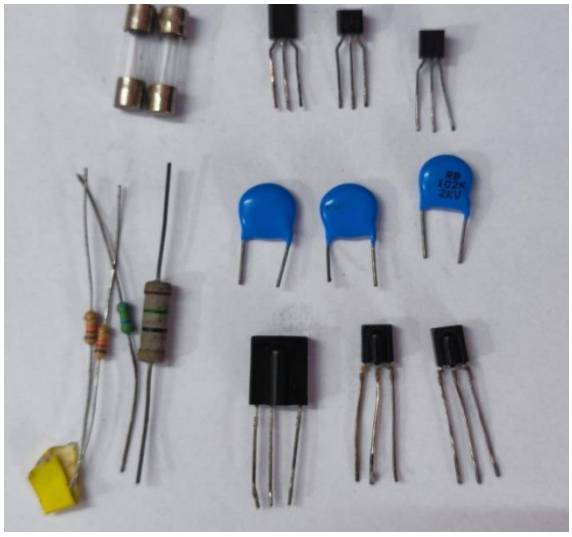


Fig 8: Fuse, transistor, resistors, ceramic capacitors, IR sensor

Fig 9: Speakers

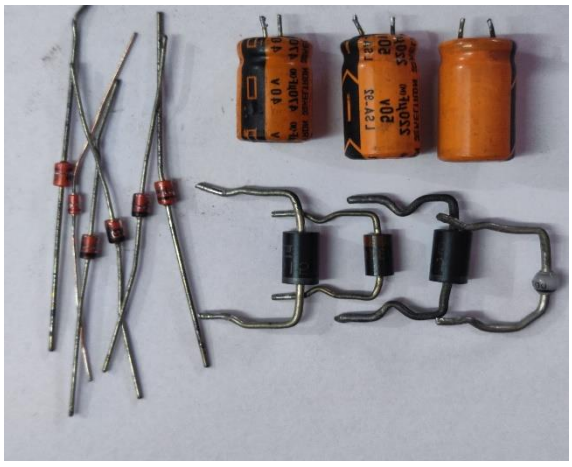


Fig 10: Zener diode, diode, electrolytic capacitor

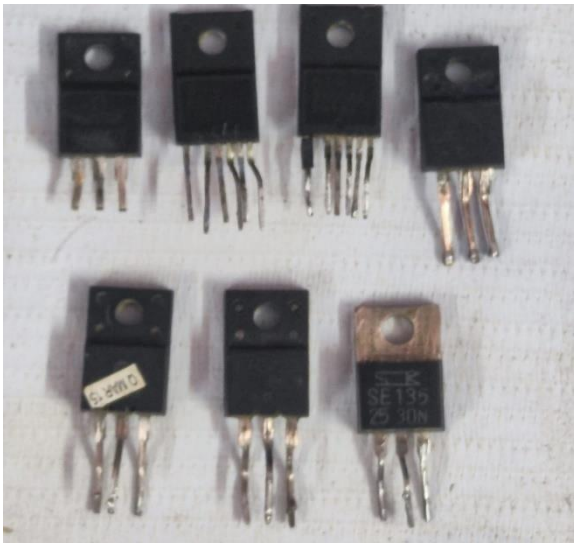


Fig 11: MOSFETs and STR

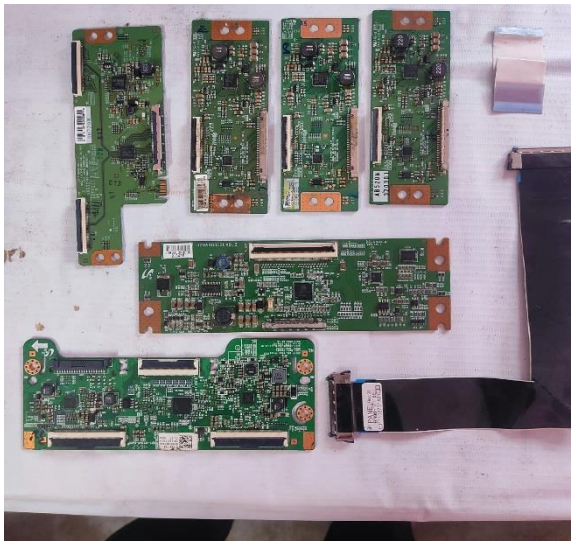


Fig 12: T- Con board and LVDS cable

Fig 13: Display

Metadata:

The data is collected for a period of 4 months. 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. The metadata contains data like litres of petrol wasted on travelling, wasted hours because of problems, number of TV's below 32 inches, number of TV's above 32 inches, service charge of TV's above 32 inches and service charge of TV's above 32 inches.

Week	No. of TV's with powersupply problem	No. of TV's with backlight problem	No. of TV's with display problem	No. of TV's with software issue	No. of TV's with motherboard problem	Litres of petrol wasted on travelling	Wasted hours because of problems	No. of TV's above 32 inches	No. of TV's below 32 inches	Service charge of TV's above 32 inches	Service charge of TV's below 32 inches	Total Service charge earned
1	2	2	4	5	4	5	22	5	5	3000	1750	4750
2	5	3	3	4	7	7	16	12	10	7200	3500	10700
3	3	5	2	6	5	6.5	13	10	6	6000	2100	8100
4	7	4	5	4	2	6	17	10	5	6000	1750	7750
5	4	6	5	3	6	5	15	10	10	6000	3500	9500
6	8	3	2	4	3	7	11	10	8	6000	2800	8800
7	5	4	3	1	7	8.5	16	10	7	6000	2450	8450
8	6	5	2	5	3	6.5	13	10	6	6000	2100	8100
9	7	7	3	6	2	10	15	10	9	6000	3150	9150
10	4	3	3	4	4	6.5	28	10	6	6000	2100	8100
11	6	5	3	4	2	7	19	10	7	6000	2450	8450
12	5	4	5	3	5	5	15	10	8	6000	2800	8800
13	4	5	6	2	1	8	13	10	5	6000	1750	7750
14	7	6	5	2	3	7	12	10	7	6000	2450	8450
15	5	5	4	4	8	9	13	15	6	9000	2100	11100
16	4	4	6	5	3	5	11	10	6	6000	2100	8100
17	5	7	5	6	7	6.5	11	10	10	6000	3500	9500

Descriptive statistics:

Size of the sample:

The size of the sample, N = 17

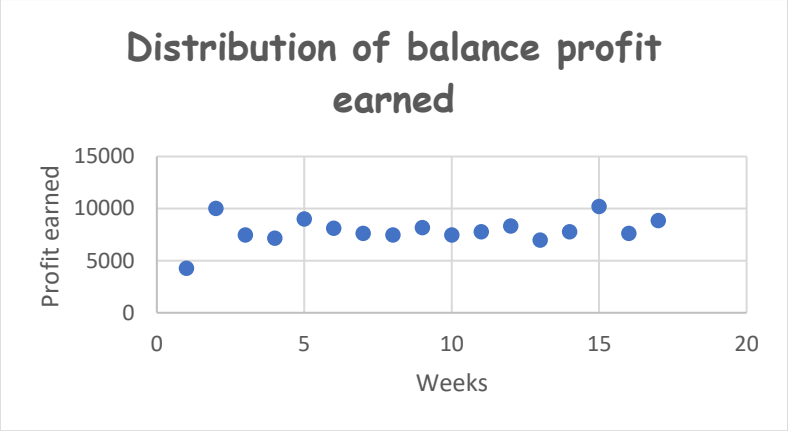
Measures of central tendency and dispersion:

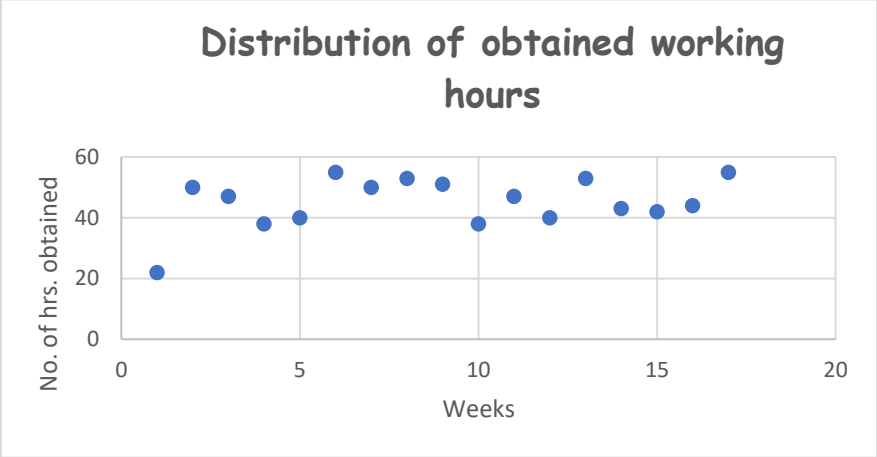
	Obtained no. of working hrs.	Balance profit earned
Mean	**45.18**	**7882.353**
Median	**47**	**7750**
Mode	**50**	**7450**

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





Analysis process:

The analysis process deals with 4 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

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 days	No. of working hrs	Obtained no. of working hrs because of problems(appx.)	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

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 weakly 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.

Analysing data:

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.

Visualizing data:

For visualizing the data, line charts are used. Since this is a small data, line charts can be used for analysing and understanding the variations and trends in the data at equal intervals.

Results and findings:

No. of days taken due to dely 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 neede for service	2	4	3	3	4	2	3	4	3	4	4	3	4	3	3	3	4

The efficiency of the firm is obtained as

$$Efficiency = \frac{\text{Expected no. of days which actually take to service televisions}}{\text{No. of days taken due to problems}} x100$$

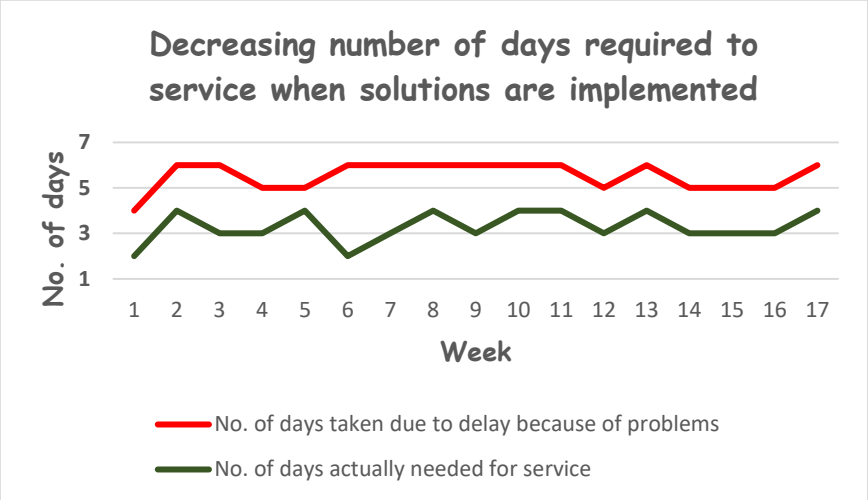
$$Efficiency = \frac{56}{94} x100$$

Efficiency = 59.57%

The percentage decrease in profit is obtained as

$$\%\ decrease\ in\ profit = \frac{145550 - 134000}{145550} x100$$

% decrease in profit = 8%



Conclusion:

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