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Business Trends of Mobile Repair Industry through out the Globe due to Covid-19

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ABSTRACT The COVID-19 a communicable infection caused by the novel "Severe Acute Respiratory Syndrome" (SARS) coronavirus, a global pandemic. With high transmissible in human to human and it's spread throughout the world make a huge impact on human's living and working styles. Lockdown ,social distancing and isolation strategies are adopted by almost every country to slow down the spreading speed of this virus. With the rise of social distancing, we are seeking out new ways to connect which is the internet. And internet use by smartphones and computer tremendously increase during this period. The small and medium-sized businesses have a great impact on this pandemic period which are dependant/in-dependant on internet technologies.Repairs related jobs also impacted by high usage of smart gadgets.

INDEX TERMS Covid-19,Small & Medium Business, Economy, Employees Work Force,Smart Phones,Demand and Supplies, Electronic payments

I. LITERATURE REVIEW

According to the recent reports [1], [3],the Internet usage exponentially increased during the coronavirus pandemic, and therefore the way of living completely changed by everybody within the world. because of the lockdown and social distancing measures, organizations and academic institutes had to stop working, and peoples were bound at home. So, they turn to and adopt the internet related means for work, education, information, and entertainment purposes.

A. THE IMPACT OF COVID-19 ON SMALL/MEDIUM BUSINESS OWNERS

Before the pandemic hit, the business of entrepreneurship was booming day by day. However social distancing limitations, health and economic driven interest shifts from this pandemic. it is expected to close the number of small and medium-size businesses organization. Few of them getting into loss and few become profitable and mobile e-commerce one of them [4], [7]

B. EMPLOYEES SAFETY PROBLEM AND UNEMPLOYMENT

Step by step instructions to protect the labor force from Coronavirus without upsetting business is that the key concern the greater part of business and attempt to permit representatives to telecommute procedures. The labour market initially face work misfortunes and expansion in joblessness were unprecedented, reflecting boundless business closures and stay home policies intended to prevent from virus. [8], [9]

C. CASH,ELECTRONIC PAYMENT SYSTEMS AND REPAIRJOBS

Business use alot of electronic means to run daily operations during covid.. [10]

D. REPAIRDESK POS DATA TO FIND TRENDS OF MOBILE REPAIR INDUSTRY

RepairDesk is worked to robotize the entire cycle of fix shops and to smooth out their day by day exercises to give you more noteworthy significant serenity. This incorporates monitoring fix occupations, overseeing stock, settling on more astute choices thus substantially more. RepairDesk gives total straightforwardness at each stage, beginning from the second the thing is at first dropped off for fix, to when it is picked up.During Coronavirus alot of fix business getting increment or reduction which will be sort out by examining them. [11]

II. DATA COLLECTION

The data used in this project is scraped from different distributed databases of product (Repair desk) under the supervision of company who owns copyright of the product due to data sensitivity and privacy. Only required data fields are extracted from database. The technique used in collecting the data is named as ETL (Extraction, Transformation, Load).

A. ETL (EXTRACTION, TRANSFORMATION, LOAD)

Since information coming from various sources has an alternate outline, each data set should be changed constantly before it very well may be used for Business Knowledge and examination. the way toward removing and aggregating crude information, changing it to make it understandable, and stacking it into an objective framework or configuration, for example, a data set, information stockroom, CSV or text document for simple access and examination, is known as the ETL cycle. [12]

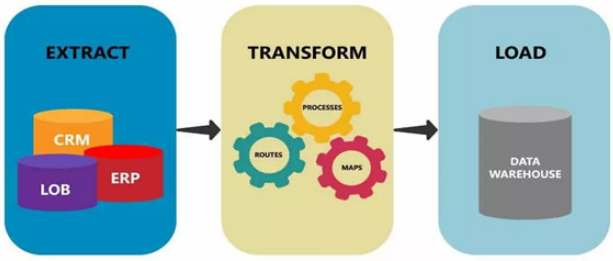

FIGURE 1: ETL $Extraction, Transformation, Load$

1) Extraction

The extraction step covers the information extraction from the source database and makes it available for additional preparing. The fundamental target of the extraction step is to recover all the necessary information from the source database with as less assets as could be possible. The required data are in different databases of MySQL so to extract the data we use bash/php scripting through ETL process using MySQL. [12]

Validations rules are applied during Extraction:

- Oblige records with the source data
- Guarantee that no spam/unfortunate data stacked
- Data type check and validate
- Dispose of a wide scope of duplicated/isolated data
- keys setup check perform

The sample of script used for extraction is attached in Figure 2.

2) Transformation

Data collected from source database is raw and unusable in this shape. Accordingly, it should be purged, planned and

```
public function Integrations($store){
    $_features = ['paypal'=>false,
        'Paypal'=>false,
        'Cayan'=>false,
        'CFD'=>false,
        'Stripe'=>false,
        'MailChimp'=>false,
        'PaypalHere'=>false,
        'Slack'=>false,
        'InternalWiki'=>false,
        'CustomerPortal'=>false,
        'SquareDeep'=>false,
        'Square'=>false,
        'PrintNode'=>false,
        'GoogleCloudPrint'=>false,
        'SmsGlobal'=>false,
        'SmsBroadcast'=>false,
        'ClickaTell'=>false,
        'ClickaTell_2_way'=>false,
        'TextLocal'=>false,
        'Paymentsense'=>false,
        'Tyro'=>false,
        'MobileSentrix'=>false,
        'Billpayments'=>false,
        'RingCentral'=>false,
        'RepairDeskPay'=>false,
        'Netvisor' =>false,
        'FreePBX'=>false,
    ];
    $config = Yii::app()->db_stats->createCommand()->select('name,array')->from('app_config')
        ->where('store_id = ' . $store['store_id'] . ' AND sub_id = ' . $store['sub_id'])->queryAll();
    if ($config) {
        foreach ($config as $_k) {
            if($_k['name'] == 'paypal'){
                $array = unserialize($_k['array']);
                if(isset($array['paypal_enable']) && $array['paypal_enable'] == 1){
                    $_features['Paypal'] = true;
                }
            }elseif($_k['name'] == 'cayan'){
                $array = unserialize($_k['array']);
                if(isset($array['enable']) && $array['enable'] == 1){
                    $_features['Cayan'] = true;
                }
            }elseif($_k['name'] == 'ApproveWork'){
```

FIGURE 2: PHP Script

changed. The information cleaned and eliminate duplication in this progression. [13]

Following are the steps performed on data.

- Modify data according to business needs.
- Change format of data to a standard arrangement for usability.
- Clean inapplicable data from the data sets.
- Sort and clean data.
  - Clear multiple copied data.
  - Re scaled where needed.

3) Load

In final step the cleaned data is stored in a csv and json file for easy to use and saved to local machine.

III. INTRODUCTION

The closing of businesses around the globe due to the coronavirus is remarkable. Stores, production lines, and numerous different organizations have shut by government policies, demands and supplies chains, health interest, or different components. Numerous of these shutting down may be lasting since of the failure of proprietors to pay continuous costs and survive the Closure. The effect on little businesses around the globe is likely to be more curse. The early impacts of Coronavirus on small repairing businesses are not available because the business data not provided by the governments of different countries.

This paper addresses the limitation, like how many repairing jobs increase or decrease during the peak lockdown time in different countries. Cash based or Online based method used for transaction as safety measures and other trading aspects during COVID-19 period. Revenue and expense increase or decrease by repairing related business. which repairing part mostly provided by supplier, Hiring and firing aspect of repair business to manage daily workload. What

Attribute name	Data type	Description
Year	int64	This attribute represent the year of data , and range between 2019 and 2020
Month	int64	This attribute represent the months of data
Employees	int64	This attribute represent no's employees of business during every month
Earning	int64	This attribute represent total no's of sales during every month
Date	string	This attribute is combination of year and month
Store_id	int64	This attribute represents business id as reference
Country	string	This attribute represents business belong to country
Current_Working_Status	int64	This attribute represents business status is active or not
Purchases_Expense	int64	This attribute represent total no's of expenses during every month

TABLE 1: Data Description

kind of e-Gadgets (mobile, tablet, computers) device mostly come to repair? For this we use the data with the special request of gadgets repairing related B2B web software [11].

By significance of this data of 1500+ small repair businesses, we are able to gives understanding into the financial effect of Covid 2019 (Coronavirus) on small repair businesses. The outcomes shed light on the monetary delicacy of numerous small repair businesses. This data is about customer details, payment methods transaction history, e-gadget details of customer, shop related inventories items and the details of purchases with associated suppliers of them, workers and staff member of repair stores, ledgering of revenue and expenses during the period of October 2019 to November 2020 throughout the different countries.

IV. METHODOLOGY AND EXPERIMENT

We have an independent data yearly base in two groups 2019 and 2020 with insight attributes purchase expense, earnings and employees, so we applied different statistical tests T-test,and Cross Tabulation. It is utilized to contrast an sample mean with a population mean or some other important, fixed value.

A. DATA FORMATTING

Data formatting was critical as data was crude, and data was distinct at some point because data gathered from distributed databases. To relate the data and make it meaningful year and month columns were merged in the date column to get a sense of every month earning data. In current-working-status column 1 taking as business is open and working with us and 0 as closed.

B. DATA CLEANING

Some fields have null values. Missing values were fixed by the mostly occurring value of that attribute subject to its matched output, which means that we select all the sample points which have the same output to that sample point, and we place the missing value with more occurring values of that attribute. Remove the store id attribute because it's unique and unusable.

C. T-TEST

The "t-test" is parametric trial of difference, implying that it makes similar presumptions about our data as other parametric tests. The formula for the two-sample t-test is shown below [14].

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{s^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \tag{1}$$

In this equation, "t" is the "t-value", x1 & x2 are mean value of the two set being noticed, "s2" is the standard error of the two set, and "n1" and "n2" are the number of feature in each of the set. A greater "t-value" show that the difference between group mean value is greater than the standard error, showing a more significant difference between the two sets [14].

We can compare our calculated "t-value" against the values in a decisive value chart to know whether our t-value is more than what might be normal by some coincidence. If so, we can dismiss the zero hypothesis and state that the two groups are different in facts.

D. REVENUE COMPARISON DURING PEAK AND OFF-PEAK TIME COVID

We have monthly data from January 2019 to December 2020. During this time period in the first half of 2020 COVID is at its peak and people have more anxiety and psychological problems during this time. So we have a hypothesis on this basis that during 2020 more repairing jobs will generate more revenue. In fig 1 we can see in chart 3 that in 2019 revenue is $1.785576e^{+9}$ and in 2020 it is $2.189717e^{+9}$.

To support our hypothesis we perform a T-test.

Independent sample T test between year and earnings

Ho = The earnings in 2020 is greater than or equal to earnings in 2019

H1 = The earnings in 2020 is less than the earnings in 2019

Group Statistics					
		N	Mean	Std. Deviation	Std. Error Mean
Earning	2019	5352	270776.3	3254492	44486.19
	2020	5352	288565.1	3467709	47400.68

TABLE 2: Earnings Mean, median and std deviation

An autonomous samples "t-test" was utilized to compare the earnings of 2019 and 2020. According to group statistics the number of earnings in 2019(N=5352) and in 2020(N=5352). The t-test was statistically significant, with

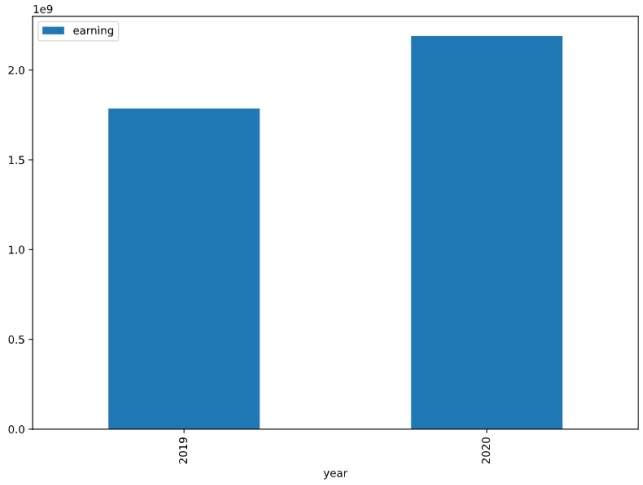

FIGURE 3: yearly earnings

		T	df	Sig. (2-tailed)	Mean Diff-erence	Std. Error Diff-erence	95% Confidence Interval of the Difference	
							Lower	Upper
earning	Equal variances assumed	-.274	10702	.784	-17788 .766	65006 .503	-145213 .583	109636 .050
	Equal variances not assumed	-.274	10659 .192	.784	-17788 .766	65006 .503	-145213 .641	109636 .108

TABLE 3: Independent sample T test between year and earnings

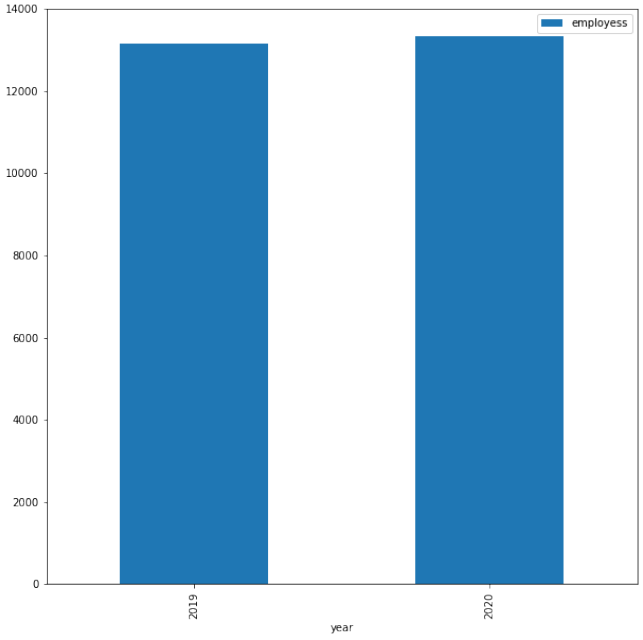

FIGURE 4: yearly employees

Group Statistics					
	year	N	Mean	Std. Deviation	Std. Error Mean
employees	2019	5352	2.46	1.978	.027
	2020	5352	2.49	2.015	.028

TABLE 4: Employees Mean, median and std deviation year vise

mean score. In table it can be observed that, p>.05, Therefore, the null hypothesis is failed to reject. It can be concluded that the earnings in 2020 were greater than or equal the earnings in 2019.

E. WORKFORCE COMPARISON DURING PEAK AND OFF-PEAK TIME COVID

Another effect of covid on all over the world can see the job loss in a number of businesses mostly which includes physical work. But on the contrary there are some businesses which boom during this time. To notice this effect in our business some comparisons are performed. As we have a hypothesis during covid anxiety and depression increase among people thats we see in our earning its increase during 2020 so for now we have a hypothesis that in 2020 we will have more employees then 2019. As it is visible in chart fig 2 during 2019 stores have 13152 employees and in 2020 these stores have 13341. Which is not much difference but means a lot as we noticed business downsized.

To support our hypothesis we perform a T-test.

Independent sample T test between year and no of employees Ho = The no of employees in 2020 were less than or equal to no of employees in 2019.

H1 = The no of employees in 2020 were greater than the no of employees in 2019.

An autonomous samples "t-test" was utilized to compare the no of employees of 2019 and 2020. According to group statistics the number of no of employees in 2019(N=5352) and in 2020(N=5352). The t-test was statistically significant, with mean score. In table it can be observed that, p>.05, Therefore, the null hypothesis is failed to reject. It can be concluded that the no of employees in 2020 were less than or equal to the employees in 2019.

		t	df	Sig. (2 -tailed)	Mean Diff -erence	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
employess	Equal variances assumed	-.915	10702	.360	-.035	.039	-.111	.040
	Equal variances not assumed	-.915	10698 .376	.360	-.035	.039	-.111	.040

TABLE 5: Independent sample T test between year and no of employees

Group Statistics					
	year	N	Mean	Std. Deviation	Std. Error Mean
purchase expense	2019	2982	16.52	23.538	.431
	2020	4169	16.87	26.559	.411

TABLE 6: Purchase Expense mean, std deviation and std error mean

		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
purchase expense	Equal variances assumed	-.575	7149	.565	-.349	.608	-1.541	.842
	Equal variances not assumed	-.586	6830.944	.558	-.349	.596	-1.517	.819

TABLE 7: Independent sample T test between year and purchase expense

F. REPAIR INDUSTRY EXPENSES COMPARISON DURING PEAK AND OFF-PEAK TIME COVID

The expenses of single store shows how much they sold or invest during this time period. as clearly see that they have more expense during 2020 because of COVID.

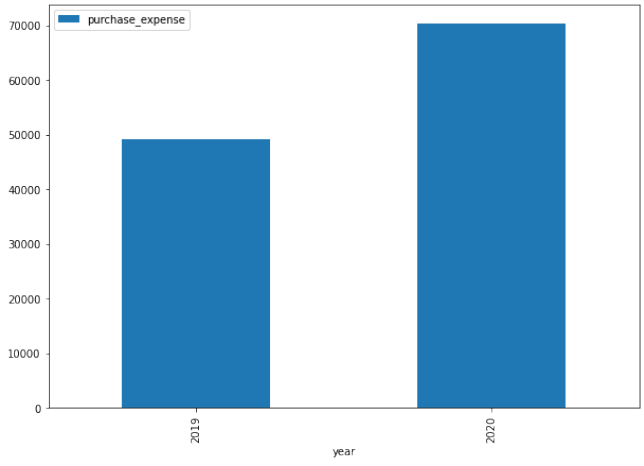

FIGURE 5: yearly Purchase of Stores

Independent sample T test between year and purchase expense

Ho = The purchase expense in 2020 is greater than and equal to purchase expense in 2019

H1 = The purchase expense in 2020 is less than purchase expense in 2019

An autonomous samples "t-test" was utilized to compare the purchase expense of 2019 and 2020. According to group statistics the number of purchases in 2019(N=2982) and in 2020(N=4169). The t-test was statistically significant, with mean score of 2019 (M=16.52, SD=23.538) & for 2020 (M=16.87, SD=26.59). In table it can be observed that, p>.05. Therefore, the null hypothesis is failed to reject. It can be concluded that the purchase expense in 2020 were greater than the purchase expense in 2019.

Cross Tabulation performed in between years effects on purchase expense The cross tabulation of year and purchase expense can be observed in bar chart for the comparison of the number of purchases each year.

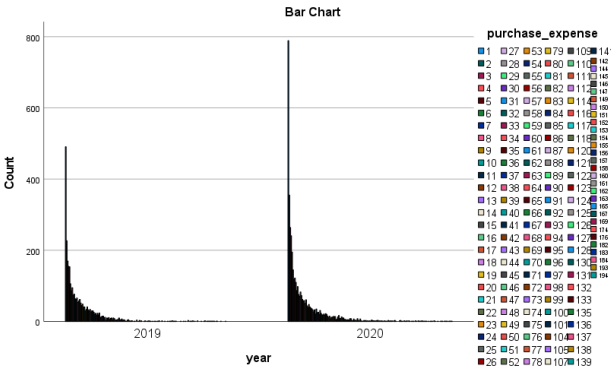

FIGURE 6: Cross Tabulation performed in between years effects on purchase expense

V. RESULT & CONCLUSION

In this paper, we learn about COVID-19 impacts on small and medium size repairing business all through the world. We take the month-to-month base information of sales, workforce, and cost between the period of time of January 2019 to December 2020 from RepairDesk [11] (A POS Software on repairing industry). We apply the T-test on 446 business of 37 distinct nations. In T-test of revenue examination during peak and off-peak time of COVID-19, we find that the small and medium size business revenue increase in 2020 as contrast with 2019. This increment reveals to us that the utilization of electronic devices increments and create equivalent or more chances of repairing business in pandemic. In T-test of work force correlation during peak and off-peak time of COVID-19, we locate that the small and medium size business work power increments in 2020 as contrast with 2019.This increase tell us that the employee's jobs straightforwardly connected with repair jobs and more open opportunities in pandemic. In T-test of repair industry expenses comparison during peak and off-peak time of COVID-19, we find that the small and medium size business cost of purchases increases in 2020 as compare to 2019.This increase tell us that the demand and supplies needs directly associated with repair jobs to run business.

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