

Reformed Vehicle Service System Based On Customer Recommendation

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Abstract: With the changing world of technology, time is considered as an important resource. Many researches are carried out in different sectors to reduce the time consumption in different ways but in some cases, technology has limitation due to its drawback of reduction in employment. In vehicle service centres the customers have to provide their vehicle for maintenance for a long time which is very time consuming and this issue is left unresolved. In this paper, solution to related issues are provided based upon customer satisfaction ratings which will help in saving time of the customer and improving management at service stations with use of different technologies like mobile application, barcode tags, etc. that are present in the market and some new strategies in this field like slot booking. All the work is done keeping customer satisfaction and loyalty in mind.

Index Terms- Vehicle services, vehicle maintenance, Recommendation system, slot booking, barcode in vehicle servicing, Feedback.

I. INTRODUCTION

In the modern world scenario, the most important asset a person have is time. As the world is changing with technology, digitalisation is taking place in every sector there are some sectors which can be digitalised to improve their efficiency. We are living in 20th century and in today's world the wastage of time is the greatest loss a person can face.

Whereas on the other hand the industries focus to fulfil their customer expectations but there come some limitations. If companies introduce complete automation in the service centres there will be a loss of daily wages for thousands of the workers who work in these centres [1]. Many factors are considered before introducing automation in a sector. But can technology be used to manage the resources and time? The answer is yes, technology can be used in different ways to improve the management of the centres.

If we consider the case of vehicle service centres, a person who want to keep his/her vehicle in maintenance have to give vehicle to the service centre in the morning and gets it back by the evening or next morning. Such cases are common at a service centres and these are a result of poor management. It has become a headache to keep a vehicle under maintenance, a person needs to take out time from busy schedule twice a day.

In today's world companies focus too much on customer satisfaction by using different business models, taking surveys, and customer feedback [2]. But the factor of time wastage is not properly taken care of which also comes under the same.

So, introducing technology in the vehicle service stations can save time in different ways. In this paper we have made an attempt to demonstrate that customer satisfaction research is not only a tool to measure customer attitude but also to be a proactive tool. We have devised a platform that will ease the users in servicing of vehicles. The customer can use this application to book the servicing of their vehicle depending on the availability of slots at respective service station. Application recommends the customer about the latest offers and servicing available depending upon his/her previous bookings. The details of the proposed technique in section 3.

II. LITERATURE SURVEY

In the current scenario if a person needs to keep his/her vehicle under maintenance, then he/she need to keep the vehicle at service centre in the morning and will probably get it back by evening. But in case if the person is not able to cut time out of his/her schedule then probably they will get it back by next morning.

In today's world it takes a lot to cut time out of the busy schedule twice a day, first is to handle the vehicle to service centre and after that to receive it back. It takes only 30-45 minutes to service atwo-wheeler [3] and 1-2 hrs to service a four-wheeler vehicle in a general servicing case, it is only a lack of proper management that it takes more than 6 hrs [4].

Introducing digitalization in the vehicle service stations can save time in different ways.

The modern world is changing with technology. The competition is increasing with time and the most successful are those that fulfil their customer need and expectations. Numerous surveys are carried out to gather the customer review and feedback so that the services can be improved [5].

Alderson *et.al.* has proposed a workof customer satisfaction model after performing analysis on data from almost 13,000 questionnaires [5]. This work is used by companies today for customer satisfaction approach. Fig.1. represents Customer



Satisfaction model.

Figure 1: Customer satisfaction model

Although there are many things done by the companies to increase the customer satisfaction but still this issue remains unresolved.

Many researches are going on in the field of customer satisfaction for not only retaining the customer but also for repeated business deals [2]. An attempt is made in this paper to highlight the use of customer satisfaction index as a tool for improving the relationship with the customer.

Customer loyalty and customer satisfaction are always taken care of by the company but still some things are left behind. Fig.2. represents the relation between Customer loyalty and customer satisfaction in different business sectors.

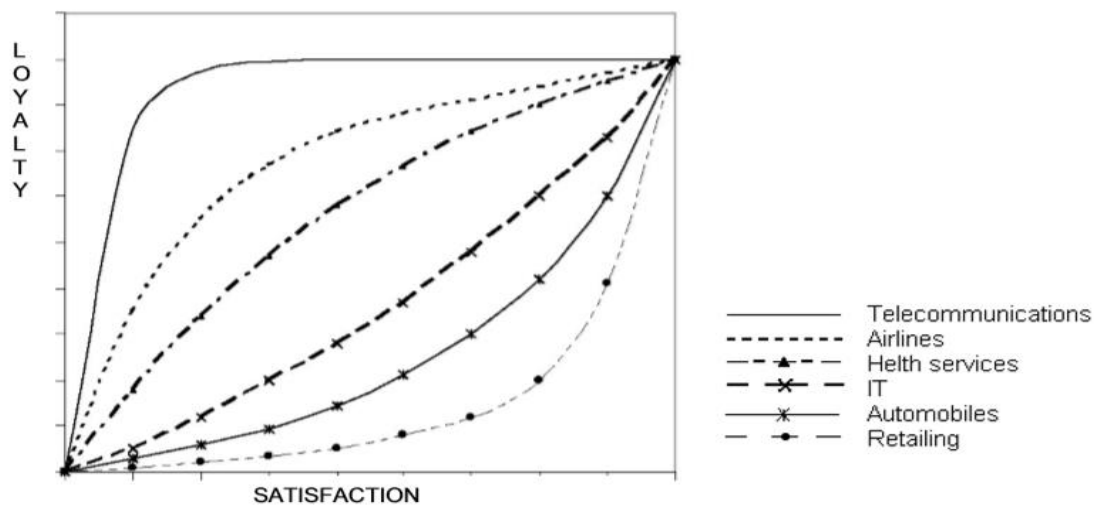


Figure 2: Relationship between satisfaction and loyalty in various industries.[2]

The above graph it can be seen that the customer loyalty is inseparably connected with customer satisfaction but the connection is not symmetrical. The customer satisfaction is not enough with lack of loyalty from the side of service provider, and lack of trust from the customers side [2] [5]. And similarly, there is no use of high customer loyalty when the customer is not satisfied.

To maintain a healthy relationship with customers, the factors are to be kept hand in hand. The lack in one will simultaneously reflect in the other.

III. PROPOSED TECHNIQUE

The issue of improper management of time can solved by slot booking using apps, website, and phone call. Different slots can be booked like appointments such that each slot have a time of 40 mins. The user can manually choose the service centre based upon the current offers and location. If any of the slots remain empty the regular work of the service centre will take place.

A list will be provided on the web site, if user want to change any particular part of vehicle, he/she can just add the item to cart and make payment by online payment gate way.

Currently, we offer the services to all kind of two wheelers and all type of cars in four wheelers. The user has to pay basic servicing fee at the time of slot booking and additional charges may be applied based upon the items purchased.

A barcode tag can be attached to vehicle till the time it is under maintenance. The barcode is scanned at each stage to give live updates to the customer, when the servicing of the vehicle is complete and it is being taken to the safe parking the security staff will scan the barcode tag and a message will be sent to the office staff and a notification is sent to the user that the vehicle is ready to be received.

The customer will be provided recommendation based on the previously searched items and the people who have purchased this item also purchased other items, this will help the customer to select the items. With the increasing growth in online sales this feature will prove as a significant factor to facilitate the customer with different options. This will result in simplification of search for the customer and hence will increase customer satisfaction [6].

The customer can give feedback based upon the service quality of the service centre. Feedback is one of the most powerful influences on learning and achievement, but this impact can be either positive or negative. Its power is frequently mentioned in articles about business strategies [7].Fig.3. represents the state module diagram of different stages through the process.

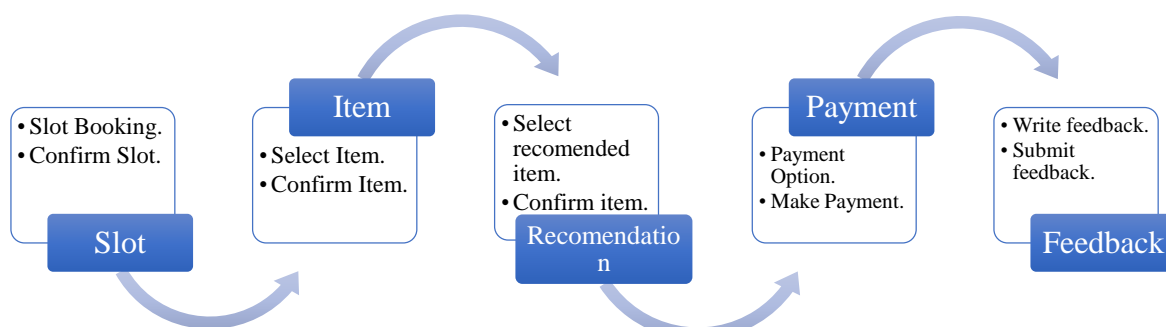


Figure 3: State modules diagram of online vehicle service

Advantages of proposed technique:

1. Customer Satisfaction:
It is one of the most important factors to be taken care of because high customer satisfaction will result in repurchase by customer.
2. Time flexibility for customer:
This factor will allow the customer to choose the time they are comfortable with and this will result in customer satisfaction.
3. Faster processing:
Faster processing will result in good management of time to achieve the target.
4. Customer update:
This feature will provide update of every stage of servicing to the customer so the customer can manage his/her time accordingly.
5. Digitalization:
The use of technology will result in digitalization of the sector hence paper work will reduce significantly.

IV. IMPLEMENTATION

The development of vehicle services using wireless communication facilities allows the sharing of the real time information with the user and such services have huge potential in the market.

The proposed technique is implemented on Windows 10 64-bit Operating system, Intel(R) Core(TM) i5-7200U CPU @ 2.50GHz 2.71GHz, x64-based processor, 8.00 GM RAM.

Firebase Cloud Messaging (FCM) is used to deliver the notification to the user. FCM provides a reliable data connection between your server and devices. It is a battery efficient method to deliver notifications to the user on iOS, Android, and the web at no cost.

Firebase is a cloud services supplier and backend as a service company. Firebase provides a special platform for building mobile and web applications. It can update and build applications in real time. Firebase stores data in JSON format [8].

Notification messages are integrated with Google Analytics for Firebase, giving the user access to detailed engagement and conversion tracking.

There are several barcodes enabled systems present in the market that are being used for various purposes, the benefit of using a barcode enabled system is that it simplifies the work.

Barcode is a machine-readable code that is generated using numbers and a set of parallel line of varying widths. A barcode scanner is used to scan the barcode printed on a commodity [9]. Fig.4. shows example of a barcode.

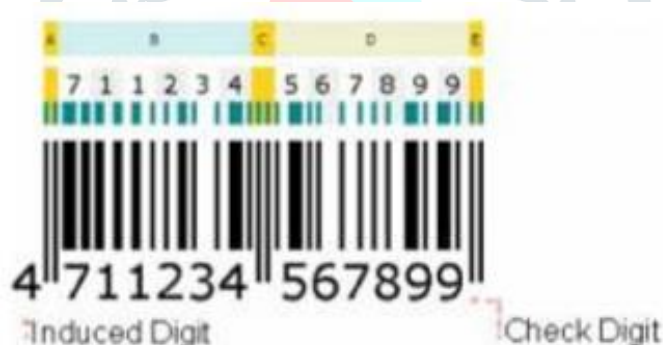
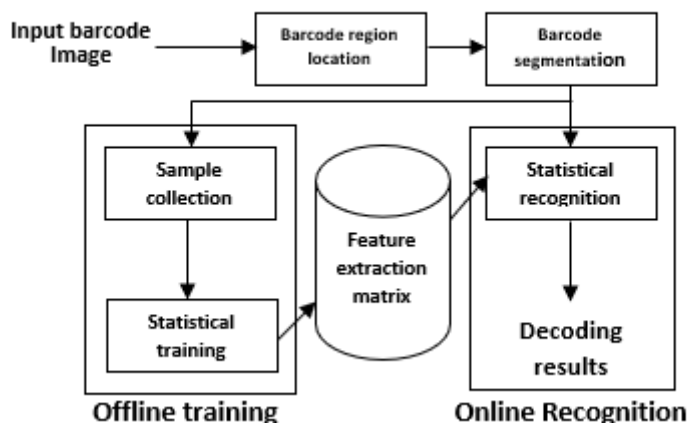


Figure 4: 1D Barcode [9]

A barcode decoding system is used to decode the barcode and provide the numeric value, the barcode scanner works fast as



compared to the manual input of numbers. Fig.5. show barcode decoding system.

Figure 5: Diagram of barcode decoding system[9]

Keeping the customer loyalty and satisfaction hand in hand is always a good business strategy used by the companies in today's world[10]. Table.1. represents the rating of satisfaction with services and loyalty.

Table 1: Correlation between satisfaction with service and loyalty in the context of vehicle servicing and new vehicle sales(Pearson coefficients)
[5].

| | satisfaction with the service | intended loyalty to the service centre | intended recommendation | intended brand loyalty | intended buying of a new car at the service centre |
|--|-------------------------------|--|-------------------------|------------------------|--|
| satisfaction with the service | 1.000 | 0.528 | 0.616 | 0.205 | 0.406 |
| intended loyalty to the service centre | 0.528 | 1.000 | 0.699 | 0.208 | 0.499 |
| intended recommendation | 0.616 | 0.699 | 1.000 | 0.226 | 0.496 |
| intended brand loyalty | 0.205 | 0.208 | 0.226 | 1.000 | 0.312 |
| intended buying of a new car at the service centre | 0.406 | 0.499 | 0.496 | 0.312 | 1.000 |

V. CONCLUSION

In this paper we have shown work to resolve the issue of time wastage of customer using following techniques:

- The use of slot booking technique will help in managing time efficiently and let the user decide the convenient time accordingly.
- The tag with barcode will let the user know about the live status of vehicle under maintenance.
- Firebase Cloud Messaging (FCM) can be used to send notifications to the users.
- The availability of the data on application and website will let the user decide for any new item to be installed in vehicle or any other thing to be replaced with a new item.
- Recommendation system will help the user in searching different items.
- Feedback section will take feedback from the user and later the feedback can be used for improvement of the service.
- These features will help in improving customer satisfaction and loyalty assuring a good relationship with customer which will significantly result in the increased repurchase.

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