

Challenging Issues of the Railway Ticketing System of Sri Lanka

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Abstract: *This system is formulated to overcome the significant flaws in the present scenario and the consequences of traveller ticket buying and seat reservations, which frequently lead to mistakes and a lot of issues. In Sri Lanka, these issues. Therefore, people are focusing on using their private vehicles for at reservation encouraging people to public transport is a better way to solve the above-mentioned troubles. But public transport should develop in a proper way to make the journey comfortable for each passenger. This is one of the purposes of this research. The existing ticketing and seat reservation system of the Sri Lankan railway, it happens on a manual method. Therefore, passengers faced lot of issues such as waiting in long queues, no proper way to make a seat reservation by self, passengers should wait a long time to make a reservation and so other issues. This research identifies those issues by using two methods. Firstly, use observations to detect issues by visiting some train stations. The second method is an online survey. After detecting the issues, research moves to the analysis part for identifying the system features for reducing passengers' issues. The main purpose is identifying the system features and functions for Smart ticketing and Seat Reservation systems for Sri Lankan Railway. People can prevent their issues by using this application because system features can reduce the passengers' issues. identifying the system features and functions for Smart ticketing and Seat Reservation systems for Sri Lankan Railway. People can prevent their issues by using this application because system features can reduce the passengers' issues. identifying the system features and functions for Smart ticketing and Seat Reservation systems for Sri Lankan Railway. People can prevent their issues by using this application because system features can reduce the passengers' issues. identifying the system features and functions for Smart ticketing and Seat Reservation systems for Sri Lankan Railway. People can prevent their issues by using this application because system features can reduce the passengers' issues. making a comfortable journey for each passenger. This is one of the purposes of this research. The existing ticketing and seat reservation system of the Sri Lankan railway, it happens on a manual method. Therefore, passengers faced lot of issues such as waiting in long queues, no proper way to make a seat reservation by self, passengers should wait a long time to make a*

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Keywords: *Smart Reservation, E-ticketing, Train Ticketing, E-transportation*

1. Introduction

One of the most significant modes of transportation, the railway is essential to the transportation sector. Getting train tickets has been a major issue with such a large client base. At the busiest train station, there are lengthy lines in front of the ticket booths everyday. Time is wasted, and the majority of domestic and international passengers have encountered several issues with the current railway seat reservation system. Before making a reservation, there is no correct way to consult the train schedule. Through electronic trade, the issue of train tickets may be resolved. Implementing a new online ticketing system is not only technological advancement, but it will also improve railway services and, to a certain extent, resolve the challenging problem of railway ticketing.

System features should be identified before the online ticketing system is put into place. Due to system features, the current train seat reservation system's problems can be resolved more effectively. The preferable approach is to first identify the present challenges and issues with the current ticketing system before identifying the system's features. Since it is crucial to implement the system's features. Therefore, two strategies were mostly used to identify difficulties. These two techniques are the main subjects of this study. Observations come first on the list. Train stations are visited in order to get the observations. Because observing issues in some study fields is a terrific and effective strategy. As a result, the suggested research

uses observations mostly for the process of problem identification. However, once in a while, a hundred observations don't result in useful information for related research. Because observations are seldom a perfect representation of the event at hand. Therefore, it is not sufficient to identify issues solely through observations. A questionnaire is used in this study to highlight problems with the current ticketing and seat reservation system. It precisely captures problems, and through research and a web-based system, solutions are made.

This research paper proposed a web-based system with solutions as system functions or reduce all issues regarding with current ticketing and reservation process in Sri Lankan Railway. In the present technical world, different type of manual processes is converted into web-based solutions. But it is a huge issue not using an online solution for ticketing and seat reservation. Therefore, a lot of practical issues happened, and those issues encourage passengers to an online solution. Passengers prefer to use a web application or mobile application for the mentioned process. The proposed system has different types of features to make it comfortable for the passenger for their transport purpose. All features are mainly dependent on issues that are grabbed from passengers. The main purpose of this research is to identify correct features for ticketing and seat reservation system according to passenger's requirements and issues. Therefore, proposed applications have different types of features and functions. Some of them are, passenger able to make a ticket on their own, passengers able to see seat format and other facilities by the application before a reservation, online payment facilities, and other features. In the analysis phase, all features have been discussed in detail. After identifying correct features and functions, it makes proper way to develop a better solution as a web-based application for Sri Lankan Railway passengers to feel easy during their transportations

2. Literature Review

According to this research paper, the Researchers discuss guideline applicability and propose a method for evaluating rule effectiveness in rough sets. Moreover, provide a way for obtaining the most effective rules. In comparison to the approach for obtaining the fascinating rules, this one is straightforward and objective. The rule of interactive Ness must take into account prior knowledge of what types of information are fascinating. This technique significantly decreases the number of rules created while providing a measure of rule effectiveness.

Moreover, the researchers build and implement an online train ticketing system in this study: the data access layer, business logic layer, and business exterior layer composed up the whole system. Customer registration, cancellation, ticket inquiries, online booking, and online ticket refund are all implemented in the system. The focus of this system is a business process and database design,

which are clearly and effectively developed through business process diagrams and database ER diagrams. Travelers will receive real-time ticket messages via the online railway ticketing system. The reservation efficiency has increased, manual booking flaws have decreased, and the administration of railway passenger transport and customer reservations has improved.

According to the research, online train reservation is one of the best innovations in the rail industry, and those service providers that have not yet accepted online reservation systems should forfeit. They may see extra expenses, maintenance expenses, and production costs as pitfalls. However, business is more than almost any other invasion, and it is a constant negotiating with the coming years and persistent assessment, an instinctual forecasting activity. The World Wide Web and the Internet have emerged, and transportation firms will take advantage of this chance to build online reservation systems and flourish in the future.

This concept envisions a significant shift in railway operations and passenger experience. TTEs are provided with hand-held devices to make passenger confirmation easier and faster. The tickets include a QR code on them, which is read by HHT devices. A passenger-specific URL is saved in a QR code; when the HHT device encodes this URL as part of the Scan procedure, it directs to the PRS server and retrieves the encoded data to verify the traveler. The scan procedure refreshes the details of all passengers on board and informs the DSA server if a seat is reserved or empty. The check-out method allows travelers to stop their travel at any station and get their remaining money while having their vacant seat filled by a waitlisted traveler. The reservation portal allows users to book tickets for travelers. These technological improvements to the train increase transparency and minimize tout behavior during the high season.

Smart trains have been introduced in developed countries leveraging the internet of things (IoT), which allows them to take advantage of the opportunities offered by the Industrial Internet of Things (IIOT). The survey in this article focuses on various communication methods within the IoT paradigm like Global System Mobile Communications- Railway, Long Term Evaluation, 5G, and Wireless Sensor Networks. The passenger ticket production and validation were detailed with the Unique Identification Authority of India database as part of the smart rail transportation vision of India 2022, and the testing results showed that the IoT system is more practical than the well-known approach. The results revealed that passengers could get tickets in fractions of a second, that the reservation chart included the travelers' names and photos, and that adequate customer reservations were preserved.

According to this research paper, anyone with a login can access the data. So, in addition to ticket buying, this application will also include ticket cancellation, ticket and train status, and live station info. The primary focus of this research is to provide a user-friendly interface for all clients that will assist them in whatever way they require in response to their questions. This program must be beneficial to all of the travelers that use trains and must fulfill their expectations.

3. Research Methodology

In Sri Lanka, the railway network has spread via the main cities. But currently still use a fully manual system for ticketing and use semi-online technology for train seat reservations. It makes a lot of difficulties for passengers and railway officers. The ticket is issued by a manual method. It is a very primary level. It is an obstacle for the tourism industry. Train seat reservations are happening with some online systems. But passengers should visit a train station to reserve a seat. Otherwise, passengers can reserve a seat by a mobile service, but it has additional charges than the ticket value. There are a few entire issues with this traditional ticketing system. There are more problems and issues were identified by three types of methods.

First method is observations by visiting some busiest railway stations in Sri Lanka. They are Colombo fort, Maradana, Gampaha, Galle and Polgahawela. At those railway stations, the most common problems were visible. Daily at peak time, passengers faced a lot of difficulties. The reservation system was done manually before the advent of modern technologies. This meant that someone planning a trip would have to waste much time standing in lines to buy their tickets. The manual reservation procedure was also subject to human mistakes, resulting in an outstanding level of frustration among tourists and local travelers. Long queues at ticket booths are caused partly because most stations do not have enough ticket counters to satisfy peak-hour demand. However, increasing the number of ticket counters to service during peak hours is not realistic. Another factor is the amount of time it takes for a single passenger to purchase a ticket. The person behind the counter is responsible for issuing the ticket, and this transaction will take longer to complete due to this. Tickets printing cost is also high. Furthermore, it is not easy to catch any imposters who travel without using tickets.

Identifying problems by observation is limited. There may be more problems that can be discovered from passengers. Therefore, getting more from the passenger is a convenient method for grabbing more issues with ticketing and seat reservation. An online questionnaire was made better analysis by getting responses from passengers.

The questionnaire was shared through real railway passengers in Sri Lanka. They have given answers to question about my experience with train ticketing and reservation. As well as they have suggested more difficulties that they have faced. It is very important, because there may be a different kinds of issues that cannot be identified by observations. The questionnaire got about fifty responses

The first question of the survey considers about residence areas of passengers. There seem to be passengers in different areas of Sri Lanka according to the result. Most of them are near to Colombo. But some are remote areas to Colombo such as Trincomalee, Madawachchiya, Bandarawela, Nuwara Eliya, Eheliyagoda, Kandy and so other areas.

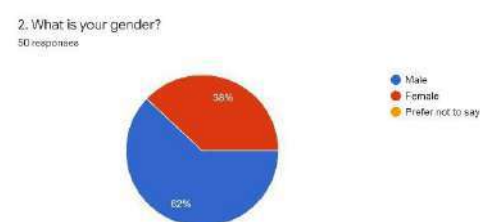


Fig. 1. Residential areas of passengers

According to survey respondents, the train is most used by men and most passengers are in 21-30 and 31-40 age groups.

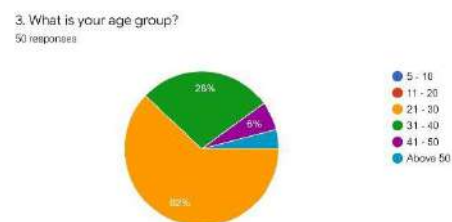


Fig. 2. Age groups of passengers

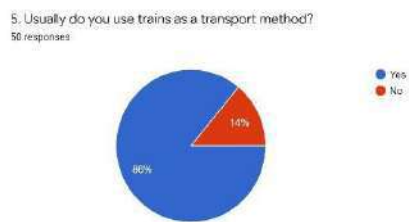


Fig. 5. How to use the trains

What this figure show is very important to this research. Because this shows how passengers have used the trains. It means around 86 percent of responses of passengers usually use trains as their transport method. As well as around 58 percent from responses of passengers use trains daily or more than two times a week. Therefore, those resource persons of this survey are more related to current ticketing and reservation method.

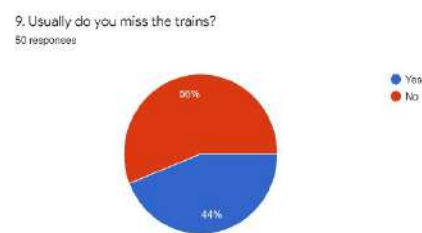


Fig. 7. Percentage of passengers who misses trains

This is an important question for identifying issues. There 44 percent from responses of passengers usually miss their train. As well as they have provided reasons for train missing. Such as taking a few times for ticketing, a lot of traffic on main roads, unable to buy a ticket because of long queue in front of the ticket counter, delay in purchasing ticket, no proper details to visible about train details, long queue and such more reasons. There for according to responses, lot of passengers face this issue.

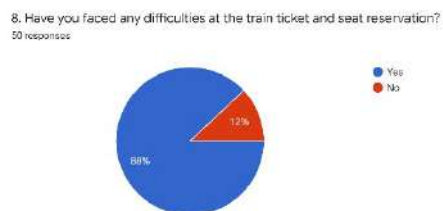


Fig. 6. Percentage of passengers have been faced issues

This is a critical key point of this research. Because one of the main purposes is identifying the issues that are currently available. This pie chart shows 88 percent from responses of passengers have faced a different kind of difficulties. It represents the need for this research properly.

This research paper mainly discusses issues in two processes according to as mentioned earlier. The survey first focuses to identify the current issues regarding ticketing. Some issues could be identified by observation, but it is insufficient to move a conclusion. When considering the survey responses, different kinds of issues can be identified.

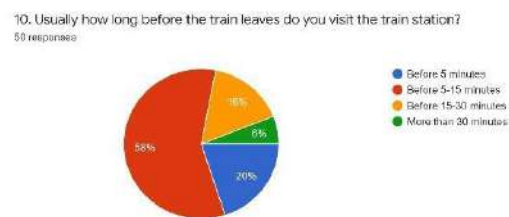


Fig. 8. Time ranges of passenger reaching train stations

This question is used to identify the time range that passenger visit railway station before the train leaves. It is important for point out the necessity of web application. Most people arrive train station 5-15 minutes before the train leaves. As well as 20 percent of responses from passengers arrive train station less than five minutes before train leaves. Passengers provide solution for mentioned incident such as road traffic, dependent on off tie of workplace and save time. If they should wait long queue for ticketing more than five minutes, the train is missed. It is an issue.

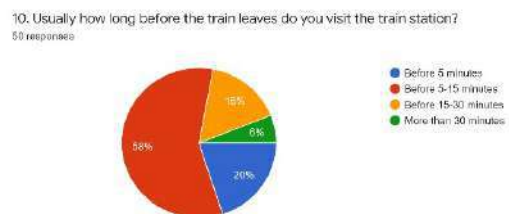


Fig. 9. Time ranges of passengers who faces the issue of missing the train before arriving to the train station

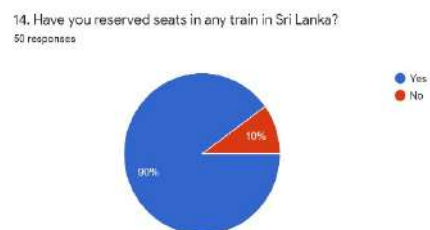


Fig. 10 Percentage of passengers who have reserved tickets from a system

The responses are collected to this question from experience of passengers. 90 percent of responses of passengers have reserved seats but they said they should wait more than 10 minutes for ticketing. 44 percent wait 5 to 10 minutes for ticketing. It is a big issue because it wastes time of people. As mentioned before, long queues are main reason for this situation too.

The question is about the ticket of currently use in Sri Lanka Railway. Most people mention that details printed on ticket are insufficient. Only Start point, end point, ticket value and train class printed on ticket. It is an issue too. People who not aware with train transportation unable to get proper idea about own route. Specially for foreign passengers.

List of issues regarding with ticketing according to mentioned

Long queue.

People delay reaching train station because of road traffic.

People delay reaching train station because of off time of workplace.

Waiting lot of time for purchasing tickets.

Insufficient train route data on ticket.

Secondly focus about the issues regarding with train seat reservation. Some issues could be identified by observation, but it is insufficient to move a conclusion. Resource persons of survey have been provided lot of issues that they have faced.

In this case question is asked for identify the how people are familiar with train seat reservation in Sri Lanka. The response of this question is move to proper way because of most people have made reservation in Sri Lanka Railway. Therefore, these resource persons are very suitable for next part of survey. In Sri Lankan Railway, there are two methods for make seat reservation. They are visiting a railway station and by M - Ticketing mobile service.

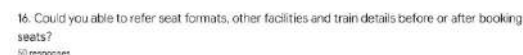


Fig. 11 Main issue in the existing s

This is a huge issue regarding with seat reservation. Because people should have facility to select any seat in the train compartment as they wish and should know food and beverage facility, seat materials and so on before the make a reservation. This facility is very important for long distance trains. Lot of local and foreign travelers use train for long their long trip. Specially these facilities are very important for improve tourism industry in Sri Lanka. Foreigners are not aware with Sri Lankan Trains and this facility make cool for them.

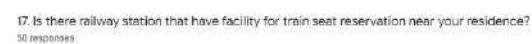


Fig. 12 Percentage of railway stations with a seat reservation system

In Sri Lanka, there are limited number of train stations around fifty have train seat reservation facility. This pie chart shows lot of people have not that type train station near their residence. Therefore, they should visit to that type of train station on another city or should use M – Ticketing mobile service. But there are several issues regarding with M – ticketing service. This service provides by Mobitel and Dialog phone service. Passenger should make phone call from any one of those phone services and their agent make a reservation to passengers according to requirement. But they charge high extra chargers for a minutes of phone call and taxes. Therefore, passenger should pay lot of extra chargers than ticket price. As well as this service have no facility to cancel a ticket.



Fig. 13. Issues that passengers provided (regarding existing reservation process)

The survey gave to a chance to put issues that they have faced at the seat reservation. This figure shows some of them and they are listed follow.

Finally, as the list of issues regarding seat reservation according to passenger's responses.

No proper method to reserve seats.

Unable to see available seats.

High rate of extra chargers in M-ticketing service

Limited train stations with seat reservation facilities.

Passengers should wait long hours to make a reservation in school vacation.

Passengers are unable to see seat format in the train compartment

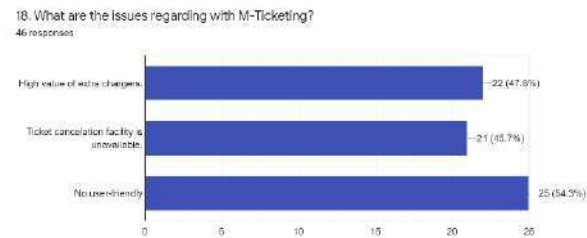


Fig. 14 Issues in the M-Ticketing system

4. Result and Discussion

According to the issues detected above, the existing purchasing train ticket and train seat booking system should change with the new technology. However, the solution of online services made it easier to obtain many things at anytime and anywhere. The leading solution is 'Smart Ticketing and Seat Reservation System.' It provides an alternate and convenient method for train passengers to purchase tickets. An Online Ticketing and Reservation System allows a potential customer to book and pay for a service directly through the system. Before implementing the system, the best way is to identify the system features. The system should have the ability to reduce all common issues that passengers are faced. Therefore, the system should implement features, and that features should prevent passenger issues. This phase discusses system features.

As a result of problem identification, a lot of issues could be identified. Those issues were identified by observations and surveys. The issues of the current ticketing and seat reservation process in Sri Lankan Railway can be finalized as follow.

A. Issues of the ticketing

process. Long queue.

People delay reaching train station because of road traffic.

People delay reaching train station because of off time of workplace.

Waiting a lot of time for purchasing tickets.

Insufficient train route data on the ticket.

B. Issues of the seat reservation

process No proper method to reserve seats.

Unable to see available seats.

High rate of extra chargers in M-ticketing service.

Limited train stations with seat reservation facilities.

Passengers should wait long hours to make a reservation in school vacation.

Passengers are unable to see seat format in the train compartment.

According to these issues, an online system can be provided proper solutions in a convenient method to reduce above all issues. These issues are detected as common issues in the existing process. The existing process happens manually. Therefore, Sri Lanka Railway has unable to provide good service to their passengers. In the methodology phase, system features have been attached to each issue.

5. Future System Design

Passengers can make a ticket by themselves. There are two methods for it. The first one is passengers can make a ticket by own smartphone by putting start station and destination. After router details and a QR code is provided to the mobile phone and passenger can get into the train station by scanning the QR code. If it is a valid QR code, the platform gate opens. The second one, the situation of passengers don't decide the destination who can provide only start train station and get QR code. But after he gets off the train, he should again scan the QR at the destination. This entire process can do by itself by a smart device such as a smartphone, tablet computer, laptop, or desktop computer. Therefore, passengers no need to wait in long queues for ticketing. They can make a ticket on the way to the train station. Therefore, passengers can enter the train station before just a moment to train leave. As well as they can be shown all train route detail such as train timetables, ticket price, train class by their mobile phone. Therefore, all issues are reduced by the ticketing feature of the Smart Ticketing and Seat Reservation System.

The reset part of the system is the seat reservation feature. It has a lot of functions to make a reservation by the easiest and convenient method. The problem mentioned passengers do not have any method to see all train details before reserving a seat. It is very uncomfortable for local travelers as well as foreign travelers and regular passengers. Smart Ticketing and Seat Reservation System make proper solutions for this problem. all the railway lines of Sri Lanka can be seen. By choosing a railway line, passengers can see trains on that railway line available a seat reservation facility. Then all details are displayed about the selected train. They are train number, available classes, departure time from start station, arrival time to destination, the train station that train stops, train name, number of

compartments, and attached pictures. Passengers can see inside the compartment by those pictures. It is a proper method to get an idea about seat format in the compartment, lavatory facilities, food and beverages, phone charging facilities, window facilities, and other facilities. As well as this part consists of other passenger services of Sri Lanka Railway like observation saloon. Then passengers can reserve seats in different classes. Sri Lanka passenger trains consist of three classes as first-class, second class, and third class. Seats are numbered, and available seat numbers are presented to the passenger. It means those seats had not been reserved. Passengers can reserve one or more seats. After reserved seats are locked, and another passenger is unable to reserve locked seats. This is the process of seat reservation. As well as anyone who wants to cancel a reservation, there is a function for doing it. However, refund money only eighty percent of ticket value. Above all, functions are essential for the tourism industry because there is no method for foreign travelers to make their train journey properly. Not only for foreigners, but local travels can also make their journey correctly.

Smart Ticketing and Seat Reservation System is developed as a web application and mobile application. The system will be implemented as a mobile application and web application. Sprint boot, Angular, Ionic, and MySQL technologies are used to develop the entire ticketing, reservation, and other applications.

6. Conclusion

In this research paper, we have discussed some problems of the current manual railway system of Sri Lanka and proposed a Smart Ticketing and Seat Reservation System; the underperforming railway transportation in Sri Lanka is not still running on the self-seat reservation system. The Sri Lankan railway has been following the same traditional way of issuing tickets. According to that process, passengers need to visit the counters in railway stations, pay for the tickets, and get the tickets. The tickets currently issued by the Sri Lanka Railways are valid only from the date of issue and to the given destination only. Also, the current ticket reservation process of Sri Lanka Railways can be identified as a primary level system. Therefore, passengers cannot know about their seats and ticket prices and train details, train destinations. In this research, all issues were identified by observations and an online survey.

Before implementing the online ticketing system, system features should be identified. Because of system features mainly provide better solutions for difficulties of current train seat reservation system. Before identifying the system features, the better way is first to identify the current difficulties and problems of the current ticketing system. Because of it is very important for implement the system features. Observations are most important for identifying issues at an initial level. But observations are insufficient to detect all issues. Therefore, the online survey grabbed lot of issues that passengers have faced. There is different kind of issues. Some of them are long queues at the ticketing,

there is no method to make a reservation by self, the limited number of train station with seat reservation facility, unable to see seat format in a train compartment before making a reservation and so other issues. Finally, this research proposed system features as the solutions for all issues and difficulties. The proposed features make a convenient and easiest method for ticketing and seat reservation. After implementing the system passengers can make a reservation or buy a ticket by themselves.

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