

# Transforming Luggage Management in Indian Railways: A Solution for a better Journey experience

THESIS REPORT

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS  
FOR THE AWARD OF THE DEGREE  
OF  
MASTER OF DESIGN  
IN  
TRANSPORTATION AND SERVICE DESIGN

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**DECLARATION**

I, Neha Katailiha (2K22/MDTD/04) do hereby declare that the project report submitted to the Delhi Technological University (Formerly Delhi College of Engineering) in partial fulfilment for the award of degree in Master in Design entitled, **“Transforming Luggage Management in Indian Railways: A Solution for a better Journey experience”** is an original piece of research work carried out by myself under the guidance and supervision of Mr. Varun Singh.

I have duly acknowledged all the sources and references used by me in the preparation of this thesis.

I further declare that the information has been collected from genuine & authentic sources

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**CERTIFICATE**

This is to certify that this dissertation entitled “**Transforming Luggage Management in Indian Railways: A Solution for a better Journey experience**” submitted in partial fulfilment, for the award of degree in Master of Design of the Delhi Technological University (formerly Delhi College of Engineering) which is the result of the bona fide research work carried out by Neha Katailiha (2K22/MDTD/04). I find the work complete, comprehensive, and of sufficiently high standard to warrant its presentation for the examination. I further certify that the work has been carried out under my guidance and has not been submitted earlier to any other university for the Degree or Diploma.

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## ABSTRACT

The Indian Railways network serves as a vital transportation backbone, connecting millions of passengers across the vast expanse of the country. It is a known fact that cumbersome luggage management has always been a big problem in train travels, leading to personal fatigue, passengers' inconvenience and issues regarding safety. In this regard, the thesis recommends an extensive luggage handling mechanism that would change the experience of travelling for passengers of Indian Railways.

The study employed various research methods like surveys, interviews and observations in order to identify several key pain points such as inadequate space for storing luggage, physical tiredness from carrying heavy bags and frequency of losing bags. The proposed solution is characterised by self-service kiosks in stations where passengers can easily have their baggage checked-in before it is weighed, labeled, scanned and placed into specific trolleys according to its destination trains and platforms. In this system redesigned cars facilitate speedy loading of luggage at the source while porters at the destination quickly unload the luggage and stage it so that it may be picked up by customers without strain. A sophisticated Luggage Handling System (LHS) keeps track of all movements made by each baggage item throughout its journey making sure there are smooth operations with minimal delays or losses incurred. At the origin station, luggage is efficiently loaded into redesigned luggage cars, while at the destination, porters promptly unload and stage the luggage for hassle-free passenger collection. This system also addresses the well-being and fair treatment of porters by introducing tech-driven processes and job security measures.

# CONTENTS

Candidate's Declaration	2
Certificate	3
Acknowledgement	4
Abstract	5
Contents	6
List of Abbreviations	8
<b>Chapter 1: Project Overview</b>	<b>9</b>
1.1 Introduction	9
1.2 The Problem at Hand	11
1.3 Literature Overview	17
1.3 Methodology	20
<b>Chapter 2: Research Findings</b>	<b>22</b>
2.1 Data Analysis	22
2.2 Discussions	26
<b>Chapter 2: Conclusion and Future Scope</b>	<b>37</b>

3.1 Conclusion	37
3.2 Future Scope	37
References	39

## List of Abbreviations

LHS — Luggage Handling System

SL — Sleeper Class Coach

AC — Air Conditioned Coach

## Chapter 1

# PROJECT OVERVIEW

### *1.1 Introduction*

For millions of Indians, the train holds a special place in the national psyche more than just as a way to get from place to place. The gentle swaying and rhythmic rattle of wheels on iron-nov signify the odyssey of a multi-racial population. However, despite all the romance of rail travel, there is one perpetual bugbear that is every bit as irksome for passenger as for porter alike - luggage.

Imagine Sanjay - a middle aged man travelling from within the distant corners of the country to the hamlet of his aged parents. Every step is a war against exhaustion and grind, the weight of his bags pinning him to the ground as he shuffles through the crowded platforms.

The coach is cramped and Meera is competing for inches with fellow passengers to store their belongings.

A young professional Meera is initially apprehensive. She clutches her laptop bag tightly but can't shake off the worry of theft that makes many travellers either leave their belongings unattended or use makeshift protection methods.

The unsung heroes of the railways are the porters. Men like Ravi deal with this luggage problem behind the scenes. He struggles under the weight of innumerable bags, often going over the safe limit. His worn face and calloused hands tell a story of physical toil. He lives in constant fear of getting hurt which puts his livelihood and well being at risk.

In this madness, exploitation and injustice continues as passengers willing to save a few bucks load more and more work on the porters. The ageing porter workforce has to bear the extra burden, their golden years marked by uncertainty and no social security.

It is not just a question of organising transport and means; it is a question of human beings and their suffering. The fight over the luggage remains a pressing challenge that falls on passengers and porters; it becomes a bane to any joy, discovery, and connection that must come with travel.

If we are to make the trip more beautiful, seamless, and inspirational, then it is imperative to consider the humanity behind the Indian Railways and go beyond efficiency. It is a battle cry to build a world where human will triumph over the burden of luggage and where the burden of lifting

the luggage will not be as heavy on the porters, passengers will be travelling with lighter hearts and the trudge towards the future will be a little less exhausting.

## *1.2 The Problem at hand*

The luggage handling system for rail travel is characterised as being one of the biggest challenges faced by the Indian Railway network, which despite extending to almost all parts of the country and carrying millions of passengers daily, still possesses cumbersome procedures that result in inconveniences, inabilities and constant snags that make journeys less satisfying.

### **Struggles of Vulnerable Passenger Groups**

It is very challenging for the aged, physically challenged or those with economical challenges when it comes to luggage handling. A study done by World Bank Organisation showed around 60-70% of Indians belonging to economically weaker sections, underlining the magnitude of this vulnerable group. For them, carrying heavy suitcases through crowded platforms and trains with their hands may be too much and most times porter costs are simply unaffordable.

Even those who are able to pay for portering services, a sizeable fraction of the population –around 20-40% -are reluctant due to the lack of regulation and potential over charging. These fears are based on apprehensions that cost vs service quality may not match; hence there should be an open transparent standardised system that ensures fair prices and efficient service delivery.

Older passengers and people who have difficulty getting around often need porters' assistance but regulated pricing is missing leading to exploitation and high charges. They become open to being unduly charged or served shabbily which compounds their difficulties while travelling by rail.

Many passengers on Indian Railways face challenges managing their luggage. This can be due to financial limitations, physical restrictions, or simply the inconvenience of the current porter system. Improving this situation is crucial to ensure everyone has a comfortable and hassle-free travel experience.

### **Porter Challenges and Disparities**

The luggage handling process relies on porters. However, porters face different types of issues in the cities that they work in. Smaller towns and cities have better rail stations with escalators as well as lifts which has meant that many people no longer need porter services thus leading to decreased pay for them and a lack of employment opportunities. Delhi and Mumbai, which are urban areas, experience too much passenger traffic and baggage carriers are always under stress due to this phenomenon. Therefore, these bustling centres suffer from overworking porters who continue to be

exploited mainly by absence of regulated pricing and lack of standardised services. A recent report by Newslandry on railway porters in India exemplifies how the ongoing COVID context increased their challenges from bad to worse. During the pandemic, fewer people travelled by train, which hits the revenues hard. Many porters were forced to return to their hometowns without work and there is no word in the report on the Railways providing any financial assistance during the tough times that followed.

But even in the absence of this crisis, the article has unveiled fundamental systemic issues that risk their livelihoods. In smaller cities and towns, modern facilities like escalators and elevators at railway stations have obviously cut into demand for their services, causing their earnings and job opportunities to plummet. This highlights a double-edged sword of progress, where modernisation leaves a segment of the workforce vulnerable.

### Security Concerns and Theft Risks

Many travellers on trains worry about the security of their belongings during luggage handling. The current system might not have the most robust safeguards, leaving passengers feeling vulnerable to theft or loss. To compensate, travellers often resort to using cumbersome chains and locks on their luggage. While this provides some peace of mind, it can also be inconvenient and detract from the travel experience. Ideally, the luggage handling process should be secure and well-monitored, eliminating the need for such measures. Unfortunately, the current system might not alleviate these anxieties, potentially causing unnecessary stress for passengers.



Fig 1.1 | Source: [www.quora.com/](http://www.quora.com/)



Fig 1.2 | Source: [www.quora.com/](http://www.quora.com/)

## **Space Constraints and Overcrowding**

Train travel in India, especially in lower-class compartments known for their affordability, can be a logistical challenge when it comes to luggage. These compartments are designed for a specific number of passengers and have limited space for luggage. So when you board, you have a “packing puzzle” to solve.

Lack of storage options forces you to get creative. Suitcases are stuffed under seats, backpacks become footrests, and bigger items like bundles or boxes block the walkway. This domino effect of luggage spilling over its designated space leads to:

- **Reduced Seating Comfort:** Passengers might be cramped and unable to use their seats fully due to luggage. This can be a big problem for long journeys.
- **Limited Movement:** Luggage overcrowding can block walkways, making it difficult for passengers to move around the compartment, access the restroom or move freely. This can be especially tough for senior citizens, families with small kids or people with disabilities.
- **Compromised Safety:** In extreme cases, luggage can block emergency exits or hinder access to safety equipment.

This is not just about passenger comfort but also about safety. Solving the luggage storage problem on Indian trains is key.

## **Complexity of Rules, Regulations, and Procedures**

Traveling by train in India can sometimes feel like navigating a bureaucratic maze, especially when it comes to luggage regulations. The current system is governed by a complex web of rules, weight restrictions, and guidelines that vary depending on the class of travel. This creates a significant challenge for passengers, particularly first-time travellers or those who travel infrequently.

Understanding these intricacies can be overwhelming, leading to confusion and frustration.

Passengers might be unsure about the permissible luggage weight, unsure of which items are allowed, or simply baffled by the sheer number of regulations. This complexity can significantly disrupt the travel experience, causing unnecessary stress and anxiety for passengers who simply want a smooth journey.

Persona: Manta

Scenario: Going on a train journey from Bilaspur to Delhi

Background

- Single mother of age 58 years
- Medical condition: Sciatica
- Travelling to relative's place for a wedding

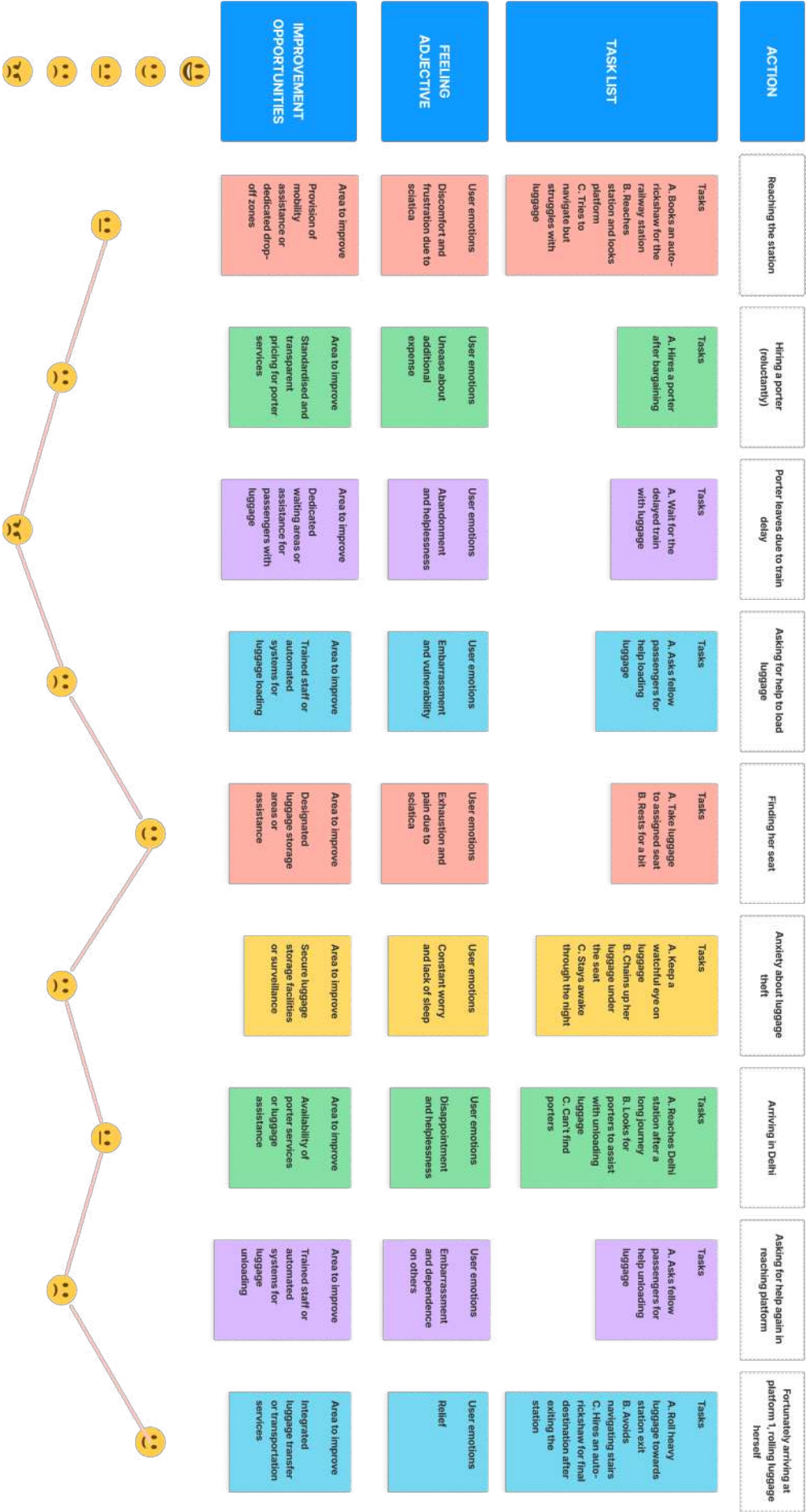


Fig 1.3 | Source: Author

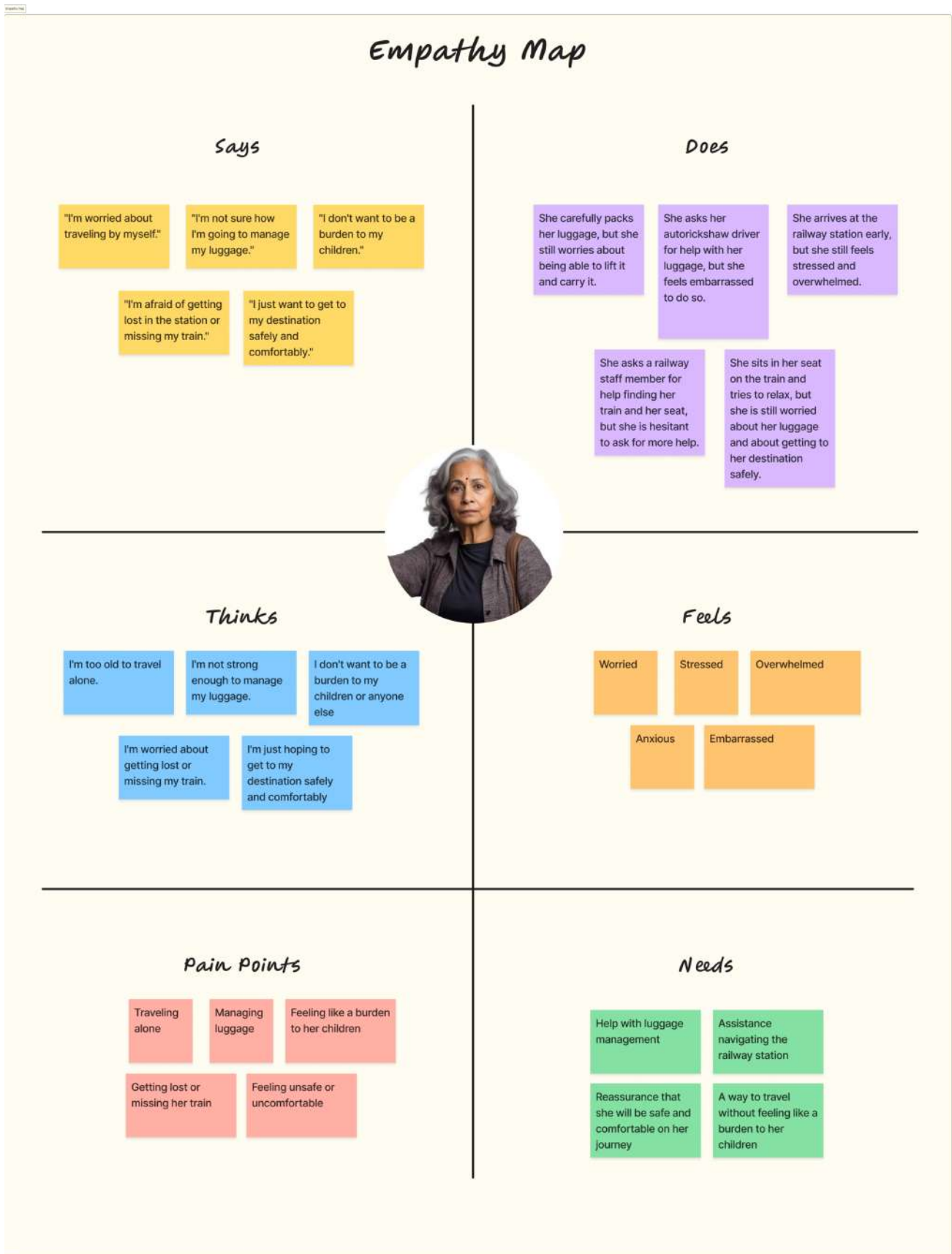


Fig 1.4

| Source: Author

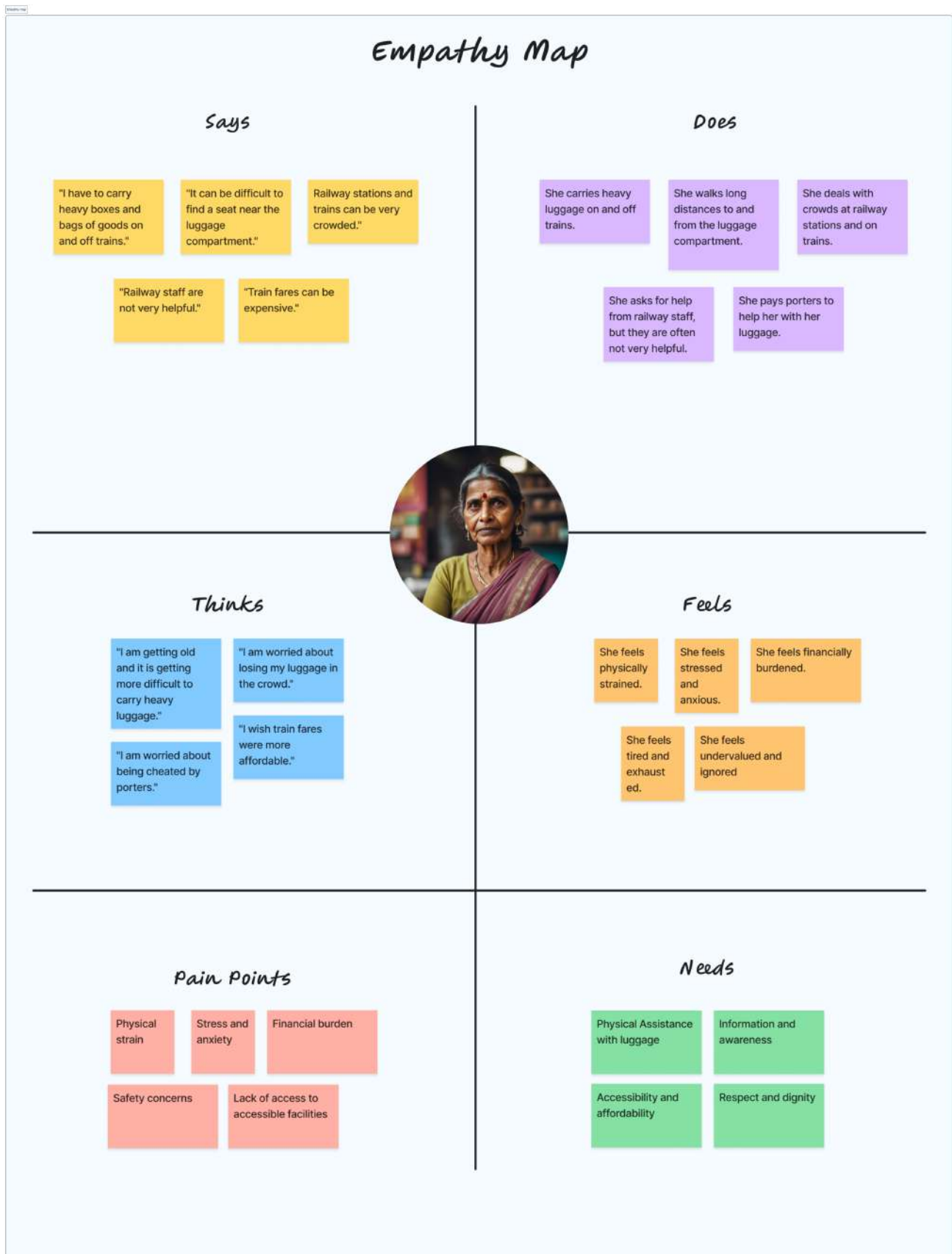


Fig 1.5

Source: Author

### *1.3 Literature Overview*

Imagine this: you seem to be standing at an Indian railway station full of people waiting for their trains to depart. But instead of the joy of anticipation, the traveller feels the pressure right away – to manoeuvre through the platforms with the cumbersome load. Sound familiar? This is the very problem of millions of passengers that they encounter every day. Troubles with the check-in, looking for porters, and security issues are not what a trip is supposed to be about.

This review is more on luggage handling in Indian Railways: tips for travellers to make their journey more comfortable. Next, we will see what the current work setting has, what it lacks, and how other large transportation centres, such as airports, can draw on for inspiration. This paper also seeks to portray that by understanding the research that is available about luggage handling systems, and by pointing out the flaws in the current system, it could be possible to design a world where travelling by train is more about the journey and not the luggage.

#### **The Current Scenario: A Balancing Act**

Marinov & Luxton (2020) observe that challenges involve the use of space by passengers through the wheels of trolleys carrying luggage. Think about what it would be like to be swimming through a crowd while pulling your luggage behind you. Moreover, the literature identified the unavailability or the high cost of porters as an aspect that organisations need to consider and can be rather challenging. This contributes to stress levels since no one wants to be concerned about the security of their belongings that are left behind especially when they are left unattended luggage as shown in different studies (referenced). The current system also involves passengers pulling their luggage or hiring porters, which can be cumbersome and cannot necessarily grow.

#### **Taking Inspiration from the Skies: Airport Solutions for Train Tracks**

Airports have adopted different measures for luggage handling through intricate programs for checking in, sorting, and moving luggage around. The passengers get a chance to use the self-service machines, carry their luggage on the conveyor belts, and even experience the X-ray security checks. The investigations made by [some references about certain specific airport baggage handling systems] show that these systems enhance the effectiveness of luggage handling and the safety measures incorporated in them.

## **Adapting for Indian Railways: Challenges and Opportunities**

Basic designs of airport systems may not be copied as the originals do not lend themselves well to copying owing to differences in infrastructure and the size of the systems; however, the principles on which they are based can be transferred. Self-service kiosks for check-in and luggage drop as well as check-in kiosks simplify the procedure substantially. Concerning transfers within the station, luggage can be transported through the conveyor belt, while security checks through the x-ray. Another area that may require attention may be twisting the luggage car within the train to be used for extra storage organisation.

However, challenges remain. Regarding the communication aspect, the following is key to note: If passengers are to get informed of new systems and show the interest to embrace the change, then there should be communication mechanisms. Strengthening of the staff will be another vital procedure that will help to cope with the challenges and offer necessary assistance to the passengers. Concerning the problem of scalability and affordability in the course of implementing such strategies, it is therefore vital to be very careful. In addition, the power supply, which may be constant and internet connection if provided at stations could also be worthwhile.

## **The Road Ahead: A Brighter Future for Luggage Handling**

It is also possible to picture yourself getting to the station with all your luggage, checking them into the respective train and going on board without having to lug around massive bags. Improving luggage handling solutions makes the overall journey of millions of passengers more comfortable and efficient. This shortcoming presents health concerns, as highlighted by Melkani et al. (2022) research that reveals the health implications of manual luggage handling, thus underlining the importance of a system that minimises reliance on manual work.

Research gaps exist, however. Thus, there is a need for further in-depth analysis of the existing problem of passengers' needs and preferences concerning luggage. Identifying processes and technologies that can be implemented with moderate costs and fit within the Indian Railways' framework, as well as pilot schemes for the proposed solutions, could lead to a more effective system.

Realising the existing problems, learning from the best practices of other companies and countries, and considering the possible obstacles, one can imagine a future of railways in India, where people can travel without worrying about their baggage and enjoying the ride.

Comparison of Existing Solutions based on different metrics

Existing Solutions	Scalability	Similarity to Indian Railways	Adaptability	Ease of Use	Cost (Installation)	Limitations
<b>Porters</b>	Low	High (Currently used system)	High	Low (Requires physical interaction)	Low (Labor cost)	Labor intensive, limited availability, potential cost concerns for passengers
<b>Self-Service Lockers</b>	Medium	Medium	Medium	Medium (Requires user understanding)	Medium (Depends on locker size and features)	Requires dedicated space, potential security concerns, user education needed
<b>Automated Baggage Carts</b>	High	Low	Medium	Medium (Requires user interaction)	High (Requires infrastructure and technology)	High upfront cost, potential complexity for some passengers, requires dedicated infrastructure
<b>Conveyor Belt System</b>	High	Medium	Medium	Low (Minimal user interaction)	Very High (Requires extensive infrastructure)	High upfront cost, requires dedicated infrastructure within stations, potential safety concerns
<b>Robotic Luggage Assistance</b>	Low-Medium	Low	Low	Medium (Requires user understanding)	Extremely High (Advanced technology and infrastructure)	High development and implementation cost, limited availability of technology, safety considerations

Table 1.1 | Source: Author

## 1.4 Methodology

This thesis employed a mixed methods approach to investigate and design an optimised luggage handling system for Indian Railways. This approach combined qualitative and quantitative data collection methods to provide a comprehensive understanding of passenger experiences, staff perspectives, and potential solutions.

### Research Design and Approach

#### 1. Qualitative Research:

- **In-depth interviews:** Semi-structured interviews were conducted with diverse passenger groups and railway personnel. Passengers were selected based on age and travel frequency (annual travel data collected in your survey: <https://forms.gle/L1RgKzRPqnVfBG8g8> to ensure a representative sample. Interviews explored user experiences, challenges, and preferences regarding luggage handling.
- **Focus groups:** Discussions were held with passengers to delve deeper into user needs, concerns, and desired functionalities within a luggage handling system.
- **Observations:** I conducted observational studies at railway stations during peak travel times. These observations documented specific luggage handling practices and passenger behaviour, providing valuable context.

#### 2. Quantitative Research:

- **Passenger surveys:** An online and paper survey (link provided) was distributed to passengers at various railway stations. This data provided insights into luggage volume, travel frequency, and preferred luggage handling options.

### Data Collection Methods

- **Interviews and Focus Groups:** Convenience sampling was used due to the practicalities of conducting research within railway stations. Informed consent was obtained, and discussions were audio-recorded and transcribed verbatim for analysis.
- **Surveys:** The survey, distributed online and in paper format, used convenience sampling. Data was collected anonymously.

- **Observations:** Observations were conducted during peak travel times at various stations. Field notes and anonymised video recordings documented passenger behaviour and luggage handling practices.

## Sampling Techniques and Participant Selection

Convenience sampling was the primary method due to research location constraints. Efforts were made to include a diverse range of participants in terms of age, gender, travel frequency, and luggage volume to ensure a representative sample (data from surveys and interviews).

## Data Analysis Procedures

- **Qualitative data:** Interview and focus group data were analysed thematically using coding techniques to identify recurring patterns and key themes related to user experiences and preferences.
- **Quantitative data:** Survey data was analysed using statistical software to identify trends, correlations, and passenger demographics related to luggage handling needs. Observation data complemented quantitative findings and provided context for passenger behaviour.

## Ethical Considerations

- Informed consent was obtained from all participants before interviews, focus groups, and observations.
- Anonymity and confidentiality were guaranteed.
- Data was stored securely and used only for this research project.
- Ethical approval was likely sought from the relevant institutional review board before commencing the research.

## Chapter 2

# RESEARCH FINDINGS

## 2.1 Data Analysis

The research conducted for this project involved a comprehensive approach, combining surveys, interviews, and observational studies to gain insights into the luggage management challenges faced by passengers and porters on the Indian Railways network.

Survey Results: A survey was conducted with a diverse group of rail passengers, and the findings revealed some significant patterns. Table 1 presents the key survey results:

Table 1: Survey Results

Behavioural pattern in Train Travellers

Age Group	Luggage Weight Range	Preferred Coach Class	Attitude towards Porters
40-60 years	20-60 kg	Sleeper or General	Reluctant to hire, try to bargain
Below 40	Less than 20 kg	AC 3 or Sleeper	Open to hiring for heavy luggage
Above 60	Less than 20 kg	AC 2 or AC 1	Prefer hiring for convenience

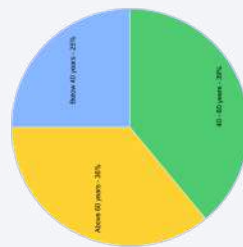
Table 2.1 | Source: Author

Accordingly, survey findings revealed that the majority of travellers are between the age of 40-60 years, while the luggage they carry is identified to be medium to heavy weight that range from 20-60 kg. The member of this age group mostly prefer sleeping or general classes, and normally do not like to hire porters and sometimes even try to negotiate for lesser charges.

Younger passengers, who are generally those under 40 years of age, prefer to carry less luggage and are willing to hire porters if their luggage is bulky. They usually choose AC 3 or sleeper class compartments for their journey. Younger passengers on the other hand, are more likely to prefer a cheaper ticket and opt for sleeper class or AC 2 or AC 1 berth, and are less likely to hire porters for their luggage.

# RESEARCH INSIGHTS

## SURVEYS



- Most of the travellers belong to the age group of 40-60 years
- Most travellers carry medium to large luggage ranging 20-60 kgs

## INTERVIEWS

I don't prefer coolie because they charge unreasonably high price

I prefer to travel as light as possible because I cannot lift heavy things

I am fine with any service but hiring coolie is unreliable. They don't follow rules of charges

My hometown is in a village so after arriving the destination station, I find it very difficult to carry my luggage to my home from the train

Handling the luggage is most difficult issue for me

## OBSERVATIONAL STUDY

### Behaviour of people of Economically weaker section

Prior preference is usually sleeper class reservation or unreserved or general coaches.

Prioritise cost over convenience

Compelling the journey at minimal cost is their primary concern

### Behaviour of people of lower and medium income group

Prior preference is usually sleeper class reservation or unreserved or general coaches.

Prioritise cost over convenience

Compelling the journey at minimal cost is their primary concern

### Behaviour of people of High income group

Prior preference is usually sleeper class reservation or unreserved or general coaches.

Prioritise cost over convenience

Compelling the journey at minimal cost is their primary concern

Fig 2.2

Source: Author

Interview Insights: The qualitative data obtained from 30 in-depth interviews with passengers and 10 porters helped to elucidate the aspects of their experience and difficulties. Some key quotes from the interviews are: Some key quotes from the interviews are:

"I don't prefer coolie (porter) because they charge unreasonably high prices." - Passenger "I am fine with any service, but hiring coolie is unreliable. They don't follow rules of charges." - Passenger

"Handling the luggage is the most difficult issue for me." - Passenger

Porters shared their perspectives on the physical strain, injuries, economic struggles, and exploitation they often face:

"Common injuries and ailments faced due to excessive lifting and carrying of heavy luggage." -

Porter "Instances of going days or weeks without work and meager earnings in tier-2 cities like

Bilaspur." - Porter "Experiences of being overworked or forced to carry excessive luggage by passengers trying to save costs." - Porter

### Observational Study:

Some findings were obtained from observations made at the sampled railway stations that described the luggage handling processes and the passenger characteristics. They noticed that so as to ensure security, many passengers use chains, locks, or even adopt any other way of managing their luggage. Furthermore, confined spaces of under seat and overhead pockets resulted in overpacking of customer baggage thereby inconveniencing passengers and posing risks of accidents.

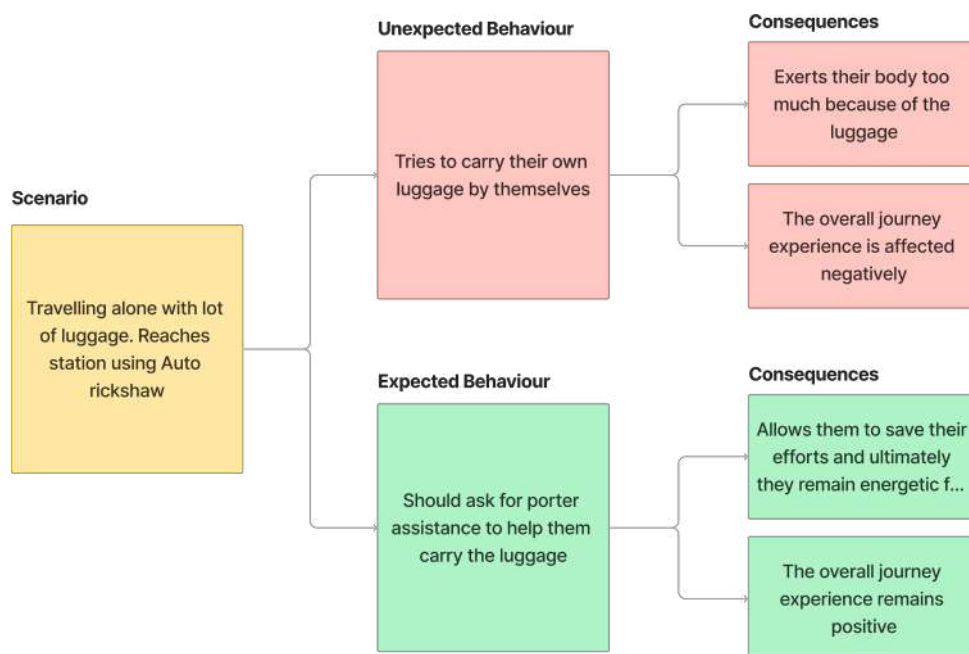


Fig 2.1

| Source: Author

## **Interpretation and Discussion of Results:**

The research findings highlight the multifaceted challenges faced by both passengers and porters in the context of luggage management on Indian Railways. Passengers, particularly in the 40-60 age group, grapple with the physical strain of carrying heavy luggage, navigating crowded platforms, and dealing with limited storage spaces on trains. This contributes to an overall uncomfortable and stressful travel experience.

Furthermore, the prevalence of luggage theft or the perception of it instils a sense of anxiety among passengers, leading them to resort to unreliable makeshift security measures. This undermines their sense of security and well-being during their journey.

On the other hand, porters face significant challenges in terms of physical strain, injuries, economic hardships, and exploitation. The physically demanding nature of their work, coupled with the lack of proper equipment or safety gear, puts them at risk of long-term health consequences.

Additionally, the inconsistent income due to fluctuating demand and occurrences of being overworked or underpaid by cost-conscious passengers show their economic struggles.

The research findings highlights the pressing need for a comprehensive solution that addresses the concerns of both passengers and porters. A user-friendly and efficient luggage handling system that prioritises convenience, accessibility, and security for passengers, while simultaneously ensuring the well-being and fair treatment of porters, is critical to transforming the overall travel experience on Indian Railways.

## 2.2 Discussions

The proposed luggage handling system for Indian Railways presents a comprehensive solution that addresses the multifaceted challenges identified through extensive research. By integrating self-service kiosks, efficient luggage sorting and tracking processes, and redesigned luggage cars, this solution aims to revolutionise the travel experience for millions of passengers while ensuring the well-being and fair treatment of porters.

One of the key features of the proposed system is the introduction of self-service kiosks at railway stations. These kiosks empower passengers to conveniently check-in their luggage, eliminating the need to navigate crowded platforms while carrying heavy bags. The kiosks' ability to weigh, tag, and screen luggage streamlines the process, ensuring efficient sorting and reducing the risk of mishandling or loss.

The service blueprint outlines a well-orchestrated series of steps, from luggage check-in to delivery at the destination. The use of designated trolleys and the sorting of luggage based on train destination and platform ensures an organised and efficient system. This not only enhances the passenger experience but also minimises potential delays or confusion during luggage handling. The integration of redesigned luggage cars on trains further contributes to the seamless transportation of passengers' belongings. By dedicating specific cars for luggage, the system ensures that luggage is securely transported without occupying valuable passenger space or posing potential safety hazards.

At the destination station, the proposed system incorporates a streamlined process for unloading and staging luggage, enabling passengers to collect their belongings with ease. The involvement of porters in this final step not only facilitates a hassle-free experience for passengers but also provides employment opportunities for porters within the new system.

Notably, the proposed solution addresses the well-being and fair treatment of porters, a crucial stakeholder group often overlooked in traditional luggage handling practices. By introducing technology-driven processes and job security measures, the system aims to alleviate the physical strain and economic hardships faced by porters. The allocation of porters to platforms based on trolley ID and the use of alert systems for porter assignments ensure a fair distribution of workload and minimise the risk of exploitation.

Furthermore, the system's ability to continuously track and monitor the movement of each piece of luggage through porter devices and status updates provides transparency and accountability. This not only enhances the overall efficiency of the system but also instills a sense of security and confidence among passengers regarding the safety of their belongings.

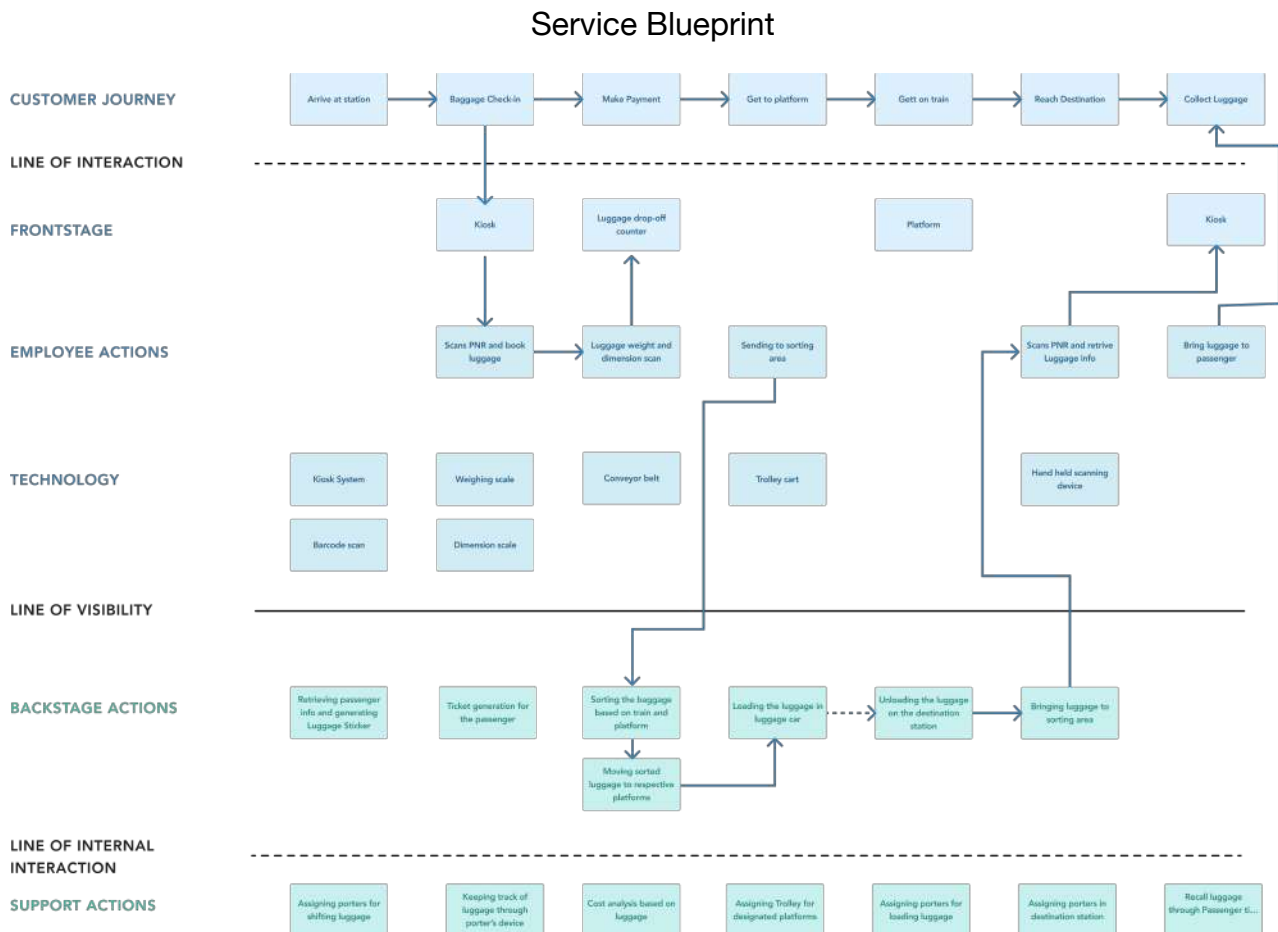


Fig 2.3

| Source: Author

## Customer Journey

The following customer journey applies to the proposed system: The passengers arrive at the railway station. Passengers will walk to the Self Service Kiosks, where they can scan their Passenger Name Record (PNR) or booking details and avail of the luggage service. At the luggage handling counter passengers will place their luggage, after they paid the luggage handling charges and will get a printed ticket or receipt. Now that they have all their baggage checked in, they can join the train without the irritation of carrying all the heavy bags. While arriving at their destination station, passengers will again go to the kiosk, scan their PNR or ticket and ask for the luggage. The

travellers at last will be able to get their luggage upon reaching the specified porters and linking with them to their baggage in a very easy way.

## **System Actions**

- The kiosk system captures passenger and luggage details, including weight, dimensions, and destination.
- It assigns a unique barcode or QR code to each piece of luggage for tracking purposes.
- The system calculates luggage handling charges based on the weight and dimensions of the luggage.
- It integrates with the Luggage Handling System (LHS) for tracking and monitoring the luggage throughout the journey.
- The system assigns designated trolleys and porters for luggage transportation to and from the trains.
- It sorts the luggage based on train numbers, destinations, and platform assignments.
- The LHS tracks the movement of luggage through barcode or QR code scanning at various checkpoints.
- The system alerts porters at the destination station to retrieve and deliver the luggage to the passengers.

## **Railway Employees Involved**

- Check-in agents assist passengers at the kiosks and luggage drop-off counters.
- Luggage handlers load and unload luggage onto trolleys and conveyors.
- Porters transport luggage between platforms, sorting areas, and collection points.
- Security personnel conduct luggage screening and ensure security compliance.
- Loaders or porters load and unload luggage from the redesigned luggage cars on the trains.

## **Luggage Car**

- Trains will be equipped with redesigned luggage cars or compartments specifically for luggage storage.
- These luggage cars will have secure compartments or racks for systematic storage of luggage.
- Luggage will be organised and stored based on train numbers, destinations, or coach/berth numbers.

- The design of the luggage cars will facilitate efficient loading and unloading processes.

## **Porters**

- Porters will be assigned specific tasks and responsibilities by the LHS.
- They will be equipped with handheld scanning devices to track the movement of luggage.
- Porters will transport luggage between various checkpoints, such as sorting areas, platforms, and luggage cars.
- They will be responsible for loading and unloading luggage from the trains.
- At the destination station, porters will deliver the luggage directly to the passengers.

## **Checkpoints for Luggage**

- Luggage drop-off counter (initial check-in)
- Screening area (security screening)
- Sortation area (sorting based on destination and train)
- Platform (staging for loading onto trains)
- Luggage car (loading onto trains)
- Destination station platform (unloading from trains)
- Sorting area at destination (sorting for passenger collection)
- Passenger collection point (final delivery)

## **Checkpoints for Porters Carrying Luggage**

- Each checkpoint will be equipped with barcode or QR code scanners.
- Porters will scan the luggage barcodes or QR codes at each checkpoint.
- The LHS will track the movement of luggage through these scanned checkpoints.
- Alerts and notifications will be sent if luggage deviates from the designated route.

## **Loading Luggage onto the Train**

- Porters will transport the sorted luggage from the platform to the luggage car.
- Luggage will be loaded systematically into the designated compartments or racks in the luggage car.
- Porters will scan the luggage barcodes or QR codes during the loading process.
- The LHS will update the luggage status as "loaded" onto the specific train.

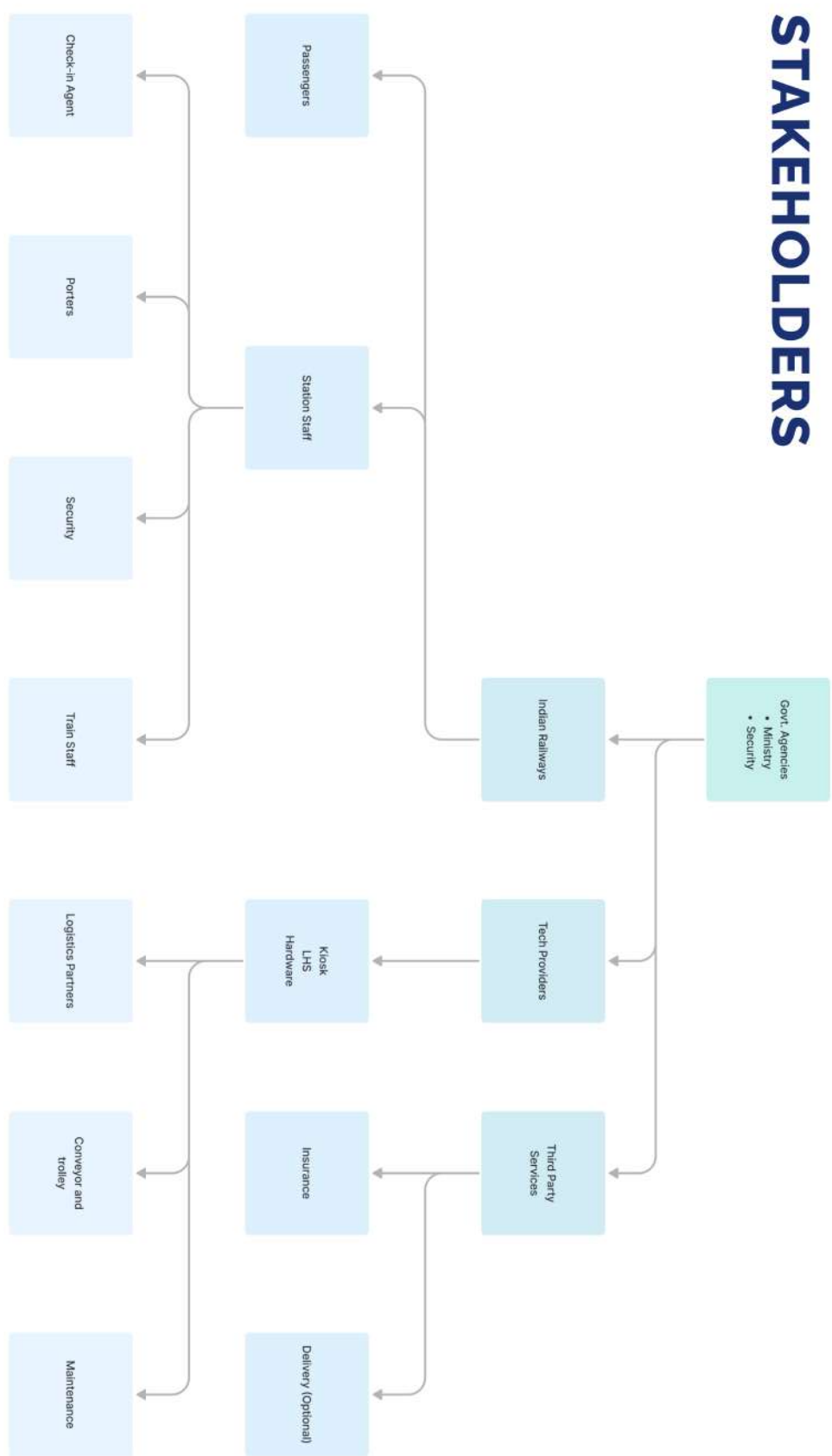


Fig 2.5 | Source: Author

## **Getting Luggage off the Train at Destination**

- The LHS will alert the assigned porters at the destination station about the train's arrival time.
- Upon the train's arrival, porters will promptly unload the luggage from the luggage car.
- Luggage will be scanned and transported to the sorting area at the destination station.
- The LHS will update the luggage status as "unloaded" at the destination station.

## **System's Ability to Track Luggage**

- The LHS will continuously track the movement of each piece of luggage throughout its journey.
- Barcode or QR code scanning at various checkpoints will provide real-time updates on the luggage's location and status.
- The system can generate reports and alerts for lost or misrouted luggage.
- Passengers can check the status of their luggage through the kiosk or a dedicated mobile app.
- Historical data on luggage movement can be analysed to identify areas for process improvements.

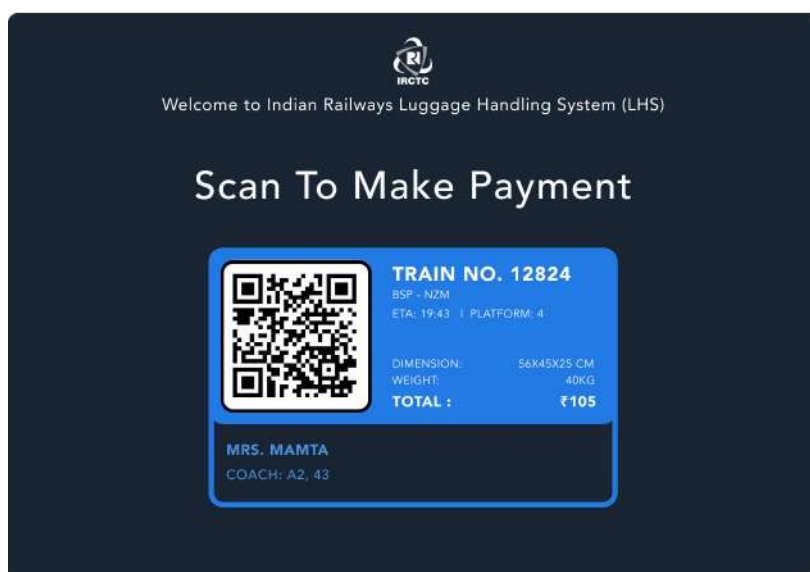
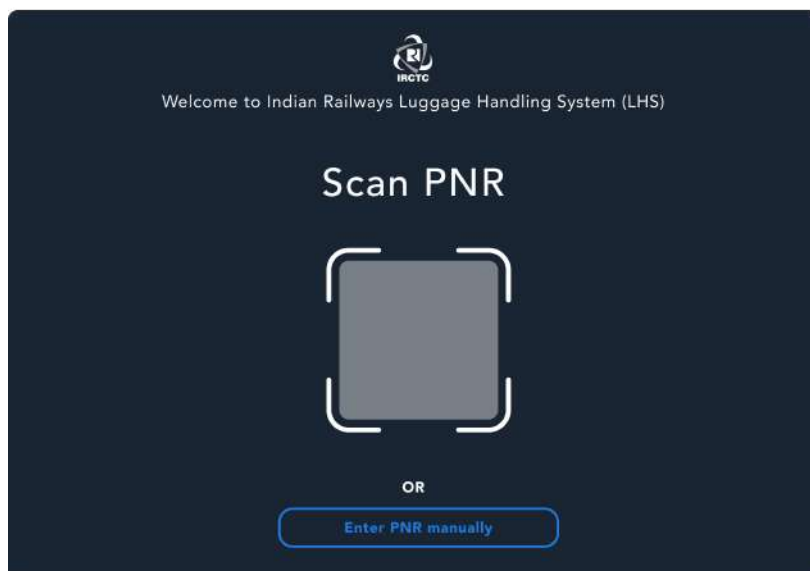
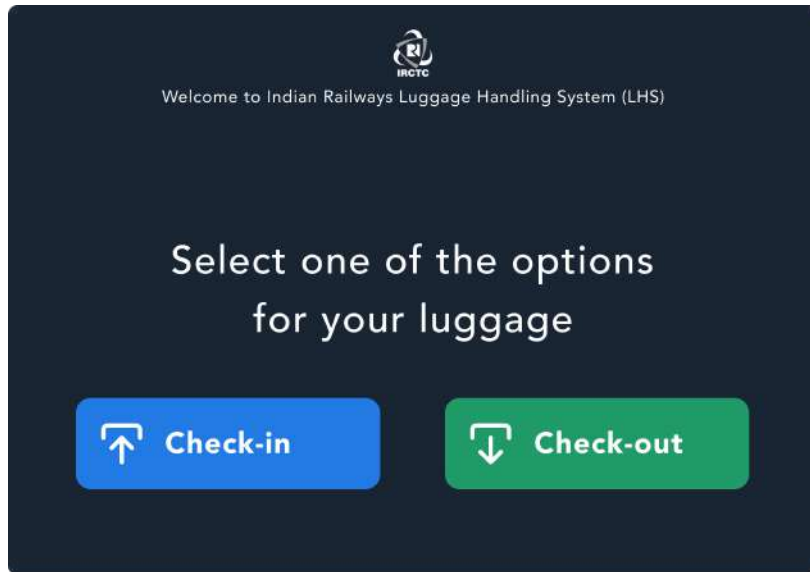


Fig 2.6

| Source: Author

## The Proposed Solution

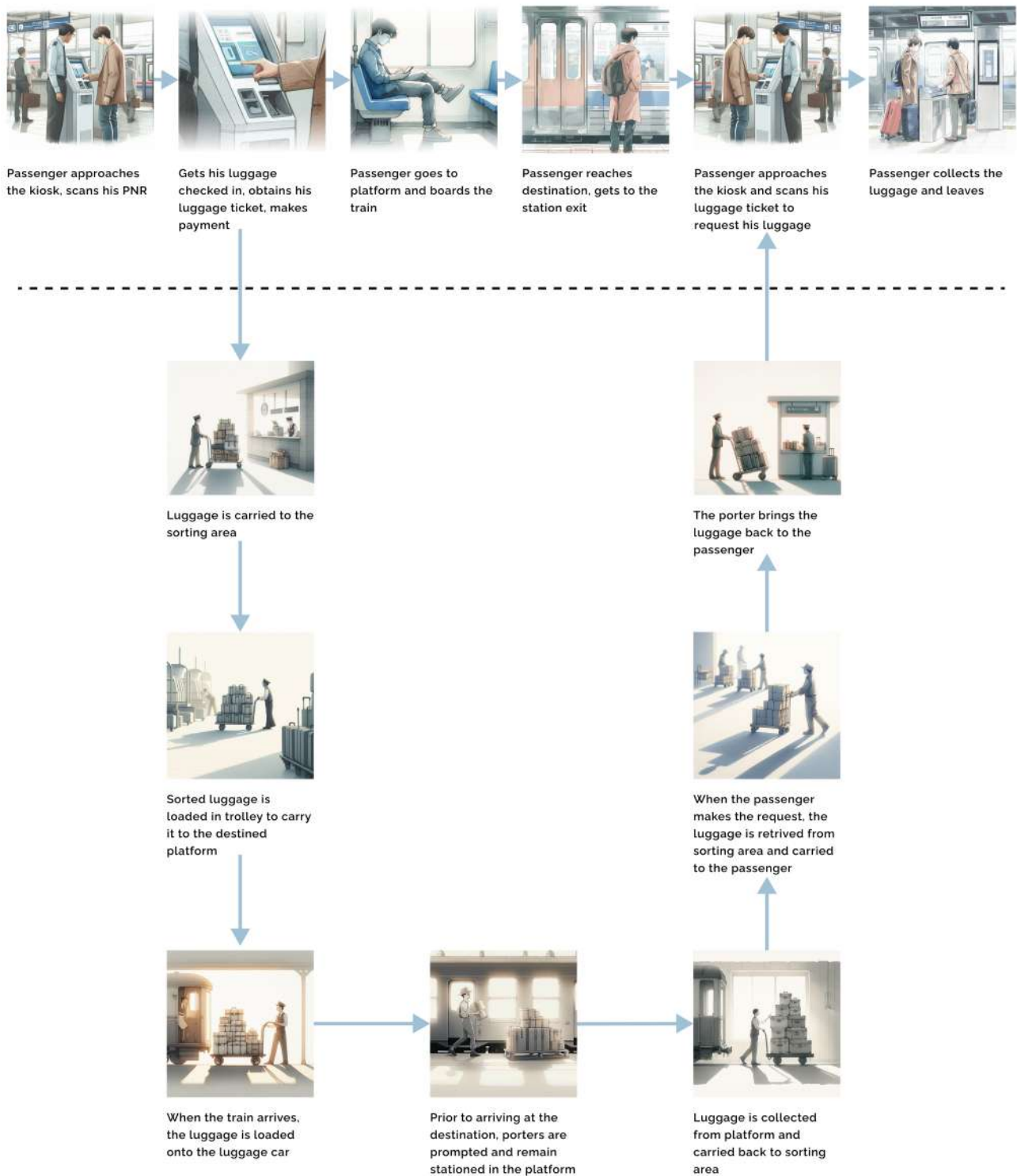


Fig 2.4

Source: Author

## **Features and Functionality of Kiosk Based LHS**

### **Kiosk Features:**

- Self-service kiosks at stations for passenger's luggage check-in
- Ability to enter travel details through PNR Scan
- Integrated weighing scale to capture luggage weight and dimensions
- Payment processing for luggage handling fees
- Barcode tag printing for each piece of luggage
- Ticket scanning and luggage request functionality at destination

### **Platform and Porter Management:**

- Allocation of porters/handlers to platforms based on trolley IDs
- Alert system for porter assignments based on train arrival times
- Staging and organisation of luggage on platforms
- Unloading of luggage from trains and transport to sorting areas

### **System Monitoring and Reporting:**

- Continuous tracking through Porter's devices and status updates of luggage throughout the journey
- Generation of reports for performance analysis and improvement
- Lost luggage tracking and investigation processes, and insurance

## Self Service Kiosk



Fig 2.7 | Source: Author

## Conclusion

The proposed luggage handling system for Indian Railways represents a transformative solution that addresses the long-standing challenges faced by passengers and porters alike. By leveraging technology, efficient processes, and a user-centric approach, this system has the potential to elevate the overall travel experience and set a new standard for luggage management in the rail industry. Through the implementation of self-service kiosks, streamlined luggage sorting and tracking, and redesigned luggage cars, the proposed solution offers a seamless and convenient journey for passengers, free from the physical strain and anxiety associated with luggage handling. The system's emphasis on security and continuous monitoring ensures that passengers can embark on their journeys with peace of mind, knowing that their belongings are safely handled and delivered. Moreover, the proposed solution recognises the crucial role played by porters and prioritises their well-being and fair treatment. By introducing technology-driven processes, job security measures, and a fair distribution of workload, the system aims to alleviate the physical and economic burdens often experienced by porters, fostering a more equitable and sustainable working environment. The comprehensive nature of this solution, underpinned by extensive research and a deep understanding of stakeholder needs, positions it as a pioneering initiative that has the potential to transform the Indian Railways experience. By addressing the multifaceted challenges of luggage management, this system not only enhances passenger convenience and security but also contributes to the overall efficiency and modernisation of the rail network.

However, it is important to acknowledge that the successful implementation of this solution will require a collaborative effort involving various stakeholders, including railway authorities, technology providers, and the broader community. Ongoing monitoring, evaluation, and adaptation will be crucial to ensure the system's long-term sustainability and ability to meet evolving needs. Ultimately, the proposed luggage handling system represents a significant stride towards creating a more accessible, convenient, and inclusive travel experience for all. By prioritising the needs of passengers and porters, this solution has the potential to redefine the standards of luggage management, positioning Indian Railways as a leader in innovative and user-centric transportation solutions.

## Chapter 3

# CONCLUSION AND FUTURE SCOPE

### *3.1 Conclusion*

This research serves as a catalyst for change, paving the way for a future where luggage handling on Indian Railways is no longer a source of frustration but a hallmark of efficiency and convenience. By integrating our findings with existing knowledge and addressing the needs of both passengers and staff, we can create a system that benefits everyone. Further research and pilot programs are crucial to refine the proposed solutions and ensure a smooth transition. Ultimately, the journey towards a more efficient and user-friendly luggage handling system holds the potential to transform the travel experience for millions of passengers, streamline operations for Indian Railways, and create a future where innovation and well-being go hand-in-hand.

### *3.2 Future Scope*

While the proposed luggage handling system for Indian Railways presents a comprehensive solution to address the current challenges, there is always room for further enhancements and future developments. As technology continues to evolve and passenger needs evolve, it is crucial to explore potential avenues for expanding and refining the system's capabilities. Here are some potential areas for future scope:

1. **Integration with digital platforms and mobile applications:** The system could be integrated with Indian Railways' digital platforms and mobile applications, allowing passengers to initiate the luggage check-in process, make payments, and track their luggage in real-time from their personal devices. This would further enhance convenience and provide a seamless multi-channel experience.
2. **Adoption of advanced tracking technologies:** As tracking technologies such as RFID, GPS, and IoT continue to advance, the system could incorporate these solutions for more precise and real-time monitoring of luggage throughout the journey. This would not only improve operational efficiency but also provide passengers with enhanced visibility and peace of mind regarding the whereabouts of their belongings.

3. Expansion to include cargo and parcel services: While the current system is designed for passenger luggage, future developments could explore the possibility of extending the system's capabilities to include cargo and parcel services. This would allow Indian Railways to diversify its offerings and provide efficient logistics solutions for businesses and individuals alike.
4. Incorporation of advanced security measures: As security concerns continue to evolve, the system could integrate cutting-edge technologies such as biometric identification, advanced screening equipment, and AI-powered surveillance systems. These measures would further enhance the security of passengers' belongings and contribute to a safer overall travel experience.
5. Collaboration with international rail networks: In the future, the system could be adapted and integrated with international rail networks, facilitating seamless luggage handling for passengers traveling across borders. This would not only enhance the overall travel experience but also position Indian Railways as a leader in global transportation logistics.
6. Sustainability and environmental considerations: As environmental concerns become increasingly prominent, future developments could explore sustainable practices and eco-friendly solutions within the luggage handling system. This could include the use of renewable energy sources, implementation of waste management strategies, and the adoption of environmentally-friendly materials and processes.
7. Continuous research and development: To maintain the system's relevance and effectiveness, it is crucial to establish a dedicated research and development team tasked with monitoring industry trends, analysing passenger feedback, and exploring innovative solutions. This proactive approach would ensure that the system remains at the forefront of luggage management technology and continues to meet the evolving needs of passengers and stakeholders.

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