GROUP REPORT UHU005 (HUMANITIES FOR ENGINEERS) SUBGROUP-3NC10



SCHOOL OF HUMANITIES AND SOCIAL SCIENCES THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY- PATIALA-147004

Project Report on

"How metro has improved the lives of people"

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LETTER OF TRANSMITTAL

Date: 30/04/2024

Respected Ma'am,

I am pleased to present the enclosed research paper, entitled "How Metro has Improved the Lives of People," which has been prepared as a part of the course Humanities for Engineers. The research focuses on the transformative impact of metro systems on urban life, examining various aspects such as reduced traffic congestion, improved air quality, economic benefits, and enhanced accessibility for the general population.

Key findings suggest that the metro has not only facilitated efficient and eco-friendly transportation but has also contributed significantly to the socio-economic development of cities.

Please find the research paper attached along with the supporting documents. I would be grateful if you could review the paper at your earliest convenience and provide your valuable insights. Your expertise and perspective would be highly beneficial in refining the study and its conclusions.

Thank you for your time and consideration. I look forward to your response and am available for any further discussions or clarifications you may require.

Sincerely,

Rudhir Pratap Singh

Shreya Ganotra

Dhairya

CERTIFICATE

This is to certify that the Report titled "How Metro has Improved the Lives of People" manifests the original work done by students of Thapar Institute of Engineering and Technology, Batch 3NC10.

Rudhir Pratap Singh

Shreya Ganotra

Dhairya

Under the supervision of Ms Rishita Goyal

Date: 30/04/2023

ACKNOWLEDGEMENT

The successful completion of this project is only because of the extraordinary support, guidance, counselling and motivation from our respected teachers at the Thapar Institute of Engineering and Technology. This journey was also incomplete without the support of our family and friends.

We firstly express our hearted thankfulness to our professor Ms Rishita Goyal in this project who made us feel her presence during all those crucial and decision-making moments this project went through. The deep insights into the subject given to us by her are believed to be the root cause of completing this project qualitatively and timely. Also, through the support provided by her, we have acquired knowledge on the avenues that this project has explored. Her direction in making us think about unique conceptual and practical aspects of practising repairability among mobile users lifted this project to this stage of successful completion. We extend our gratitude to all our friends for their encouragement and support.

EXECUTIVE SUMMARY

The advent and proliferation of metro systems have fundamentally transformed urban landscapes worldwide, revolutionizing the way people commute and interact with their cities. Serving as efficient arteries of transportation, metro systems offer fast, reliable, and accessible travel options, drastically reducing commute times and enhancing mobility for millions. Beyond mere convenience, these systems wield significant economic influence, catalyzing urban development, attracting investments, and fostering vibrant communities around transit hubs. Moreover, their environmental impact cannot be overstated, as metro systems play a pivotal role in curbing greenhouse gas emissions and mitigating air pollution by promoting sustainable modes of transportation. Social equity is also bolstered through metro access, providing affordable and inclusive mobility options for individuals from diverse socioeconomic backgrounds. As engines of urban growth, metro systems alleviate traffic congestion, stimulate economic activity, and shape the cultural identity of cities, serving as iconic symbols of modernity and progress. In essence, metro systems have become indispensable components of urban life, enriching the lives of people and contributing to the sustainable development and vibrancy of cities globally.

Metro systems play a crucial role in shaping the lives of university students, offering them convenient and affordable transportation options that greatly impact their academic pursuits and personal lives. By providing efficient connectivity between campuses, residential areas, and city centers, metro systems facilitate easy access to educational institutions, enabling students to attend classes, participate in extracurricular activities, and engage in academic and social events with greater flexibility and convenience. The accessibility offered by metro systems not only reduces commute times but also expands opportunities for students to explore internship opportunities, attend seminars, and access resources beyond their immediate campus. Additionally, metro systems contribute to a more inclusive campus environment by accommodating students from diverse socio-economic backgrounds, enabling them to access educational opportunities regardless of their geographical location or financial means. Furthermore, the cultural and social exposure facilitated by metro travel enriches the university experience, broadening students' horizons and fostering a deeper connection with the vibrant urban communities in which they live and study. Overall, metro systems play a vital role in enhancing the educational experience and quality of life for university students, contributing to their academic success and personal growth. Analysis of the data collected by the form and secondary sources, inferences have been drawn and findings have been listed.

INTRODUCTION

Topic: How metro has improved the lives of normal people

The introduction of metro systems in urban areas has significantly improved the lives of normal people in various ways. Firstly, the metro offers a reliable and efficient mode of transportation, reducing commute times and providing a more predictable journey compared to other modes of transport like buses or cars stuck in traffic. This time-saving benefit allows individuals to allocate more time to productive activities or leisure, enhancing work-life balance.

Moreover, the metro system often proves to be more cost-effective than owning and maintaining a personal vehicle, saving commuters money on fuel, parking fees, and vehicle maintenance. This financial relief contributes to improved economic stability for individuals and families.

Dependent Variable: Quality of life/well-being

Independent Variable: Presence and Accessibility of Metro

When deciding on the independent variable (IV) and dependent variable (DV) for a study on how the metro has improved the lives of normal people with the DV being quality of life or well-being, and the IV being the presence and accessibility of the metro, several factors are considered:

- 1. Dependent Variable (DV): Quality of Life/Well-being:
 - Quality of life or well-being is the main factor of interest in the study. This can encompass various aspects such as physical health, mental health, satisfaction with life, happiness, sense of fulfilment, social connections, and overall satisfaction with living conditions.
 - The DV is what researchers aim to measure and understand how it is influenced by other factors, in this case, the presence and accessibility of the metro system.
- 2. Independent Variable (IV): Presence and Accessibility of Metro:
 - Presence: This refers to whether a metro system exists in a particular area. It can be measured by the presence or absence of metro stations within a certain radius of individuals' residences or workplaces.
 - Accessibility: This refers to how easily individuals can access the metro system.
 Factors influencing accessibility include the proximity of metro stations to
 residential areas, frequency of metro services, ease of navigation within the
 metro system, affordability of fares, and availability of facilities for individuals
 with disabilities or special needs.
 - The IV is considered the potential cause or predictor variable that may influence the quality of life or well-being of individuals. In this study, researchers would investigate how the presence and accessibility of the metro system affect people's quality of life or well-being.

LITERATURE REVIEW

The Impact of Metro Systems on Urban Development

The article explores the relationship between metro systems and urban development, focusing on their comprehensive impacts on the economic, environmental, and social aspects of cities. The study acknowledges the global trend of cities developing metro systems to address urban challenges and promote sustainable urbanization. Metro systems have widespread, profound, and lasting effects on urban development. The study calls for a comprehensive understanding of the impacts of metro systems to guide decision-making on urban development and infrastructure investment.

An overview of recent developments in China's metro systems

This research paper explores the rapid development of metro systems in mainland China over the past two decades, emphasizing the significant role of metro systems in addressing urbanization challenges. The paper investigates the relationships among economic capabilities, resident populations, administrative divisions of cities, and the development of metro systems. Key findings include:

- Urbanization and Economic Growth in China: The paper highlights China's impressive economic growth and rapid urbanization, leading to substantial development in transport infrastructure, including the massive expansion of metro systems.
- Metro Development in China: China has experienced remarkable growth in metro systems, becoming a global leader in terms of planning and constructing metro networks. By the end of 2019, 37 cities in mainland China had operational metro systems with a total length of over 5,180 km.

New metro system and active travel: A natural experiment

(Guibo Suna, Jianting Zhaoa, Chris Webstera, Hui Linb)

The research paper investigates the impact of a new metro system on modal shift and active travel behavior in a developing city, using the metro as a natural experiment. The research provides empirical evidence on the causal inference in the new metro's impact on active travel in a developing city context.

Contrary to assumptions, the study suggests that a new metro does not necessarily lead to an increase in active travel or a reduction in car use. The findings call for caution in making general assumptions about the effects of urban rail transit investments and emphasize the importance of context-specific research in transportation planning and policy-making.

SCOPE AND SIGNIFICANCE OF STUDY

The study of how metro systems influence the lives of people encompasses a broad scope that includes transportation efficiency, economic impact, environmental sustainability, social equity, urban development, and cultural significance. This comprehensive examination provides insights into the multifaceted effects of metro systems on individuals and communities. Understanding these impacts is significant for several reasons. Firstly, it informs transportation planning and policy decisions, guiding investments in infrastructure and transitoriented development to meet the evolving needs of urban populations. Secondly, metro systems play a pivotal role in driving socio-economic development by enhancing accessibility to essential services and fostering economic growth. Moreover, they contribute to environmental sustainability by promoting sustainable transportation alternatives and reducing emissions. Additionally, metro systems serve as equalizers of mobility, enhancing social equity by providing affordable and accessible transportation options. Furthermore, their influence on urban form and development patterns underscores their significance in shaping the built environment and promoting livable, walkable communities. Lastly, metro systems contribute to the cultural identity of cities and facilitate social interactions, cultural exchange, and civic engagement among residents and visitors. In essence, studying how metro systems influence people's lives offers valuable insights into creating more sustainable, equitable, and vibrant urban environments for present and future generations.

OBJECTIVES OF THE STUDY

The introduction of metro systems has significantly improved commuting convenience by reducing travel time and alleviating congestion on roads, offering residents a fast, reliable, and accessible transportation alternative.

Survey findings indicate a notable reduction in carbon emissions and pollution resulting from the shift from private vehicles to metro travel. This transition has led to a cleaner and healthier environment, promoting public health and sustainability. The metro has substantially enhanced safety and security for commuters, with well-lit stations, surveillance cameras, and regular security patrols instilling confidence among passengers and ensuring a safer travel experience.

Improved accessibility for people with disabilities and senior citizens has made cities more inclusive, guaranteeing equitable access to public transportation and fostering a sense of community cohesion.

The presence of metro stations has driven increased property values and real estate development along metro corridors, benefiting homeowners and investors while stimulating economic growth in surrounding areas. Future plans for metro expansion and development underscore a commitment to meeting urban transportation needs, with efforts focused on enhancing service coverage, improving connectivity, and further enhancing quality of life for urban residents.

RESEARCH METHODOLOGY

This research aimed to assess public perception of the metro system and its impact on daily life. A survey design was chosen for its efficiency in gathering a large amount of data from a broad range of participants.

Sampling Strategy

A non-probability convenience sampling approach was used. Participants were recruited from a variety of locations where they were likely to encounter the metro system, such as stations and surrounding areas. This approach acknowledges limitations in generalizability but offers a practical way to gather data from a relevant population segment within a reasonable timeframe.

Data Collection Instrument

A self-administered survey was created using a pie chart format for each question. This format offered respondents a clear and concise way to indicate their level of agreement or experience with various aspects of the metro system. The answer choices were carefully designed to capture a range of perspectives on each topic.

A pilot test was conducted with a group of around 150 people to ensure the clarity and effectiveness of the survey instrument before full-scale data collection began.

Data Analysis

Data analysis was primarily descriptive, focusing on the distribution of responses across the various answer choices presented in each pie chart.

DATA SOURCES

• Primary Data

A questionnaire was filled out by the people. The data collected and the interpretations of the same are presented ahead in this report.

Secondary Data

Research papers, journals, and magazines were studied.

• Data Collection Method

The primary data collection method used in this research is the questionnaire method. Here the data are systematically recorded from the respondents. The secondary data used here is from published research papers, journals and podcasts.

RESEARCH TOOL

A structured questionnaire has been prepared to get the relevant information from the respondents. The questionnaire consists of a variety of questions presented to the respondents for their despondence.

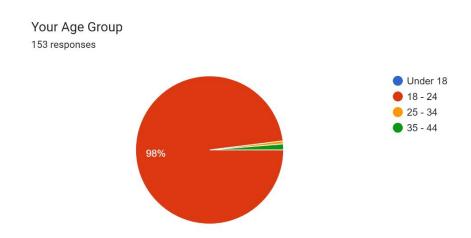
SAMPLING

The target sample chosen was to people living in cities with metro cities, specifically Delhi considering the fact that they would provide more accurate information and will be having more specific and well-defined repair preferences.

Sample Size: The sample size chosen for this study is 150 since it is a Mini Research Project.

RESULTS AND DISCUSSIONS

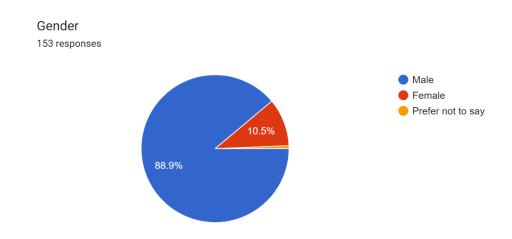
Survey Question 1



Interpretation:

• The pie chart shows that 98% of the people are from age group 18-24 years.

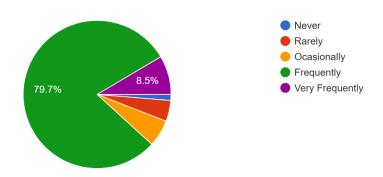
Survey Question 2



- 88.6% male respondent
- 10.5% Female Respondent

1. I use the metro system:

153 responses

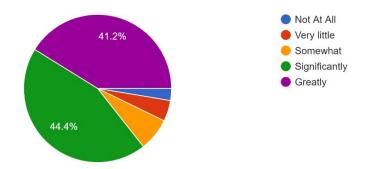


Interpretation:

- The pie chart shows how often people use the metro system. Out of 153 respondents, the largest portion (79.7%) said they use the metro system frequently. This is followed by 8.5% who rarely use it, 7.9% who occasionally use it, and 4.6% who never use it.
- The pie chart suggests that the metro system has been successful in reducing commute times for a significant portion of its users. Nearly half of the respondents reported that the metro system has significantly reduced their commute time, while another fifth reported some time savings.

Survey Question 4

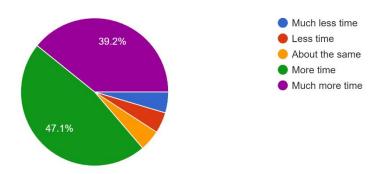
2. The metro system has impacted my daily commute in terms of time saved $_{\rm 153\,responses}$



Interpretation:

• 85.6% people thinks that metro has impacted their daily commune in terms of time saved

3. On average, the time I save by using the metro compared to other modes of transportation is 153 responses

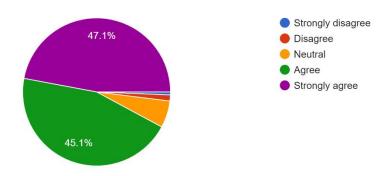


Interpretation:

- A significant portion, 47.1%, reported spending more time using the metro compared to other transportation options.
- 39.2 represents the number of people who said it took them "much more time" by metro.

Survey Question 6

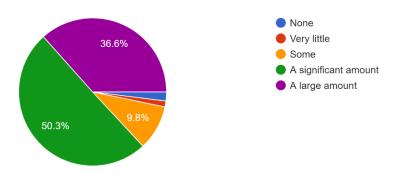
4. I have noticed a decrease in my transportation expenses since using the metro system 153 responses



Interpretation:

• 47.1% of the 153 respondents strongly agree with the statement. Another 45.1% agree, for a total of 78.4% who say their transportation expenses have decreased since using the metro system.

5. I estimate I save each month by using the metro instead of other transportation methods 153 responses

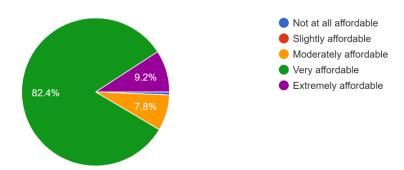


Interpretation:

- A large amount (50.3%) of respondents say they save a large amount of money by using the metro.
- Some (36.6%) say they save large some money.
- A very little (9.8%) say they save very little money.
- None (3.3%) say they don't save any money.

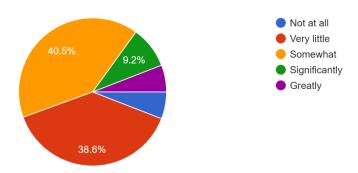
Survey Question 8

6. I find the metro fares to be affordable compared to other transportation options 153 responses



- The largest portion (82.4% or 126 people) said they find metro fares to be very affordable. 7.8% (12 people) said metro fares are moderately affordable.
- Only a small portion (9.8% or 15 people) said metro fares are slightly or not at all affordable.

7. The metro system has influenced my decision on where to live or work 153 responses

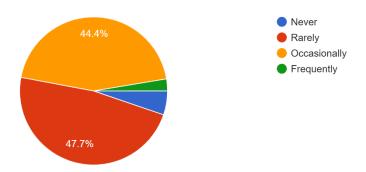


Interpretation:

- The largest slice of the pie chart (40.5%) is labeled "Somewhat". This suggests that for many people, the metro system was one of several factors that influenced their decision on where to live or work.
- A smaller slice (38.6%) is labeled "Very little".
- This suggests that for almost 40% of respondents, the metro system did not play a role in their decision on where to live or work.

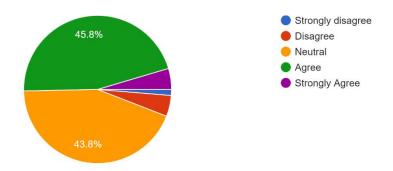
Survey Question 10

8. I have experienced disruptions or delays while using the metro system. If yes, how often 153 responses



- Nearly half (44.4%) of respondents reported experiencing disruptions or delays.
- Fewer people reported rarely (21.6%) or occasionally (18.9%) experiencing disruptions or delays.
- Only 15.1% said they never experience disruptions or delays.

9. I feel that the metro system has reduced traffic congestion in my city 153 responses

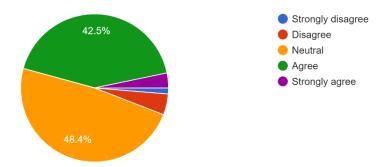


Interpretation:

- Agree (45.8%) is the largest slice of the pie chart.
- Neutral (43.8%) is the second largest slice.

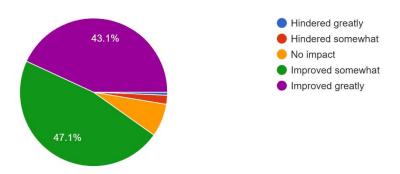
Survey Question 12

10. I have noticed any improvements in air quality since the introduction of the metro system 153 responses



- Agree (42.5%) is the second largest slice of the pie chart, which means nearly half the respondents said they have noticed a change in air quality.
- Neutral (48.4%) is the largest slice.

11. The metro system has impacted my ability to access different areas of the city 153 responses

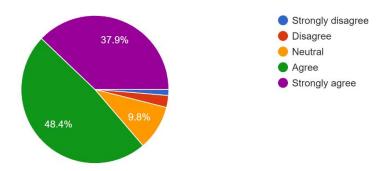


Interpretation:

• The findings of the pie chart is that 47.1% of respondents said that the metro system has impacted their ability to access different areas of the city.

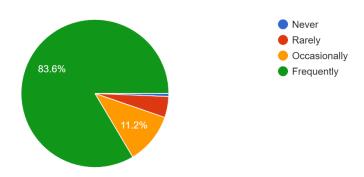
Survey Question 14

12. I feel safer using the metro compared to other modes of transportation $_{\rm 153\,responses}$



- The pie chart you sent shows that 86.3% of people feel safer using the metro compared to other modes of transportation.
- 9.8% of respondents are neutral on the issue.

13. I have experienced overcrowding issues during peak hours on the metro 152 responses

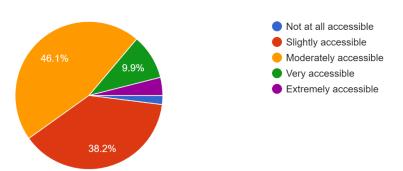


Interpretation:

• The pie chart you sent shows the percentage of people who have experienced overcrowding issues during peak hours on the metro. 83.6% of respondents said they have frequently experienced overcrowding, while 11.2% said they occasionally experience it.

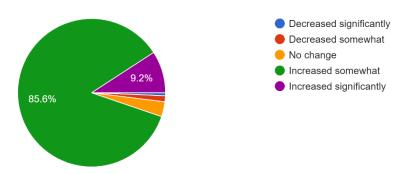
Survey Question 16

14. The metro system's accessibility for people with disabilities or mobility issues is 152 responses



- Moderately accessible (46.1%) is the largest slice of the pie chart. This suggests that nearly half of the respondents with disabilities or mobility issues believe the metro system is somewhat accessible to them.
- Very accessible (9.9%) is the second largest slice.

15. I have noticed changes in property values or rental prices near metro stations 153 responses

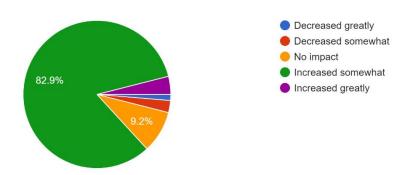


Interpretation:

• Increased somewhat (85.6%) and Increased significantly (9.2%) - combined total of 94.8% of respondents said they noticed property values or rental prices have increased near metro stations.

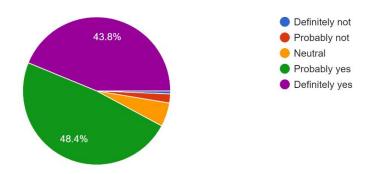
Survey Question 18

16. The metro system has affected my overall quality of life 152 responses



- The largest slice (82.9%) is labeled "Increased Somewhat". This suggests that for the majority of respondents, the metro system has had a positive impact on their quality of life.
- A smaller slice (9.2%) is labeled "No impact". This suggests that for a smaller portion of respondents, the metro system has had no impact on their quality of life.
- The remaining slices of the pie chart are labeled "Increased Greatly" (4.6%), and "Decreased Somewhat" (3.3%)

17. I would recommend the metro system to others based on my experience 153 responses



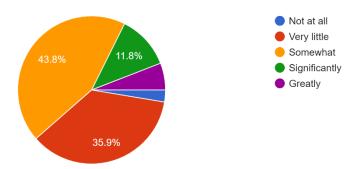
Interpretation:

92.2% said they definitely would not recommend the metro system.

7.8% said they are either neutral or probably would not recommend it.

Survey Question 20

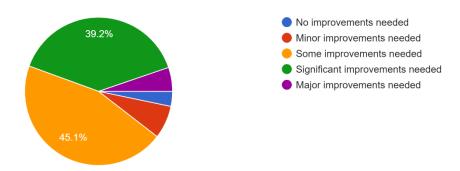
18. I think the metro system could further contribute to reducing carbon emissions in my city 153 responses



- The largest slice (43.8%) is labeled "Somewhat." This suggests that almost half of the respondents believe the metro system could further contribute somewhat to reducing carbon emissions.
- A smaller slice (35.9%) is labeled "Very little" This suggests that over a third of respondents believe the metro system could not contribute much more to reducing emissions.

19. Improvements I would suggest to make the metro system even more effective in terms of time and cost savings

153 responses



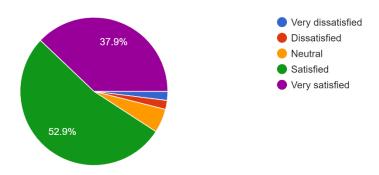
Interpretation:

- The largest slice (45.1%) is labeled "Some improvements needed".
- A smaller slice (39.2%) is labeled "Significant improvements needed".
- The remaining slices of the pie chart are labeled "Minor improvements needed" (15.3%),

Survey Question 22

20. Overall, how satisfied are you with the metro system's impact on your daily life in terms of time and cost savings?

153 responses



- The largest portion (52.9%) said they are satisfied.
- 37.9% said they are Very satisfied.
- Only a small portion (9.2%) said they are neutral, dissatisfied or very dissatisfied.

KEY FINDINGS

This survey of 153 respondents (aged 18-24 years old) gathered insights on their experience using a metro system. Here are the key takeaways:

Positive Impacts:

- **Reduced Commute Times:** A significant portion (nearly half) reported the metro system has significantly reduced their commute times.
- **Saved Money:** The majority (over 78%) agreed their transportation expenses decreased after using the metro. Most riders (over 80%) find fares affordable.
- **Increased Accessibility:** Nearly half said the metro system has improved their ability to access different parts of the city.
- Safety: A large majority (86%) felt safer using the metro compared to other options.
- **Quality of Life:** The majority (over 80%) said the metro system has had a positive impact on their quality of life, with property values increasing near stations.
- **Reduced Emissions:** Almost half believe the metro system could further contribute to reducing carbon emissions.

Challenges:

- **Overcrowding:** A large majority (over 80%) have frequently experienced overcrowding during peak hours.
- **Disruptions:** Nearly half (44%) reported experiencing disruptions or delays.
- Accessibility for Disabled: While nearly half find it moderately accessible, there's room for improvement.

Neutral Findings:

- **Impact on Location Decisions:** While some consider it a factor, for nearly 40% the metro system did not influence their decision on where to live or work.
- Air Quality: Nearly half are neutral on whether they noticed a change in air quality.

Surprising Finding:

• **Recommendation:** Despite the positive impacts, a large majority (over 90%) said they would not recommend the metro system.

Further Investigation Needed:

- The reason behind the high dissatisfaction despite reported benefits needs to be investigated.
- It would be helpful to understand how the challenges (overcrowding, delays) can be addressed to improve the user experience.

Overall, the metro system seems to benefit many by reducing commute times, saving money, and increasing accessibility. However, overcrowding, delays, and limited accessibility for some require improvement. The high dissatisfaction rate, despite positive aspects, suggests a need to understand user concerns better.

CONCLUSION

The findings from the pie charts painted a generally positive picture of the metro system. Here are the key takeaways:

- Convenience and Time Savings: A significant majority of respondents reported using the metro system frequently and experiencing time savings due to it.
- Cost Savings: A large portion of the surveyed population felt the metro system reduced their transportation expenses. Most found fares affordable compared to other options.
- Impact on Location Decisions: While not the primary factor, the metro system influenced the decision on where to live or work for a considerable portion of respondents.
- Room for Improvement: Disruptions and delays were the most common complaints.
 Overcrowding during peak hours was also a frequent issue. Accessibility for people with disabilities needs improvement.
- Overall Satisfaction: Despite the mentioned issues, a majority of respondents were satisfied with the metro system's impact on their daily lives in terms of time and cost savings. Most would recommend the system to others, although a significant portion remained neutral on the recommendation.
- Environmental Impact: The majority of respondents believed the metro system could further contribute to reducing carbon emissions in the city.

APPENDIX

SURVEY FORM AND QUESTIONNAIRE

How metro has improved the lives of people

Metro systems have revolutionized urban transportation, significantly enhancing the lives of ordinary individuals worldwide. This survey aims to understand the multifaceted benefits of metro systems on the daily lives of people. Your feedback will contribute to a better understanding of how metro systems positively influence the well-being and efficiency of urban communities.

rsingh2_be21@thapar.edu Switch account

Not shared

* Indicates required question

Your Age Group

*

Under 18

18 - 24

25 - 34

35 - 44

Gender*

Male

Female

Prefer not to say

1. I use the metro system:

Never

Rarely

Ocasionally

Frequently

Very Frequently

2. The metro system has impacted my daily commute in terms of time saved

Not At All

Very little

Somewhat

Significantly

Greatly

3. On average, the time I save by using the metro compared to other modes of transportation is

Much less time

Less time

About the same

More time

Much more time

4. I have noticed a decrease in my transportation expenses since using the metro system

Strongly disagree

Disagree

Neutral

Agree

Strongly agree

5. I estimate I save each month by using the metro instead of other transportation methods

None

Very little

Some

A significant amount

A large amount

6. I find the metro fares to be affordable compared to other transportation options

Not at all affordable

Slightly affordable

Moderately affordable

Very affordable

Extremely affordable

7. The metro system has influenced my decision on where to live or work

Not at all

Very little

Somewhat

Significantly

Greatly

8. I have experienced disruptions or delays while using the metro system. If yes, how often

Never

Rarely

Occasionally

Frequently

9. I feel that the metro system has reduced traffic congestion in my city

Strongly disagree

Disagree

Neutral

Agree

Strongly Agree

10. I have noticed any improvements in air quality since the introduction of the metro system

Strongly disagree

Disagree

Neutral

Agree

Strongly agree

11. The metro system has impacted my ability to access different areas of the city

Hindered greatly

Hindered somewhat

No impact

Improved somewhat

Improved greatly

12. I feel safer using the metro compared to other modes of transportation

Strongly disagree

Disagree

Neutral

Agree

Strongly agree

13. I have experienced overcrowding issues during peak hours on the metro

Never

Rarely

Occasionally

Frequently

14. The metro system's accessibility for people with disabilities or mobility issues is

Not at all accessible

Slightly accessible

Moderately accessible

Very accessible

Extremely accessible

15. I have noticed changes in property values or rental prices near metro stations

Decreased significantly

Decreased somewhat

No change

Increased somewhat

Increased significantly

16. The metro system has affected my overall quality of life

Decreased greatly

Decreased somewhat

No impact

Increased somewhat

Increased greatly

17. I would recommend the metro system to others based on my experience

Definitely not

Probably not

Neutral

Probably yes

Definitely yes

18. I think the metro system could further contribute to reducing carbon emissions in my city

Not at all

Very little Somewhat Significantly Greatly

19. Improvements I would suggest to make the metro system even more effective in terms of time and cost savings

No improvements needed Minor improvements needed Some improvements needed Significant improvements needed Major improvements needed Other:

20. Overall, how satisfied are you with the metro system's impact on your daily life in terms of time and cost savings?

Very dissatisfied Dissatisfied Neutral Satisfied Very satisfied

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