

# Nagpur Metro- Evaluating Travellers Perception

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## Abstract

Nagpur being the geographical centre of India has always seen transport moving in and through it. It has been recognised as one of the greenest and cleanest city of Maharashtra. However, Nagpur is experiencing a sudden influx in the traffic since the last three years. What used to take just 30 minutes to reach now takes not less than 45 minutes to one and half hours to reach. And that is mainly due to the increase in traffic.

In this context, the government proposed a plan to ply a metro in the city to curb traffic jams, air and noise pollution and health hazards. Metro is expected to provide better, safer and more accessible Nagpur for present and future generations to come. However due to the inconvenience caused by construction of Metro, the people in Nagpur have mixed feelings regarding building the metro infrastructure in city. Hence the research aims to know the perception of people about use of Nagpur Metro.

**Keywords:** Metro, Pollution, Traffic, Transportation, Nagpur

## Introduction

Nagpur is winter capital of Maharashtra with approximate population of 35 lakhs. Nagpur lies precisely at the centre of the country with the Zero Mile Marker indicating the geographical centre of India. The city was founded by the Gonds but later became part of the Maratha Empire under the Bhonsla's. It is also declared as, "Tiger Capital of India" as it connects many Tiger Reserves in India to the world.

Nagpur has been growing pretty rapidly over the last few years. Nagpur is also developing as an industrial and educational hub in central India with IIM, AIMS coming and also SEZ-MIHAN, students from all over Vidharbha look up to Nagpur for opportunities whether it be Jobs or education.

The infrastructures like metros need to be planned keeping the future requirements. This would mean a lot of people migrating to Nagpur for better opportunities. Also Nagpurians going out for Job might come back for settling in their native city. Nagpur has its own in- house city bus service, the buses are already over-crowded and with the ever increasing people base here it would really be difficult to cope up with the situation in the near future. Thus the metro is expected to be the answer to all.

## Need of Metro

The students from all over Vidharbha look up to Nagpur for opportunities whether it be Jobs or educational and thus they are migrating to the sub-capital of Maharashtra on a large scale. Nagpur needs to be ready with the infrastructure to accommodate the people, thus there is need of metro.

Though, Nagpur has its own in-house city bus service, the buses are already over-crowded and with the ever increasing people's base, it would really be difficult to cope up with the situation in the near future, thus there is need of metro. Nagpur has a lot of work to be done. It can still be expanded and house - Multinationals, Multiplexes, Hospitals, and what not. And that all comes with infrastructure, thus there is need of metro. For a proper development of rural, agricultural, industrial and also tourism sector needs best roads and transportation. That is what we are leading to in Nagpur with specific lift to MIHAN with arrival of METRO.

Metro in the long run would only be beneficial for the city, and the only Con as researchers perceive is the nuisance it's causing the people here till the metro is completely operational. With older structures being destroyed every other day and a foundation for a new metro path or a flyover being laid, the traffic is getting worse but yes once the metro is operational the people are only to thank the authorities for their tremendous feat.

## Metro Project

The Nagpur Metro system is an urban Mass Rapid Transit System (MRTS) being built by the Maharashtra Metro Rail Corporation Ltd. (MahaMetro) to serve the city of Nagpur in eastern Maharashtra.

Nagpur Improvement Trust (NIT), the Planning and Development Authority for the entire Nagpur Metropolitan region, signed an agreement with Delhi Metro Rail Cooperation (DMRC) for the preparation of the detailed project report (DPR) for Nagpur Metro rail system in February 2012. DMRC submitted the DPR to NIT in February 2013.

Traffic survey for the project was concluded in May 2013. The project catering to Nagpur—the Orange City and Tiger Capital of India—aims to create 2 lakhs jobs. Apart from transit-oriented development, the project aims to reduce the number of vehicles that ply on roads and also bring down air pollution in the city. It aims to reduce average travel time of commuters by around 50 per cent.

The government of India sanctioned the project in August 2014 and foundation stone was laid by the Indian Prime Minister in the same month. The Maharashtra Airport Development Company (MADC) transferred 37ha of land to Nagpur Metro Railway Company Limited (NMRCL) for the metro rail project in February 2015.

Construction on the project began on 31 May 2015 with trial run done successfully on 30th September 2017 and an anticipated partial commercial operation was expected in March 2019. Construction for its 38.215 km first phase started in 2015 and is expected to be completed in 2022 (estd.) with a mix of elevated & at-grade level lines in November 2017, MahaMetro's board approved a 3 km extension of Line-1 with the addition of two new stations at Eco park and Metro City – extending the first phase of the

project to 41.7 km. Besides that, a new elevated station was added at Cotton Market between Sitabuildi and Railway Station stations on Line-2.

The Nagpur Metro project achieved a major feat on September 30 when after 27 months of being launched it became the fastest Metro project to reach the trial stage. Prime Minister Narendra Modi inaugurated the Nagpur Metro Rail project and the trial runs were flagged off by Maharashtra Chief Minister Devendra Fadnavis and Union Transport Minister Nitin Gadkari on September 30. The project was initiated in 2015 and the first two phases are scheduled to be completed by 2023.

### **Metro Network**

The project costing Rs. 8,860 crore comprises two Metro corridors – east-west and north-south. The combined length of the two Metro corridors is a little over 39 km. The total number of stations in the first two alignments corridors will be 33. The north-south section with 16 stops will operate between Automotive Square and Khapri and the east-west section with 18 stops will run between Prajapati Nagar and Lokmanya Nagar. The two lines will intersect at the interchange station of Sitaburdi. The two routes will be served by 36 stations in total.

### **Metro Funding**

The Nagpur Metro Rail Corporation (NMRC) has drawn funding from several channels at the state, Centre and international level for the Rs 8,860 crore projects. The Nagpur Metro Rail project has received around 20 per cent funding from the Centre and an equal investment from the Maharashtra government, Nagpur Municipal Corporation provided around 5 per cent as did the Nagpur Improvement Trust. As much as Rs 4,000 crore has come from German-government owned development bank KFW. Rs 600 crore has come from French development agency AFD.

## Study of Existing Literature

In order to identify the research gaps a review of existing literature was conducted and the results are tabulated as below:

Year	Authors	Title	Research Description
September 2017	AniketRaut, AshutoshTonpe, Ajinkya Kulkarni, SaksheeBhaiswar	Execution of Metro Rail Projects – A Case Study of Nagpur Metro Rail Loyalty Chain: A Study in the Context of Cellular Services in India	From the above study, clearly, the efforts of Nagpur Metro Rail Corporation reflect on the progress of the project. Further upcoming projects in the country can be planned and executed in a way such that the experiences and bottlenecks identified in previous projects can be eliminated. India has a huge need of Mass Rapid Transit Systems as a growing economy. The development of such metro projects would boost the infrastructure and help the economy to develop.
November 2017	Rangesh M. Jajodia, Prof. K. R. Burkul	Study of Structural Features of Nagpur Metro	This study emphasis on Features of metro as follows: Large amount of land is not required as the major portion of the track is elevated and only 02 stations are atgrade. The foundation used is mainly pile foundation with 0.8 to 1.0m diameter and cutoff level at 1.5m to 2.0m depth below the existing ground. Various geo-technical investigations are carried out to find the preferred type of foundation, which concluded that cast-in situ RC pile is most suitable. Segmental method of construction is adopted for rapid and effective construction of project.
December 2017	Mr.Ajit Sao, Md. GulfamPathan, Mr. Ajay Mendhe	Nagpur Metro: A review	From the study conclusion can be made that Nagpur metro rail is proposed before the worst situation unlike other cities and if it works in planned ways then it could be the model for all cities for development of public transport system and management of road traffic. Unlike other metro rail project Nagpur is absolutely different and having its own socioeconomic difficulties. The distribution of Nagpur population is also a problem which will not covered in metro rail project.

### Research questions

- Will Metro be successful in Nagpur City?
- Will people opt for Metro as their regular transport?

### Research Objective

1. To know whether Nagpur people are satisfied with their current mode of transport.
2. To know the perception of probable Nagpur Metro users about upcoming metro.
3. To know feasibility and acceptance of metro among probable Nagpur users.
4. To study relevant factors of satisfaction among probable metro users.

**Hypothesis**

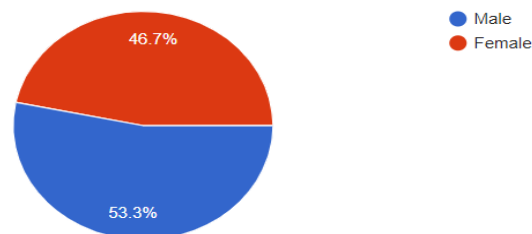
- H01. There is no relationship between gender and satisfaction with current mode of the transportation.
- H02. There is no relationship between age and satisfaction with current mode of the transportation
- H02. There is no relationship between occupation and satisfaction with current mode of the transportation
- H02. There is no relationship between area and satisfaction with current mode of the transportation
- H05. There is no relationship between distance travelled and satisfaction with current mode of the transportation.
- H06. There is no relationship between expenses and satisfaction with current mode of the transportation.
- H07. There is no relationship between travel safety, travel cost, travel comfort, travel time, availability of vehicle and use of Metro over current mode of the transportation

**Data Collection tool and Sampling Frame**

The data is collected using questionnaire. The structured questionnaire was prepared and circulated among the perspective Metro users of Nagpur which includes service man, businessman, house wives and students. The respondents belong to diverse demographics. The sample size targeted was 400. The valid responses collected were 368. Thus the success rate was 92%. The data so collected was coded, tabulated and analysed for interpretation and drawing conclusions.

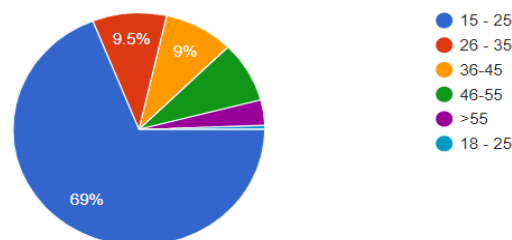
**Data analysis and Findings**

Gender  
368 responses



No of male and female who responded were mostly similar. So gender has not very conclusive impact on the study.

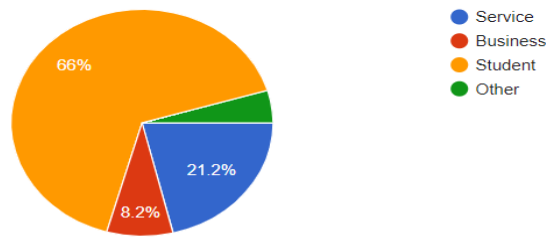
Age  
368 responses



From data collected it can be said that most of our response were from age 15-25 i.e., 69%, then 26-35 that is 9.5% and so on. We can conclude that most of respondent were youngster who goes to school/college who would be using Metro.

### Occupation

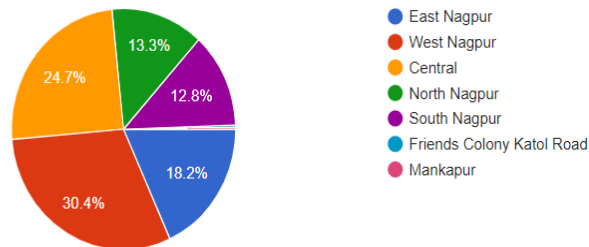
368 responses



Through the research is mainly concentrated in Nagpur City and our target segment also comprised the students. From the above chart it becomes clear that most of the respondent were students who think about Metro and are the one who would be using metro .

### In which area you stay in Nagpur

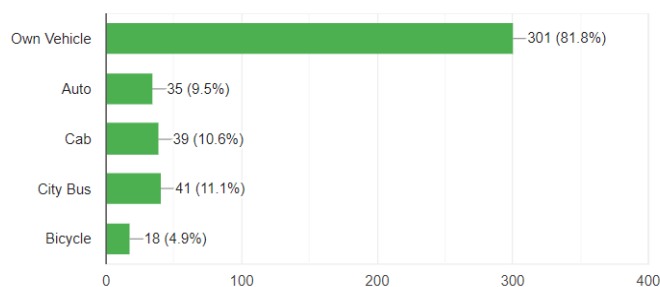
368 responses



Through the survey was conducted throughout Nagpur City, but number of response received from West Nagpur were more than other areas of Nagpur ,i.e. 30.44% then Central 24.7%.It can be said that west respondent care more about Metro.

### What mode of transport you generally use for routine travel

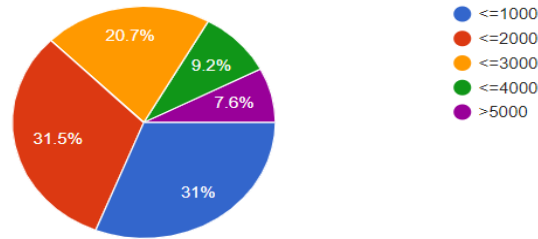
368 responses



From above chart, it can be stated that 81.8% of respondents use their own vehicle for transportation and only few respondents use other modes of transportation viz. City Bus, Cab, Auto and Bicycle.

### What are your monthly expenses on travelling

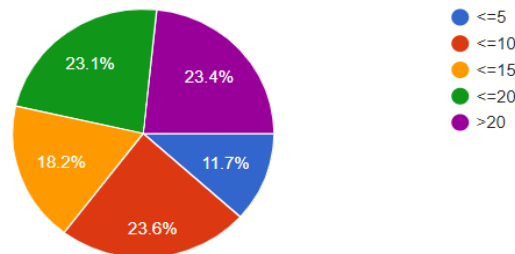
368 responses



It can be observed that 31.5% of respondent spend around Rs.2000 and 31% of respondent spend around Rs.1000 in travelling and rest of respondent spend around Rs.3000, 4000 and 5000, i.e. 20.7%, 9.2% and 7.6 % respectively. Through this we come to know that people are spending lot on travelling, some people even spend Rs.5000 in month.

### What is your daily travelling distance in Kilometers

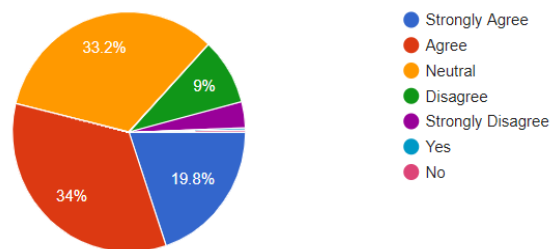
368 responses



It was found that among 368 respondents 23.6% respondent travel 10km , 23.4% respondent travel 20km and above, 23.1% respondent travel 20km or less, 18.2% responded travel 15km and 11.7% of respondent travel 5km a day. It can be conclude that most of respondent travel even 20 km and above and this take considerable amount of time and effort, this can be reduced if they will use Metro.

### I am satisfied with my current mode of transport

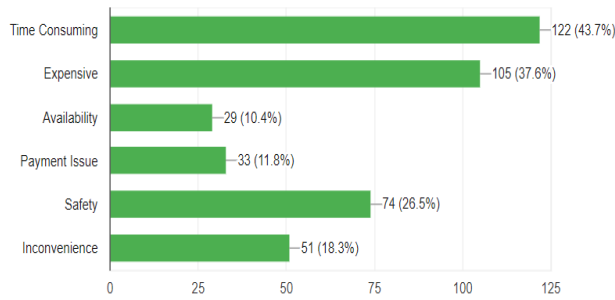
368 responses



It is very important to identify whether people are satisfied with their current mode of transport. From the above chart it can be concluded that 53.8% of respondent agreed and were satisfied with their current mode of transportation. Also 33.2% of respondent were neutral and only 9% of responded disagree.

I am dissatisfied because

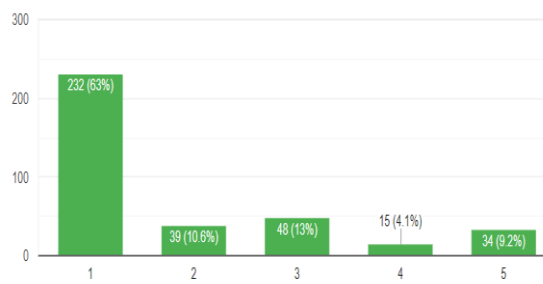
279 responses



It is very important to identify why people dissatisfied with their current mode of transport. Among all approximately 43.7% respondents agreed that time consumption for travelling was the main reason for dissatisfaction. Apart from time consuming factor there are various other factors like expensive, safety backed for dissatisfaction of the current mode of respondent’s transport.

How important you consider safety while travelling

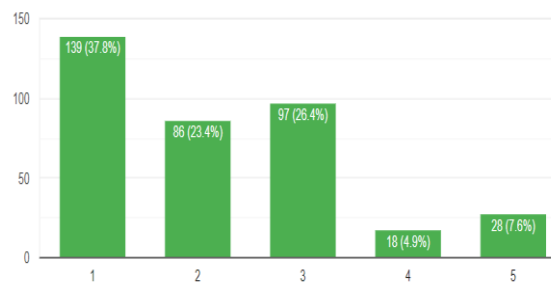
368 responses



Safety has become one of the most important factors while travelling. About 73.6% of respondents agreed and considered safety to be very important while 13% of respondents were neutral and 12.3% of respondents were disagreed to it. It can be concluded that people consider safety as the most important factor while travelling.

How important you consider travel cost

368 responses

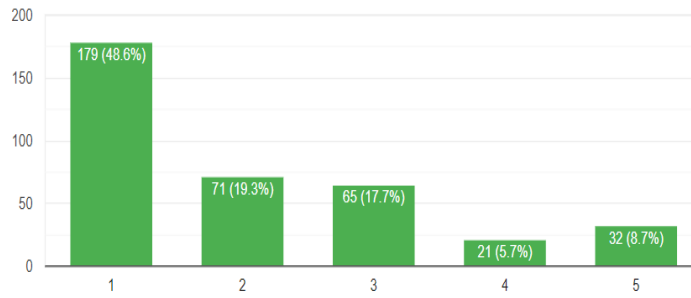


Travel cost is also one of the important factors while travelling; most of people are looking for cheaper transport now a days. According to the response 37.8% of respondents were strongly agreed and 23.4% of respondents were agree and stated that travel cost is important, while 26.4% of respondents were neutral and 4.9% of respondents disagreed and 7.6% of respondents strongly disagree and state travel cost is not important. It can be concluded that respondents considered travel cost as an important factor for travelling.



How important you consider travel time

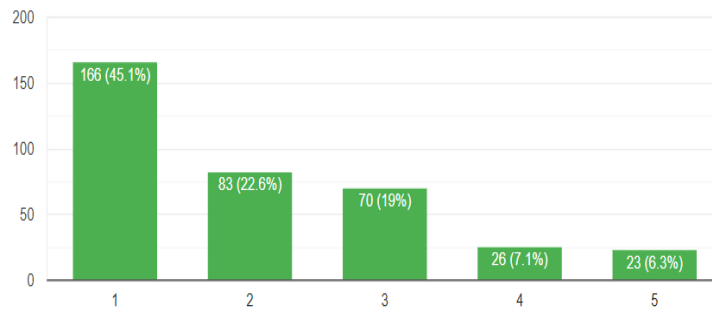
368 responses



Travel time is one of the basic factor in travelling as reaching the destination on time is important factor for many. It can be observed that most of respondent i.e. 67.9% agreed and said travel time is important while 17.7% of respondent were neutral and only 14.4% of respondents were disagree and said time is not important. Through this we can conclude Travel time is very important factor in travelling.

How important you consider travel comfort

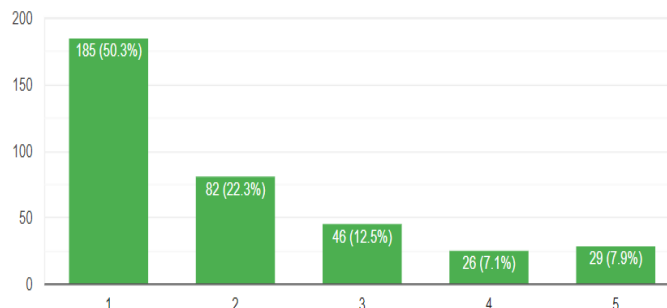
368 responses



People have been going towards travelling comfort also, so it becomes important to find about it. It was found that 67.7% of respondents agreed that travel comfort is important, 19% of respondents were neutral and 13.4% of respondents disagreed and feel travel is not important. So, it can be concluded that people now days want comfort while travelling and consider it as important factor.

How important you consider availability of vehicle

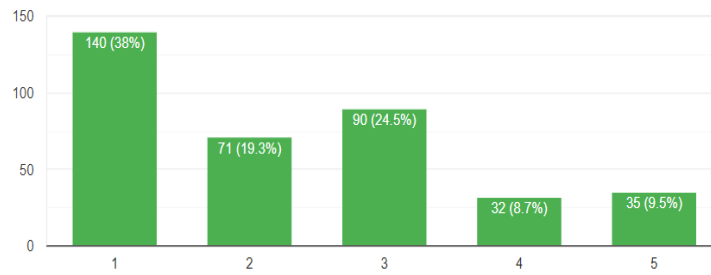
368 responses



People also consider availability of vehicle as important factor either public or own vehicle. It can be seen that respondents totally agreed and said availability of vehicle is important i.e. 72.6% agree, 12.5% are neutral and only 15% disagree to it.

Metro will be able to solve traffic problem in city

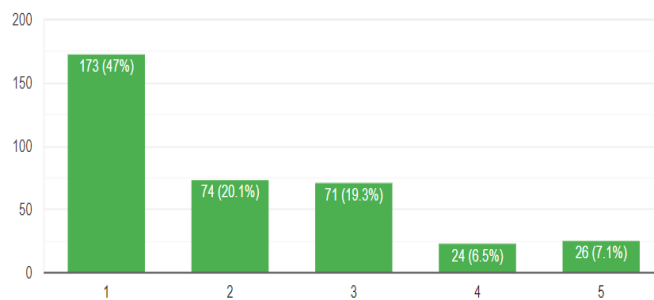
368 responses



It's important to know if people think that Metro will be able to solve traffic problem in Nagpur city, as one of main purpose to run Metro is to solve traffic problem. It was found that most respondents think it will solve traffic problem but there is also respondents who think Metro won't solve traffic problem. 38% of respondents strongly agree, 19.3% agree, while 24.5% of respondents were neutral, 8.7% disagreed and 9.5% strongly disagree.

It will contribute to industrial development of Nagpur

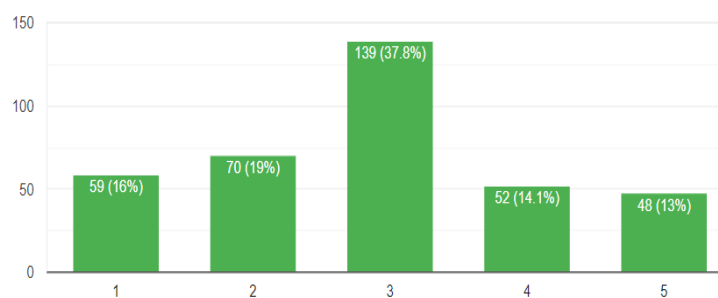
368 responses



It's important to know if people think Metro will be able to contribute in industrial development of Nagpur city, It can be observed that 67.1% of respondent agree and say that it will contribute to industrial development, while 19.3% respondent stayed neutral and only 13.6% of respondent disagree and think Metro won't contribute to industrial development of Nagpur.

I think Metro in Nagpur will be costly

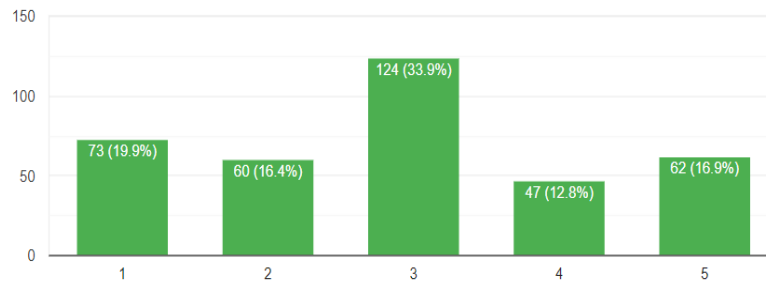
368 responses



It is important to know people view about travelling in Metro will be cost efficient or will it be costly. It was observed that 35% of respondent agree and think metro will be costly, while 37.8% of respondent were neutral and don't know if it will be costly or cost efficient and only 27.1% of respondent disagreed and said that it won't be costly. It can be concluded that people don't know if Metro will be costly or cost efficient, while Metros main purpose is to be cost efficient and be cheap. It is because Nagpur people are going to experience metro for the first time and don't know much about it and aren't aware about it much.

I will prefer Metro over my current mode of transportation

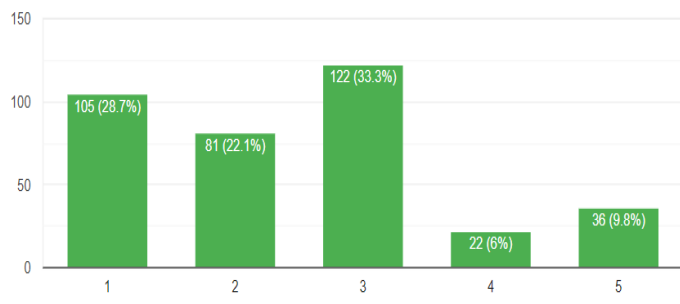
366 responses



Metro success depend on if people are willing to change their mode of transport to Metro. It was found that 36.3% of respondent agree and said that they will use Metro over their current mode of transport, 33.9% of respondent are neutral and don't know if they will change or not, while 29.7% of respondent disagree and said they won't change their current mode of transport. So it can be concluded that some people will change their current mode of transport to Metro and some won't and some haven't decided yet. This is because Nagpur people not being aware of how Metro can be helpful and also they haven't used Metro yet, this scenario might get changed after Metro start and people start using it.

Metro will be successful

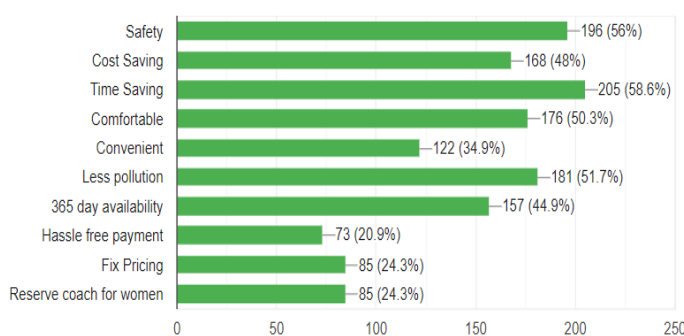
366 responses



Through the response we find that 50.8% of responded agree and say Metro will be successful while 33.3% of responded are neutral and are not sure if Metro will be successful or not and only 15.8% of responded disagree and feel Metro won't be successful. Through this we can conclude most of people thing Metro will be successful but there also people who are not sure if it will be success.

I may prefer Metro because

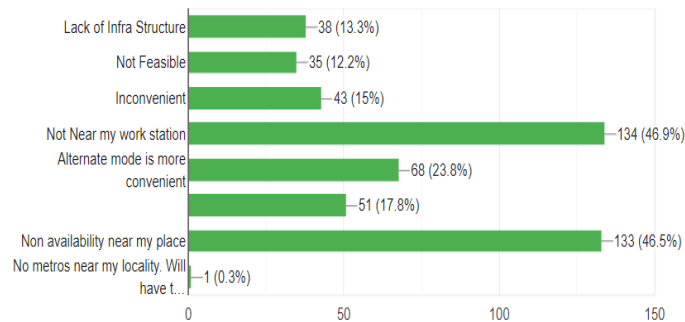
350 responses



It is very important to identify why people may prefer Metro. It is obvious that due to its time saving factor they may prefer it. About 58.6% of sample size agrees that time saving is the main reason why they will be using Metro. Apart from time saving factor there are various other factor like safety, less pollution, comfortable, cost saving are the other reasons backed for preferring Metro.

I may reject Metro Because

286 responses



It is also very important to identify why people may reject Metro. It can be observed that due to its “Not Near my Work Station” factor. About 46.9% of the sample size agrees that main reason not to prefer metro because Metro station is not near their area . Apart from “Not Near my Work Station “factor, there are various other factor like Non availability near my place, alternate mode is more convenient are the other reasons backed for rejecting Metro.

**Hypothesis Testing**

The test of independence through Chi-square test was carried out at level of significance of 5%. Analysis was done using data analysis tool available in MS Excel. The results are as follows:

**H01. There is no relationship between gender and satisfaction with current mode of the transportation.**

**Actual Observed**

Gender	S	NS	
M	106	91	197
F	96	75	171
Total	202	166	368

**Expected**

Gender	S	NS
M	108.1359	88.86413
F	93.86413	77.13587

**P =0.653701**

Null hypothesis is true means user’s satisfaction for their current mode of transportis independent of gender.

**H02. There is no relationship between age and satisfaction with current mode of the transportation**

**Actual Observed**

Age	S	NS	TOTAL
15-25	128	126	254
26-35	27	11	38
36-45	19	12	31
46-55	20	11	31
>55	9	5	14
Total	203	165	368

**Expected**

Age	S	NS
15-25	140.1141	113.8859
26-35	20.96196	17.03804
36-45	17.10054	13.89946
46-55	17.10054	13.89946
>55	7.722826	6.277174

**P= 0.082735, Null hypothesis Accepted.**

In this case p is greater than 0.05, so we believe the variables are independent (i.e. not linked together). So age has no relation with user's satisfaction about their current mode of transportation.

**H03. There is no relationship between occupation and satisfaction with current mode of the transportation.**

**Actual Observed**

Occupation	S	NS	TOTAL
Service	58	22	80
Business	20	11	31
Student	118	123	241
Other	8	8	16
<b>Total</b>	204	164	368

**Expected**

Occupation	S	NS
Service	44.34783	35.65217
Business	17.18478	13.81522
Student	133.5978	107.4022
Other	8.869565	7.130435

P=0.00205

Hence, Null hypothesis rejected and it can be said that there is relationship between occupation and their satisfaction with current mode of the transportation.

**H04. There is no relationship between area and satisfaction with current mode of the transportation.**

**Actual Observed**

Area	S	NS	TOTAL
Central	52	38	90
East	36	31	67
North	32	20	52
South	22	25	47
West	61	51	112
<b>Total</b>	203	165	368

**Expected**

Area	S	NS
Central	49.64674	40.35326
East	36.95924	30.04076
North	28.68478	23.31522
South	25.92663	21.07337
West	61.78261	50.21739

$P=0.643327$  Hence, null hypothesis accepted. And it can be said that there is no relationship between area and their satisfaction for the current mode of the transportation.

**H05. There is no relationship between distance travelled and satisfaction with current mode of the transportation.**

#### Actual Observed

Distance	S	NS	TOTAL
$\leq 5$	32	12	44
$\leq 10$	47	40	87
$\leq 15$	36	32	68
$\leq 20$	44	42	86
$> 20$	43	40	83
<b>Total</b>	202	166	368

#### Expected

Distance	S	NS
$\leq 5$	24.15217	19.84783
$\leq 10$	47.75543	39.24457
$\leq 15$	37.32609	55.88119
$\leq 20$	47.20652	38.79348
$> 20$	45.55978	37.44022

$P=0.002177$ , Hence Null hypothesis is rejected and it can be concluded that there is relationship between distance travelled and their satisfaction with current mode of transportation.

**H06. There is no relationship between expenses and satisfaction with current mode of the transportation.**

#### Actual Observed

Expenses	S	NS	TOTAL
$\leq 1000$	65	51	116
$\leq 2000$	65	49	114
$\leq 3000$	42	34	76
$\leq 4000$	19	15	34
$> 5000$	13	15	28
<b>Total</b>	204	164	368

#### Expected

Expenses	S	NS
$\leq 1000$	64.3	51.7
$\leq 2000$	63.2	50.8
$\leq 3000$	18.85	15.15
$\leq 4000$	8.315	15
$> 5000$	8.315	6.685

$P=3.23725E-16$

Hence, Null Hypothesis Rejected and it can be concluded that there is relationship between expenses and satisfaction regarding current mode of transportation.

**H07. There is no relationship between travel safety, travel cost, travel comfort, traveltime, availability of vehicle and use of Metro over current mode of the transportation**

This hypothesis is tested using regression and result is as follows”

#### SUMMARY OUTPUT

<i>Regression Statistics</i>					
Multiple R	0.71847				
	6609				
R Square	0.51620				
	8638				
Adjusted R Square	0.51486				
	103				
Standard Error	0.62037				
	2155				
Observations	361				

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	147.42	147.4	383.05	
		3324	2332	5416	<b>1.4544E-58</b>
Residual	359	138.16	0.384		
		5318	8616		
Total	360	285.58			
		8643			

**As Significance F =1.4544 E<sup>-58</sup>**

It can be concluded that there is positive relationship between travelling factors like travel safety, travel cost, travel comfort and availability of vehicles and successful use of metro and its contribution towards city and industrial development. Hence it can be said that the people who consider above factors important while travelling may prefer metro over their current mode of transportation.

#### Conclusion

**Metro is going to be a definite plus for Nagpur citizens. The opinions and views of respondents are mostly uniform. The distance being travelled daily is an important factor for deciding the satisfaction of traveller. This reinforces the need of public transport like Metro for a developing city like Nagpur.**

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