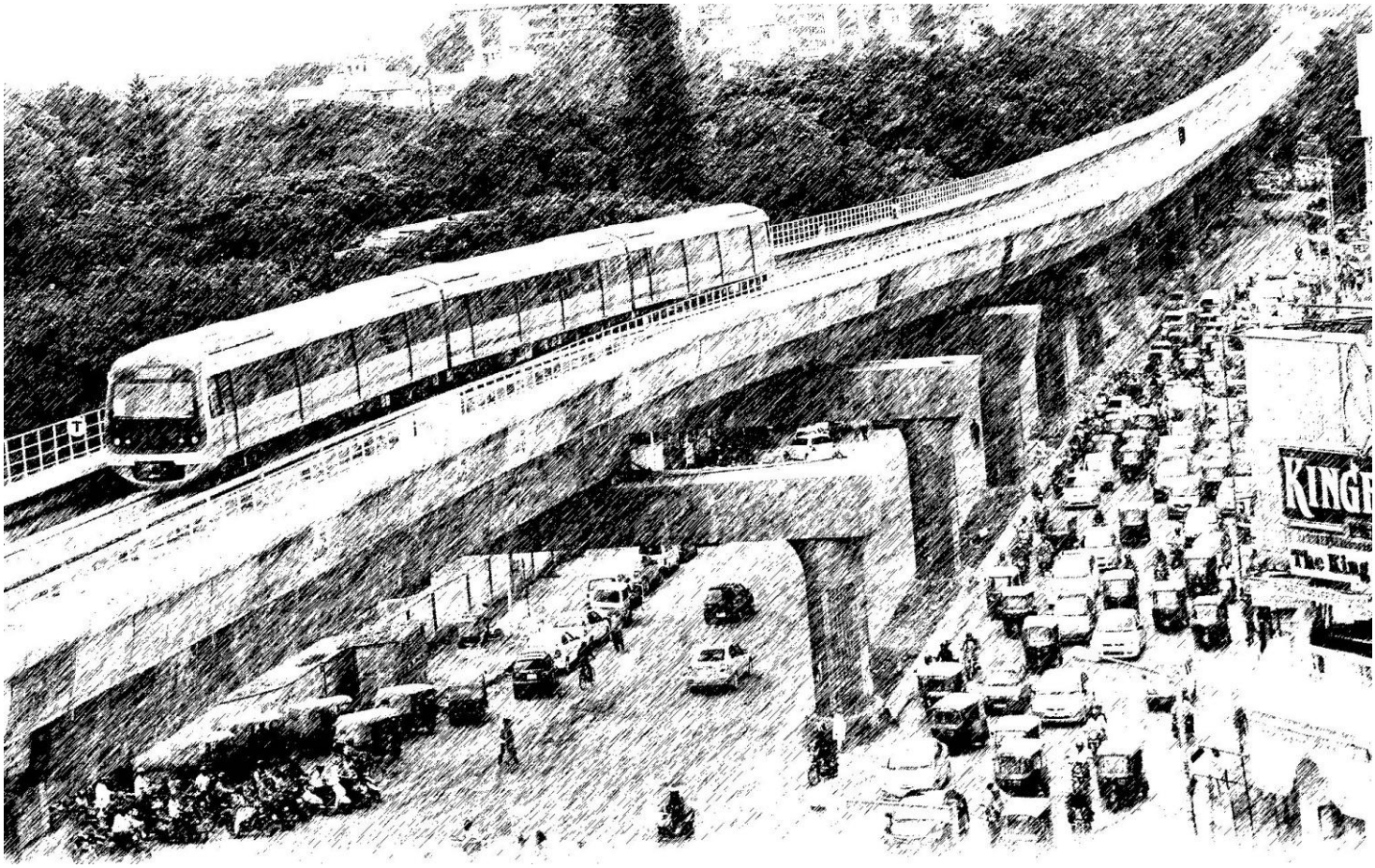

A Methodology to Evaluate Socio-Economic Impact of Existing Six Metro Railway Stations of Bangalore: from Dwellers' Perspective

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Chapter 1: Introduction

1.1 Preamble

At present the most Indian cities including Bangalore, are expanding in a fast pace and the city plans include development of urban activities. These cities have mixed land use patterns though strict zoning for land use is desirable. Consequentially many citizens live close to work places and can walk, bicycle, use para-transit or buses quite conveniently (Mohan, 2008). Recent experience in urban light rail infrastructure is widely discussed in the transport policy literature (Crampton, 2003). One of the most important issues is the impact of new urban rail infrastructure on socio- economic development along the new routes; and secondly, whether the access of stations are easily communicated by dwellers of adjacent area. This research reports on evidence (based on site visits) on the socio-economic impacts of new urban light rail, *i.e., Namma Metro*.

1.2 Literature review

1.2.1 *Global context*

In the different era, a number of researches worked on the effects of rail transit plans before the opening of a rail transit line, including heavy rail in Washington, DC (Damm et al.1980), Miami (Gatzlaff and Smith 1993), and Chicago (McDonald and Osuji 1995), and light rail in Vancouver (Fergusan et al. 1988) and Portland (Knaap et al. 2001). According to Goldberg (1981), railway transport investment is expected to support a more compact urban structure so that it can serve the purpose of urban planning. On the other hand, Grass (1992) suggested that public infrastructure has a profound influence on the pattern of urban development and spatial distribution of urban property values. The benefits of such infrastructure are also capitalized into urban property values (Damm et al, 1980). Babalik's (2000) work on attainment of land-use and urban development related to urban rail systems provided the evidence of success in terms of stimulation of development in a) the city centre b) declining areas, and c) change in the pattern of

urban areas. Her work had shown the contrasts between rich growing areas and poor depressed ones with some remedial measures. According to Jia *et al.* (2009) most of the studies found in the presently available literatures focus only on one infrastructure type such as road or rail. The impact on the introduction of a transport corridor is ignored, especially in developing cities. His study focused on efficiency, environment, and equity along the corridor. Boement and Mills (1999) presented economic analysis of the alternatives of light railway and draw some of the policy conclusions. All these works are based on the infrastructure and corridor related issues of light rail system only, not considering the normative aspects of people related to the same.

Few papers reviewed on several aspects of households near light railway. Chen *et al* (1997) presented the impact of the light-rail system on single-family home values using distance to rail stations as a proxy for accessibility and distance to the line itself as a proxy for nuisance effects. Several literatures have given the importance of three attributes, important for development of a region influenced by light rail transit. These are physical attributes of the house, neighborhood and location attributes (Miller, 1982; Freeman, 1979; Ridker *et al.*, 1967). On the other hand Dueker and Bianco (1998) worked on assessment of impacts on development trends indicating the extent to which consumer preferences have responded to light rail transit investments. Brown and Werner's (2008) main focus on attitude of residents, travel behavior, and obesity of the dwellers along the route of light railway, whereas Tyson (1992) suggested for the analyses of social cost-benefit on light rail investment.

Some empirical studies focused on the demographic aspects of railway stations and its impact on population characteristic of various zones of city. Income and social divisions are the main focus in those literatures (Debrezion et al, 2003). It is also important to note that proximity to a railway station is of higher value to low-income residential neighborhoods than to high-income residential neighborhoods (Nelson 1998; Bowes and Ihlanfeldt 2001). The reason is that low-income residents tend to rely on public transportation and thus pay higher value to living close to the station. Based on the same background Debrezion *et al* (2003) studied on effect of railway station proximity on property value. Latest work of Pan (2012) concentrated on light rail transit in US metropolitan areas and searched for potential socioeconomic opportunities to the transit dependent commuters.

On light railway system numerous papers are available. In this section only some of the most relevant literatures are reviewed.

1.2.2 *Indian Context*

Coming to the Indian scenario, Parasuraman *et al.* (1985) identified several key indicators of service quality as perceived by the service provider and the consumer, viz. reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding/ knowing customer, and tangibility to formulate a service quality framework. In the year of 2006, National Urban Transport Policy (NUTP) have listed some policies to reduce pollution, promote cleaner technologies, and encourage greater use of public transport by keeping Indian urban transport development in mind (Ramachandran, 2012).

City planners, the State Government, and the Government of India tried to solve the overgrowing transport problem of Kolkata. It was conceived that something had to be done fast to cope up with the current situation. For the first time Dr. B.C. Roy, the then Chief Minister of West Bengal, perceived the idea of building an underground railway for Kolkata to solve the problems in 1949 (Metro Railway Kolkata, 2013). It was the first underground railway in India and fifth in Asia, with the first operations commencing in October, 1984. On the other hand, Central Road Research Institute undertook the first initiative to study traffic and travel characteristics exhaustively in Delhi in the year of 1969-70 and it recommended for a Mass Rapid Transit Network for Delhi. Further, Delhi Development Authority prepared a perspective plan for Delhi in 1984 and recommended for a multi modal transport system comprising of 200 km of Light Rail Transit System. The first phase of the network comprises of 65.11 km of route length with 13.01 km underground called Metro corridor and 52.10 km elevated called Rail Corridor and the first operation commenced in December 2002. Bag and Sen’s (2012) work focused on assessing the effects of consumer perceptions of the various aspects of services provided by Kolkata Metro Railways. The study aims to propose a framework on quality of the services provided by the Kolkata Metro Railways and their overall satisfaction.

It is important to note here Bangalore’s vehicle population has grown from 1.56 million in 2011 and it is expected to reach 2 million in the year 2012 (Suresha, 2012). This large vehicle population is causing extreme congestion on the city's roads. The side effects of the same includes slower average speeds, fuel wastage, heavy air pollution and a continued rise in the levels of road accidents in Bangalore. According to Sekar and Karuppannan (2012), in general lack of directed and regulated metro rail projects affect on city growth, especially hamper city's function, structure, and development. They have attempted to conceptualize better development

scenarios related to metro railway in Chennai and Bangalore. Same perspective is observed in the voice of Y.K. Muddukrishna, the Vedike President:

> *"We are not opposed to development in the form of Metro Rail or otherwise. But do not disturb the tranquility of the locality and the serene atmosphere in Jayanagar. Appalled over the damage caused to the greenery from South End Circle to Banashankari for the Namma Metro project, the residents appealed to BMRCL to reduce the number of stations from Lal Bagh West Gate to Banashankari from the proposed five to four. If the R.V. Road Terminal is shelved, many trees from Nanda theatre to Rajalakshmi Kalyana Mantapa could be saved,"* (The Hindu: Monday, Oct 12, 2009)

Additionally, P. Mandoth (2012), the Executive Chairperson, Infrastructure Committee, Federation of Karnataka Chambers of Commerce and Industry, suggested that Bangalore metro can be passengers' friendly by improving its various connecting linkages and infrastructure.

1.3 Motivation of the research

It is observed from the aforesaid review that existing literature discussed only infrastructure, passengers' satisfaction, of late changing pattern in demographic and socio-economic aspects of residential neighborhood of light railway. Till date very few researches have focused on the dwellers' view point for analyzing impact of metro railway stations. Considering the same concern the present research tries to establish a methodology to evaluate the socio-economic impact of existing metro railway stations based on dwellers' preferences. Respondents are selected only from areas adjacent to those particular stations.

1.4 Research objective

Based on the aforesaid research gap the objective of the present report is *to evaluate the socio-economic impact of existing six metro stations of Bangalore: from dwellers' perspective*. The study area is the four adjacent wards of six existing stations of Bangalore *Namma Metro*.

1.5 Conclusion

This chapter discussed the background of the research in brief and outline of the same. Based on the objective of the present research Chapter 2 gradually reveals the methodology, nature of data, and interpretations of the collected data.

Chapter 2: Results and Analyses

Present chapter consists of data analyses and its result interpretations based on the objective of research. It is important to mention here that the research deals with demand side of the dwellers', residing around the existing metro railway stations, not considering the supply end of the same. Methodology of the research is explained in Section 2.1. In the subsequent sections nature of data, study areas are presented. In the following section of this chapter detailed analyses on data interpretations are discussed. Main findings from data analyses are presented in last section of the present chapter.

2.1 Methodology

Detailed methodology is discussed in Figure 2.1. The figure shows that the approach taken for the present study is *bottom up approach*. At first analyses on each of the disaggregated ward constituting metro station are presented and further to achieve an overall comprehensive view, all wards are spatially integrated and reviewed.

2.1.1 *Study area*

Eastern part of Bangalore is taken as study area where metro stations already exist. The existing stations along with its wards are presented in Table 2.1. Out of six metro stations Baiyyappanahalli and Swamy Vivekananda Road (S V Road) stations are in the same ward of Sarvagna Nagar, and Halsur and Trinity are in Halsoor ward. Other two stations viz. Indiranagar and Mahatma Gandhi Road (M G Road) are in the wards of Hoysala Nagar and Shanthla Nagar

Table 1.1: Metro stations and wards

Name of stations	Name of wards
Baiyappanahalli	Sarvagna Nagar
S.V. road	Sarvagna Nagar
Indiranagar (1st stage)	Hoysala Nagar
Halasur	Halsoor
Trinity	Halsoor
M.G. Road	Shantala Nagar

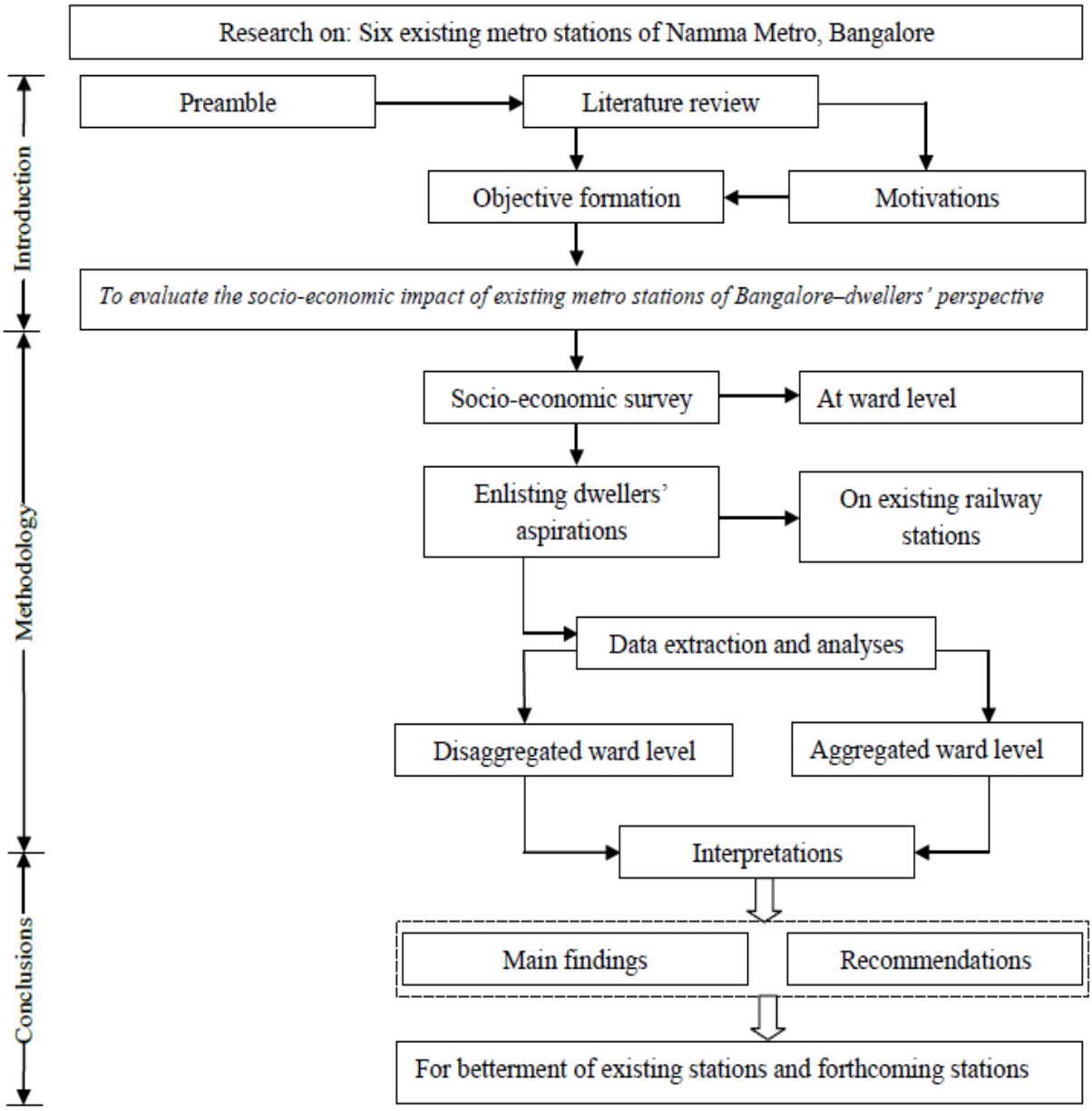

Figure 2. 1: Methodology framework

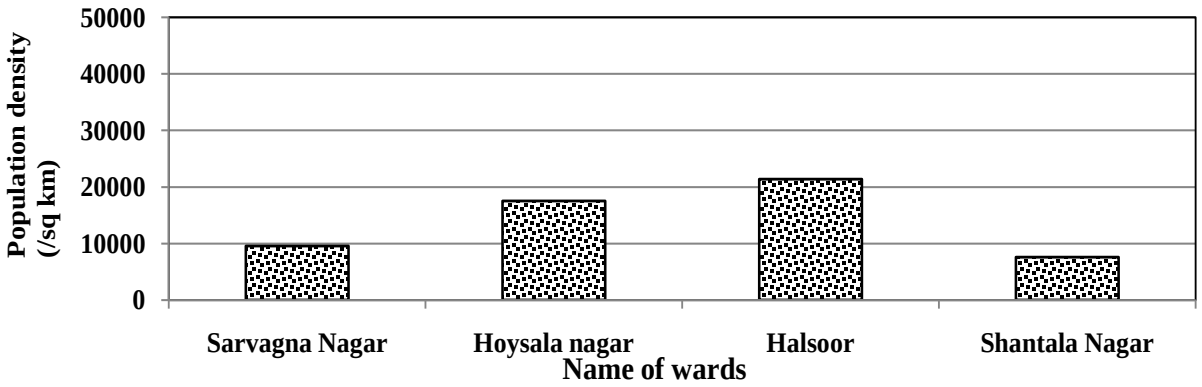

Figure 2.2: Ward wise population density

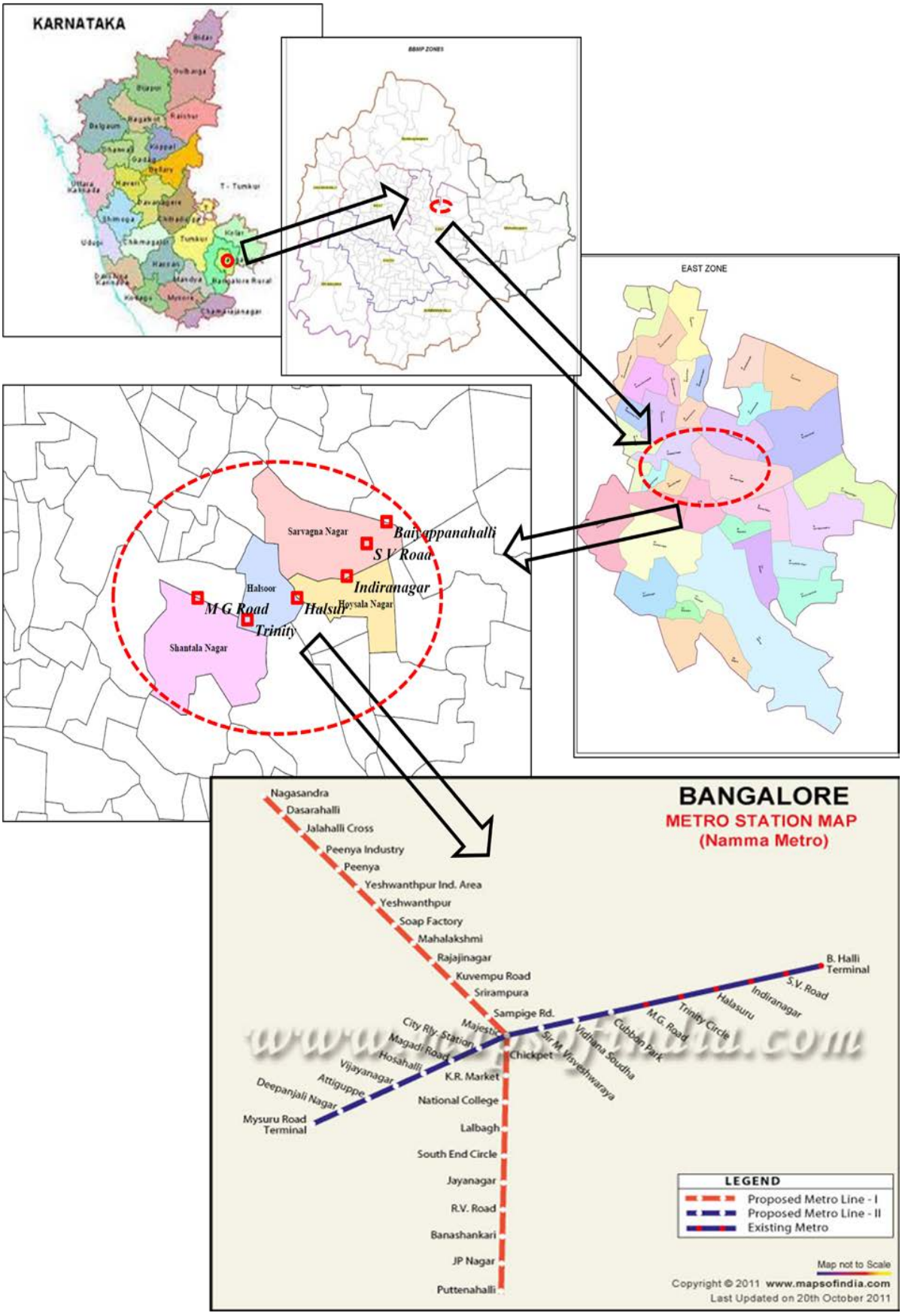

Figure 2.3: Study area

respectively. Based on the secondary data of wards it is evident that population density (persons/sq km) is highest in Haalsur (around 21,364 persons/sq km), followed by Hoysala Nagar (Figure 2.2). The lowest density is found within Shantla Nagar, following Sarvagna Nagar.

The evolution of study area is shown in Figure 2.3. Primary survey is conducted around six existing metro stations within the four wards in accordance. Minimum 35 households are taken as sample from each of the ward during survey though 33 households are statistically optimal number. The total number of household survey is 246.

2.2 Analyses

Statistical analyses based on primary data are captured in two methods. First based on spatial segregation of four wards and secondly integration of all wards to get a complete overview of the current situation.

2.2.1 *Spatial segregation of wards*

In the present section comparative analyses are based on inter wards level. It is obvious from Table 2.2 that dwellers of Sarvagna Nagar use existing metro station the most (85%) followed by Hoysalanagar (78%). It is noteworthy here that above 60% of the dwellers using metro of all four wards. Based on impact of *seven* socio-economic indicators existing metro stations have been studied at segregated ward level.

Table 2.2: Dwellers using metro

Name of wards	Dwellers using metro (%)
Sarvagna Nagar	85
Hoysalanagar	78
Halsoor	66
Shantla Nagar	64

2.2.1.1 *Purpose of using metro*

The most prominent purpose of using metro is educational institute related trip except dwellers of Sarvagna Nagar (Figure 2.4). Work related trips by metro are maximum in Sarvagna Nagar

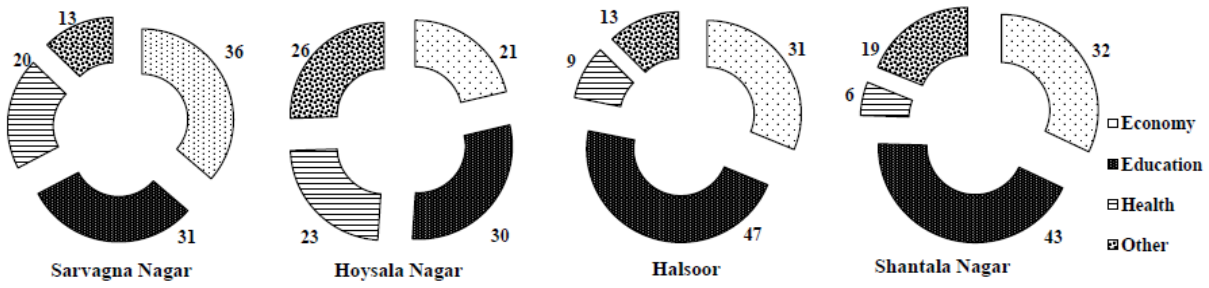

Figure 2.4: Purposes of using metro

(36%), whereas these trips are second important purpose within other three wards. For health purpose the percentage seems insignificant within the wards of Halsoor and Shantala Nagar, though these trips are relatively higher in percentage within Sarvagna Nagar and Hoysala Nagar. Contributions of other purposes viz. travelling for entertainment purpose or some other works are also significant in percentage within all wards.

2.2.1.2 *Frequency of using metro*

During primary survey dwellers were asked how often they are using metro. It is obvious that dwellers of all wards are more inclined to use metro railway occasionally, except Halsoor (Figure 2.5). The range of frequency varies from >25% to 40%. Use of metro as a daily mean of travel is very less, i.e., <20% for the entire area. Till date a significant number of dwellers among the surveyed ones never avail metro.

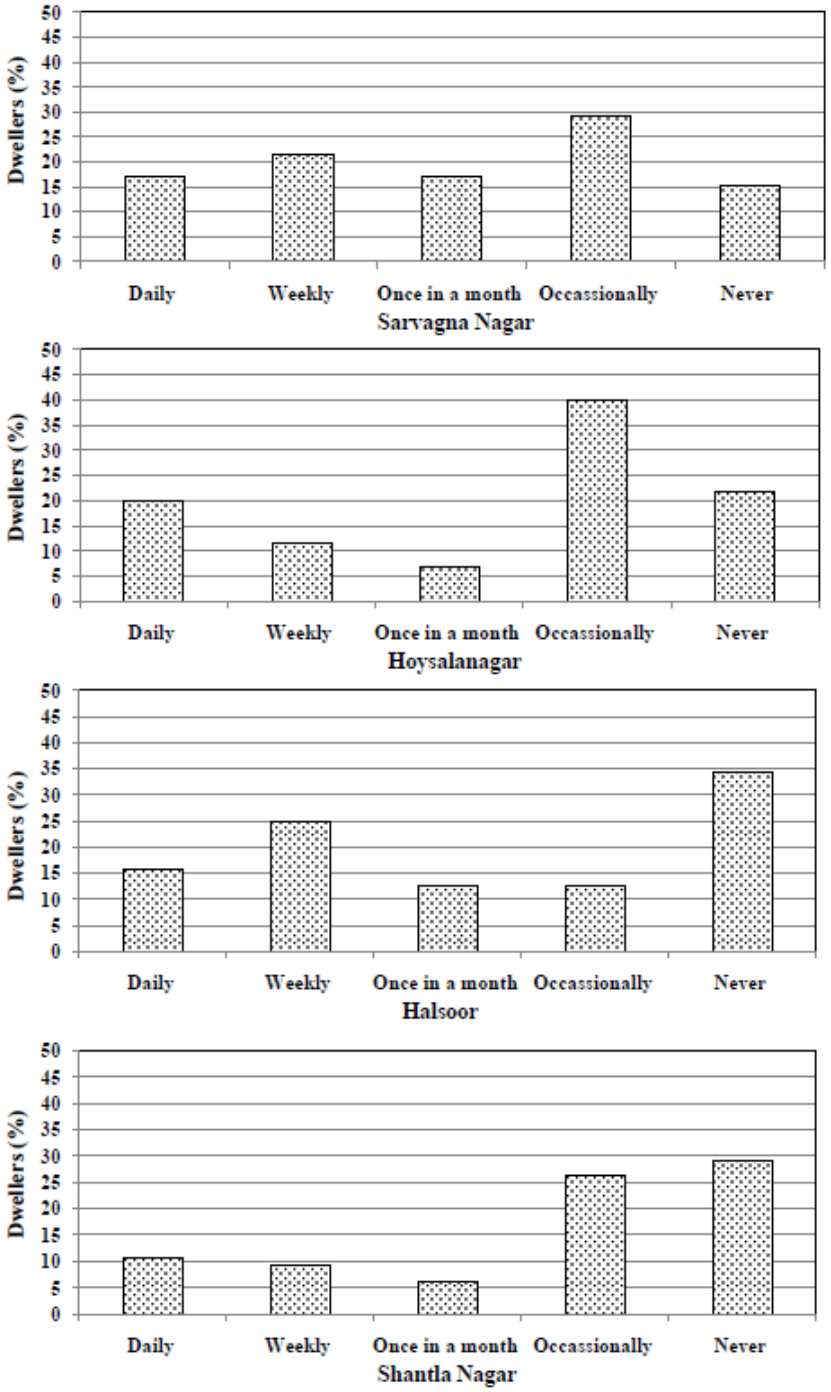

Figure 2.5: Frequency of using metro

2.2.1.3 *Distance wise metro using by dwellers*

Figure 2.6 presents the relation between distance and percentage of dwellers' accessing metro. Here distance is calculated based on households to nearest metro station. The trend line shows that > 60% of the surveyed dwellers travel from <500 meter to avail metro within Sarvagna Nagar and Hoysala Nagar. Whereas people residing within 500 meter to 1km from metro station, are relatively less in percentage (24% to 30%) within the same wards. But the aforesaid trend is not valid for Halsoor and Shantla Nagar as the metro stations viz. Trinity and M. G. Road are on heavy commercial area. For Halsoor though 48% dwellers are coming from <500 meter but for Shantala Nagar it is as low as <10%. For both the stations around 25% of the dwellers avail metro from the distance within 500 meter to 1km. It is important to note that the trend curves decrease with the distance from metro station, except Shantala Nagar. It means that within the wards with the increasing distance number of dwellers availing metro decreases.

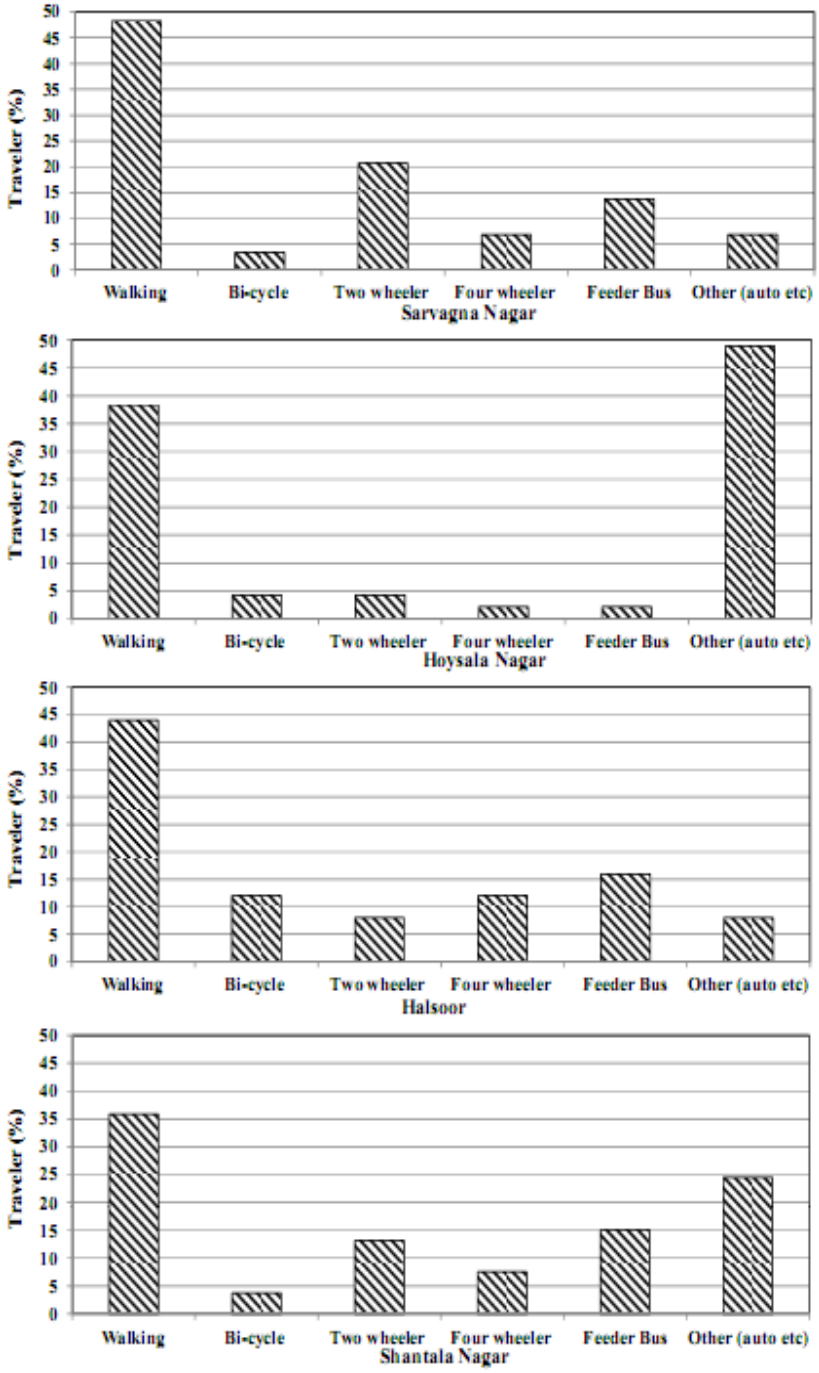

Figure 2.6: Means of communication towards metro station

Table 2.3: Dwellers using metro – age wise

Age group	Percentage of dwellers
<18	34
18 – 40	52
40 – 60	8
>60	5

2.2.1.4 *Means of communication to avail metro*

From primary survey it is evident that in general >35% dwellers, who use metro within the wards travel primarily by walking to metro station (Figure 2.7). Two wheelers including, cycles are the important mode of transportation. In this respect feeder bus accounts relatively less in comparison to other means of communication. It is interesting to note that other services, say, auto etc also significant in number especially for the wards of Hoysala Nagar and Shantala Nagar. Dwellers traveling by

Additionally, it is evident from Table 2.3 that age group of young adults (18 – 40 years) are more in numbers availing metro followed by younger population (52% and 34% respectively). Population above 60 years is the least in number availing the same (5% only).

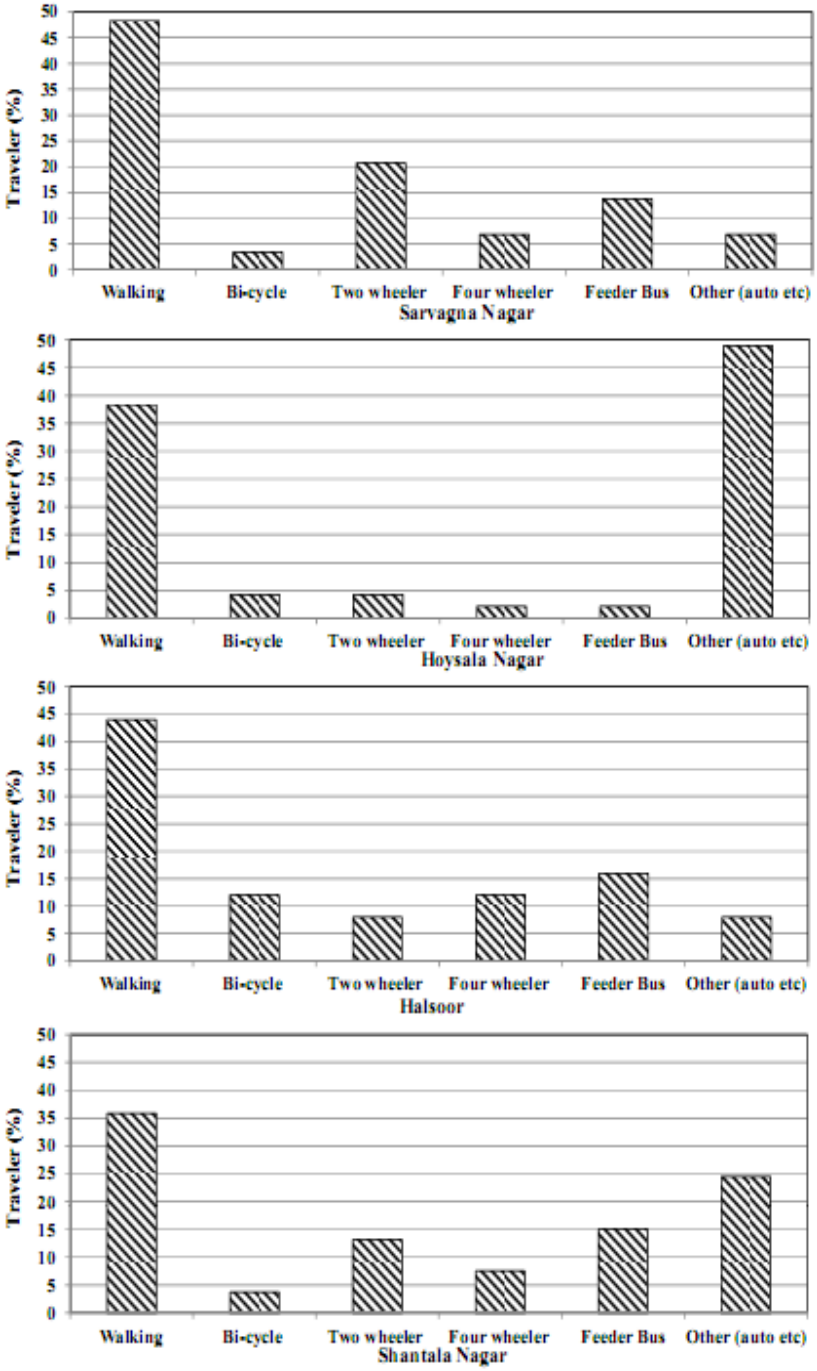

Figure 2.7: Means of communication towards metro station

four wheelers are very insignificant in number.

2.2.1.5 *Dwellers' income and metro*

It is observed that in general dwellers of higher middle income group (45,000 to 85,000/ month) are more inclined to travel by metro followed by higher income group (85,000 to 1,50,000/ month; Figure 2.8). On the other hand, propensity of using metro as a mean of communication is very low within lower income group and rich, though it is moderate for lower middle income group (16,500 to 45,000/ month).

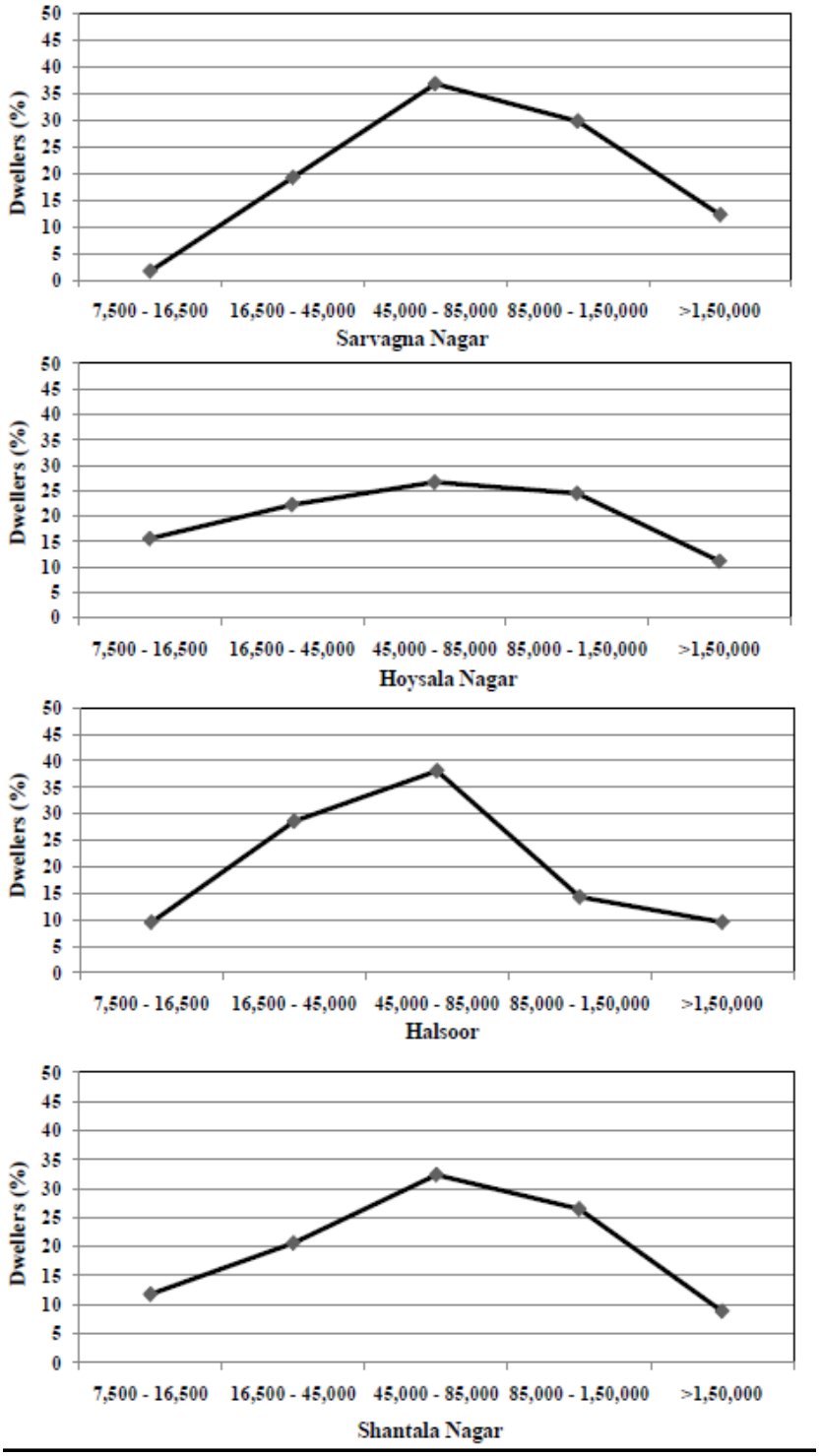

Figure 2.8: Metro-users income group

2.2.1.6 *Order of modes of communication*

During primary survey dwellers are asked for their preferences regarding use of modes of communication for day to day livelihood. They have ranked their preferences. According to collected data, dwellers prefer private vehicles (including

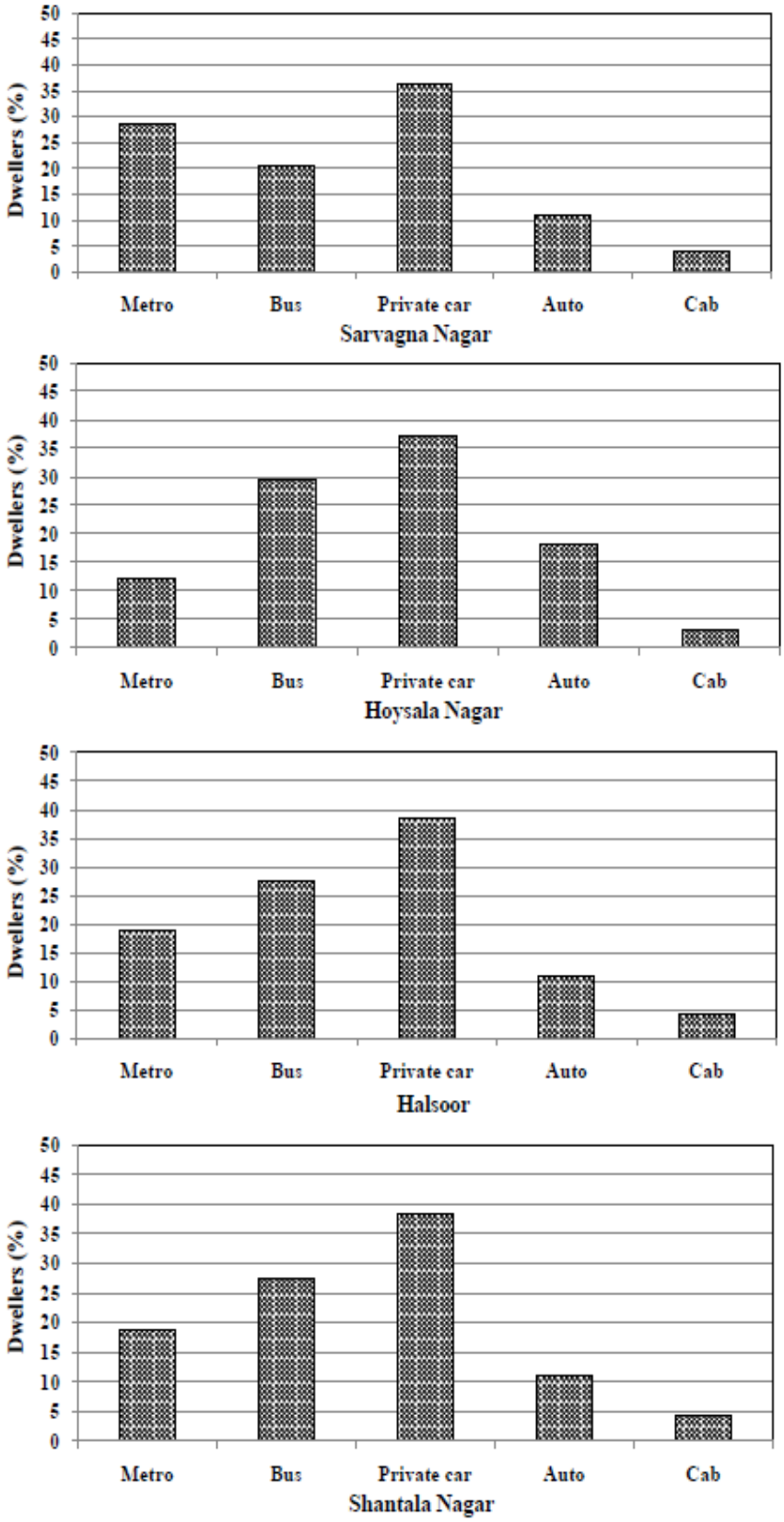

Figure 2.9: Preferences of modes of communication

cars and two wheelers) most, followed by bus, which are > 35% and >25% respectively, except Sarvagna Nagar ward (Figure 2.9). In this ward metro uses exceed uses of bus. Dwellers prefer metro more than auto and cab within Halsoor and Shantala Nagar. For auto the preference varies from low to moderate in range. Preference of using cab is the least.

2.2.1.7 *Importance of metro*

In the primary survey furthermore dwellers are asked to rank metro railway in terms its importance to their daily life in comparison to other means of communication. The survey reveals that 25% and above of the total dwellers have ranked it as an equal important mean of

communication (Figure 2.10). Here it is also important to note that according to 20% and above of the surveyed dwellers metro is less important mode of transportation except the dwellers of Sarvagna Nagar. But around 30% of the dwellers from this ward ranked it as a more important mode. A significant number of dwellers also account metro as a least important mode of transportation except Sarvagna Nagar ward.

In brief aforesaid discussion is based on the comparative analyses on socio-economic impact of existing metro station within each of the ward. Now this research presents the impact of the same by integrating four entire wards.

2.2.2 *Spatial integration of wards*

In this section all wards are taken into consideration as an entire area to review the present state of metro railway from dwellers aspirations' level.

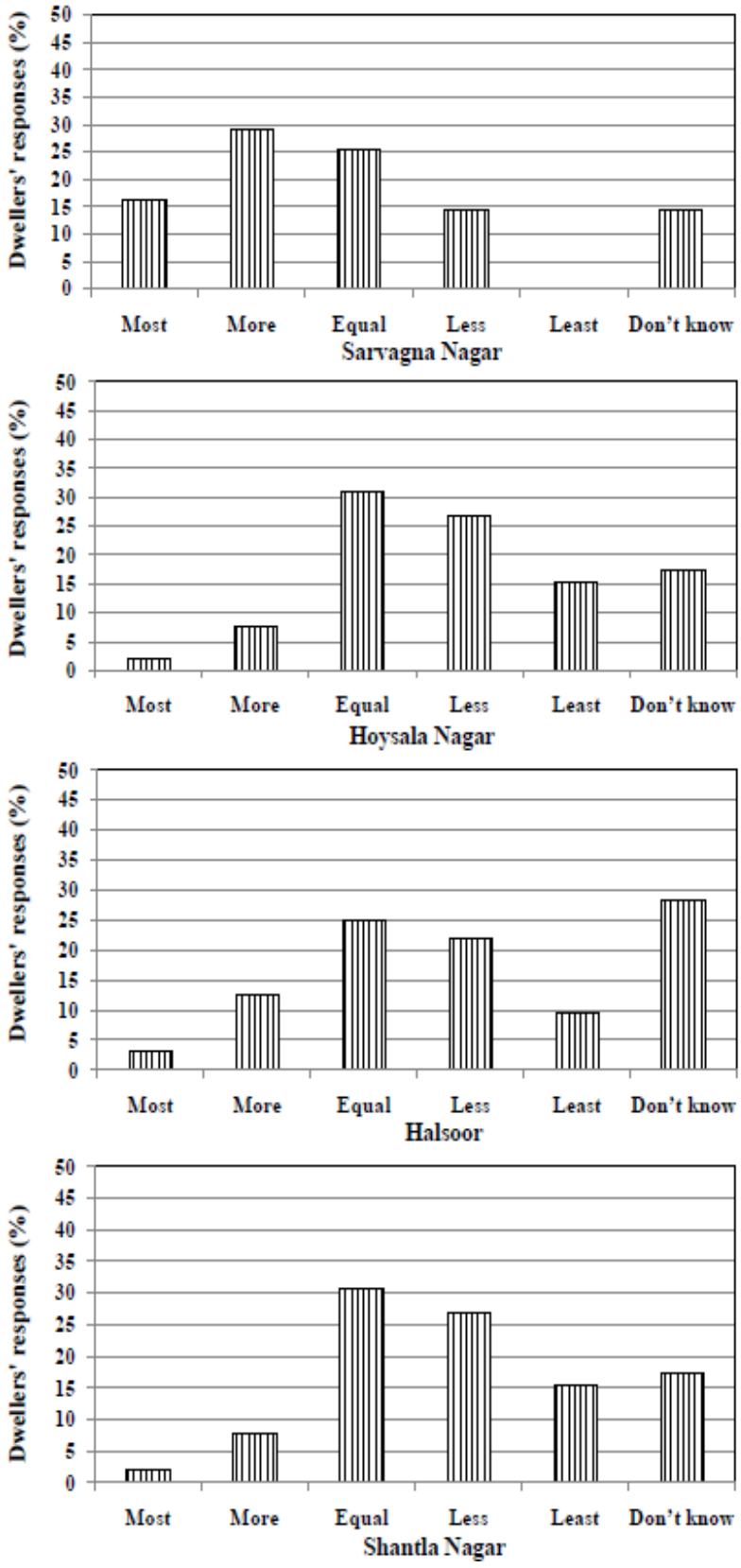

Figure 2.10: Importance of metro

2.2.2.1 *Expenditure slab*

From Figure 2.11 it is evident that 46% of the dwellers who are using metro regularly expend >400 Rs/month as transportation expense for metro. It seems that regular travelers are more interested to use the stored value tickets (Varshik) as fare is discounted by 15% of the Token fare, which is used as single journey ticket and useful for casual travelers. Frequency distribution

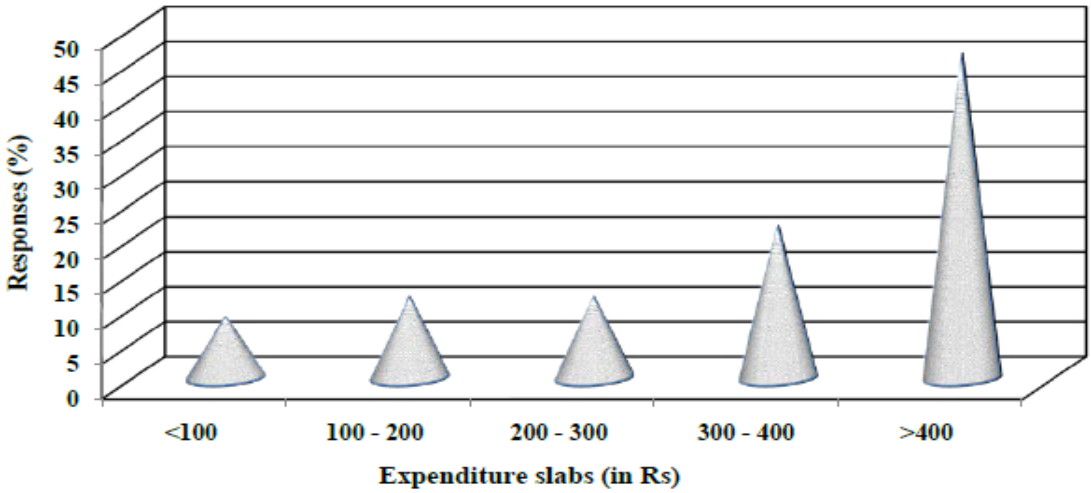

Figure 2.11: Metro expenses of dwellers

of responses for other slabs is less important and it means dwellers are more casual in nature in using metro (total 54%) than consistent, i.e., 46%.

2.2.2.2 *Transportation cost for metro reduced or not*

Dwellers, consistently using metro are also asked whether their transportation cost reduced due to availing metro or not. Figure 2.12 shows that 53% of the users expressed that it has been reduced, whereas 43% users have no clear idea on the same. Additionally, a significant number of dwellers who are using metro due to its cost effectiveness conveyed that metro reduced the transport cost from 5 – 10 times (Figure 2.13). Few dwellers stated it reduces the cost by 10 to 20 or more times, though their number is relatively less.

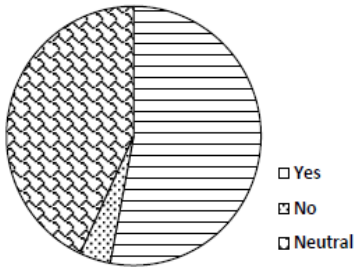

Figure 2.12: Dwellers' response on reduction of

2.2.2.3 *Metro improvement – from dwellers perspective*

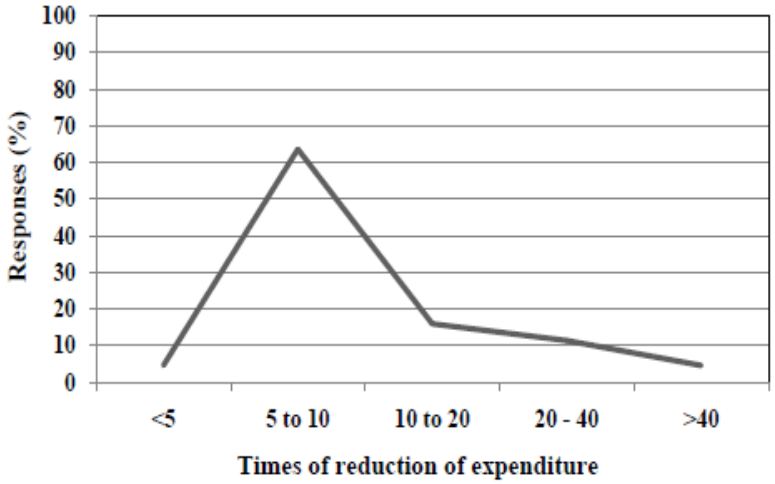

Figure 2.11: Reduced expenditure

According to dwellers (32%) of this area metro may become more popular towards people with the help of efficient linkage facilities to the metro stations. They (34%) have also pointed out the necessity of proper parking system (Figure 2.14 and 2.15). Some of them have also stated the need of more frequency of the trains during peak time of the day. 23% of the surveyed dwellers highlighted the needs of other facilities say, efficiency of information desk, proper direction hangers for staircase and escalator, and presence of toilets/washrooms.

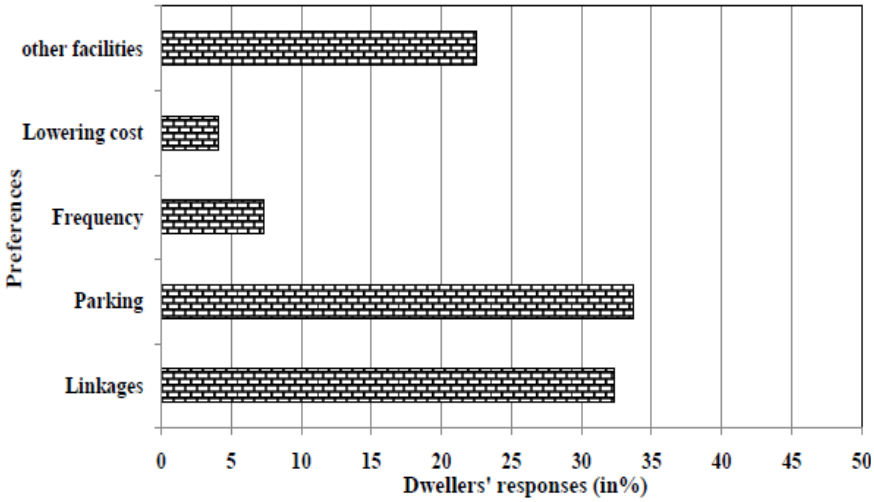

Figure 2.12: Suggested indicators for metro improvement

Figure 15: Parking area near M G Road metro station
(Photo courtesy): www.icarelive.com

2.2.2.4 *Drawbacks of metro stations*

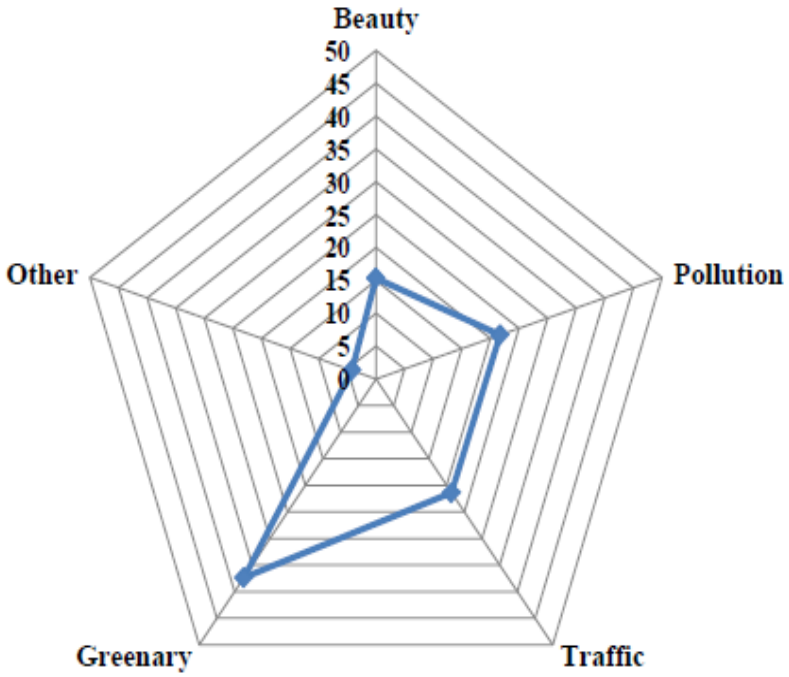

Figure 2.16: Damages caused by metro construction

Figure 2.16 presents the damages caused by metro stations and its track. 37% of the dwellers of the entire wards opined that metro construction has destroyed greenery a lot and increased pollution and traffic congestion (23% and 21% responses respectively). Some of the dwellers (15%) conceived that aesthetic beauty of their residential area and neighborhood also hampered by the same (Figure 2.17 and 2.18). Few dwellers are (4%) somewhat disappointed with the encroachment of different *classes* of people within the

A B

Figure 2.17: A - Dust near S V Road metro station; B – Traffic congestion near residential area, too much closeness of metro track towards the residential building.

Figure 2.14: A – Debris piled up underneath the metro track near Indiranagar metro station; B – Debris piled up near S V Road metro station; C – Large sized stones near M G Road metro station along the main road

2.2.2.5 *governance option*

Dwellers of the entire wards strongly support public governance to take care of metro stations and its related facilities (Figure 2.19). Few of them also supportive of PPP (Public-Private-Partnership) type governance. But dwellers' preferences for private governance are very few.

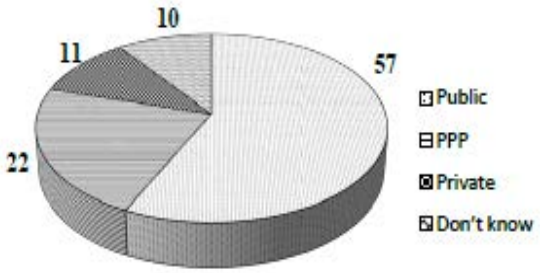

Figure 2.13: Governance options

2.3 Main findings

In this section main findings are presented in brief keeping the aforesaid discussion in mind. These are as follows

- At present young adult dwellers are using metro more for going to educational institutes than workplaces
- Dwellers prefer to use metro more occasionally than daily or weekly
- Within residential area >60% of the dwellers avail metro from the distance <500 meter mainly by walking
- Metro is popular to middle higher income group than any other group of dwellers
- Till now dwellers prefer private vehicles more as their daily mode of communication though they feel the importance of metro
- Dwellers able to reduce their transport cost by using metro
- For betterment of metro dwellers have suggested for proper parking and linkages as well as proper directions from metro governance. They conceived that public governance is sufficient for the same
- Dwellers' residential area and neighborhood hampered by metro construction because of increasing noise and pollution and damaging of greenery and aesthetic beauty

2.4 Conclusion

This chapter presents the current situation of dwellers living near the existing metro station and its track. With the help of dwellers' aspirations and suggestions and considering experts' review on the present situation, Chapter 3 tries to set some policy and recommendations to make metro more popular and useful towards the dwellers.

Chapter 3: Conclusions and Recommendations

In the current chapter policy recommendations and conclusions are presented in the first section. In the following sections contributions, limitations and future scope of the research are gradually discussed.

3.1 Policy Recommendations

Policy recommendations are based on the main findings of 2.2. These are as follows:

a. At present metro is more popular to school, college, or other educational institute going dwellers than any other group going to workplace or health related or further issues.

Recommendation: Integrated planning on transportation connectivity is needed so that each of the existing station should be connected to the industrial/commercial hubs and other group of offices. For that proper public transit system should be well organized.

b. Maximum numbers of dweller now prefer to use metro occasionally. Metro is not the prime mean of communication till date rather people use it as weekend trip with family. At the peak time of the day (8 am to 8 pm) the train runs every 10 minutes and for other time i.e., from 6 am to 8 am and from 8 pm 10 pm, it runs every 15 minute. Though the frequency is sufficient for students but for office goers the 10 minute gap is not favorable. They have to take bus from metro stations for their offices and for that total journey time increases.

Recommendation: The frequency of metro should be taken care of based on nature of the demand of passengers. Detailed study is needed in this area based on customer satisfaction.

c. More than 60% of the dwellers avail metro from the distance of <500 meter. They avail it mainly by walking. Except Baiyappanahalli there is no proper parking facility for all the other five metro stations. Near those metro stations paid parking is available along the

main road which is narrow and not sufficient. Many dwellers want to travel by metro persistently but due to this problem they have to choose alternative means of communication.

Recommendation: There is a need to arrange proper parking facilities immediately near metro stations.

d. Metro is popular to middle higher income group than any other group of dwellers. As student community primarily access metro, students from lower income group do not prefer it as they have monthly card facilities i.e., student concessional passes from Bangalore Metropolitan Transport Corporation (BMTC).

Recommendation: In future to attract more passengers Bangalore Metro Rail Corporation Limited (BMRCL) can consider some concessional passes for students having economic constraints.

e. Till now dwellers prefer private vehicles (including four wheelers and two wheelers) more as their daily mode of communication. This is because of ease of parking in or around destinations, easiness of travelling by own vehicles without changing means of communication frequently.

Recommendation: Government should encourage dwellers by several advertisements on cost effective analyses of daily transportation expense and build public awareness on eco-friendly aspect of metro railway as it can reduce pollution as well as congestion by avoiding too many uses of personal vehicles.

f. Metro governance, i.e., BMRCL needs to be more organized regarding proper maintenance of information desk and direction hangers in stations.

Recommendation: Though each of the station has many BMRCL's personals for helping customers, still those persons should have better knowledge regarding metro railway so that can entertain passengers' query properly. Staffs dealing the information desk should have proper training on the same. BMRCL can think for few rest rooms within some of the station entity or near to it.

g. Due to metro rail construction dwellers' residential area and neighborhood hampered by increasing noise and pollution and damaging of greenery and aesthetic beauty. Though the aim of metro rail is to reduce pollution and congestion but in reality both are increasing day by day. The main road area along the metro track becomes very gloomy and dusky due to the same. In many areas road is poorly lit and suffering from too many potholes which are dangerous for drivers.

Recommendation: Government should repair the damaged road and put more barricades where ongoing construction works are closer to main road. Government can also plan for small tree plantation to rejuvenate greenery in the city just beneath the metro track.

In summary the survey reveals that dwellers are feeling the importance of metro uses nowadays as it is hassle free and avoid pollution and congestion. Numbers of dweller have got the advantage of cost effectiveness of transportation expenses. So it can be concluded that after full fledged completion of metro routs it will be user friendly. The governance has to take care of residential areas so that socio-economic impact of metro stations and its corridor should be positive without hampering tranquility of the dwellers livelihood.

3.2 Contribution of the research

The present research tries to evaluate the socio economic impact of metro stations from the perspective of dwellers within a particular jurisdiction, i.e., ward level. It reveals the dwellers' future aspirations and preferences regarding their own Namma Metro. This research also attempts to draw some policy recommendations for authority in concern to make it more popular and users' friendly towards dwellers of the entire area.

3.3 Limitation of the research

a. The present research deals with demand side of the dwellers living adjacent area of metro stations not the supply side of any institutions
b. This research concentrates only at ward level not the entire catchment area
c. It does not embrace entire passengers' satisfactions, it focuses on dwellers' perspective on metro
d. This study also not related to land use/ land value changes due to introduction of metro

3.4 Future scope of the research

a. As the main aim of metro is to reduce pollution and congestion and it fails to tackle both the issue, further research may initiate on present pollution and congestion

b. Detailed research is required on passengers' satisfaction, accessibility towards metro and so on. These are the important areas yet to be enfolded.

Appendix A: Questionnaire

Survey Questionnaires for **Households**
Centre for infrastructure, Sustainable Transportation, and Urban Planning (CiSTUP)
Indian Institute of Science, Bangalore
Karnataka, India – 560012

l no. of family members…… Name of interviewee…

ıers name…… Address……

1. Number of dwellers' using metro
2. Metro station is how far from the household (in km): <500 mt | 500-1 km | 1-2 km | >2 km
3. No. of members availing metro: Age: ☐ Expenditure (in Rs/month): ☐
4. Purpose of using Metro: Economy/Education/Health related
5. Mode of transportation for metro station: Walking ☐ Bi-cycle ☐ Two wheeler ☐
   Four wheeler(self) ☐ Feeder bus ☐ Other ☐
6. Family income:

Amount	Tick
3,500 – 7,500	
7,500– 12,000	
12,000– 16,500	
16,500 – 45,000	
45,000 – 85,000	
85,000 – 1.5 Lakh	
>1.5 Lakh	

7. Frequency in using metro rail:

   Daily | Weekly | Once in a month | Occasionally | Never

8. Metro reduces transport expenses: Yes ☐ No ☐ Neutral ☐
9. Percentage of expenses reduced/increased: <5 | 5 – 10 | 10 – 20 | 20 – 40 | >40
10. Importance of metro to your family: Most | More | Equal | Less | Least
11. Priority for the means of transportation (1 to 5):

    Metro | Bus | Private vehicle | Auto | Cab

12. Metro station has hampered any of the following character:

    Aesthetic beauty | Pollution (air, noise, etc) | Traffic congestion | Greenery | Other

13. Overall improvement of metro can be done by Improving:

    Linkages | Parking | Frequency | Lowering cost | Other facilities

14. Opinion for governance of metro: Public | PPP | Private

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