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AN APPRAISAL OF SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS OF METRO BRT ON SURROUNDING COMMERCIAL ACTIVITIES IN LAHORE, PAKISTAN

Abstract
The present paper aims to assess the positive and negative socio-economic and environmental impacts imposed by the development of Metro BRT Lahore on its surrounding commercial activities. The study area comprised of eight stations located on the BRT route, starting from MAO College station to Kalma Chowk station. The primary data was collected through structured questionnaire from the shopkeepers of shops situated along the route and was tabulated through Microsoft Excel 365, The locations of surveyed shops were marked through GPS and Google Earth Pro 7 and Arc GIS 10.0 were used to prepare the distributional and thematic maps for the study. It was concluded that the Metro project has contributed to improve the overall market outlook by adding greenery, public lights, and safe road crossings, controlling pollution, garbage, improving the drainage and sewerage conditions. However, at few other points it has triggered few problems, such as traffic congestion, drainage, sewage, and parking. The study suggests the development of new BRT projects in other cities of the country for an efficient travel system.

Key words: Bus rapid transit, socio-economic impacts, commercial activities, Lahore

Introduction

Provision of effective public transport is a major concern predominantly in the cities of many developed and developing countries. Particularly, since transport habits have changed, public transport is the only way to access employment, education, and all other urban amenities; especially when distance exceeds the limits usually accepted in terms of walking and cycling (Levinson et al., 2002; Cervero and Dai, 2011; Saputra and Widyasmara, 2014; Stefanska et al., 2020). An efficient communication network is a must have for efficient mobility within the megapolitans of urban world. In recent decades, bus rapid transit (BRT) system has gained popularity around the world due to its efficacy and improved transportation (Deng and Nelson, 2011). The swift connectivity of a place with other parts of the city is an added advantage of the BRT that is capitalized in terms of raised land values of the properties located in the proximity of BRT besides there may be some adverse impacts as well (Satiennam et al., 2006; Cervero and Kang, 2011). In Pakistan, BRT is a fresh introduced mode of intra-city travelling, with Lahore BRT popularly known as Lahore Metro bus stood the pioneer in this regard (Kepaptsoglou et al., 2020). Being operational in 2013, BRT Lahore has, not only altered the mode and mood of Lahore's transportation, but also has changed the scenario and situation of economic development along the already developed arterial road i.e. Ferozpur Road of Lahore.

In recent past, several scholars have conducted research to study the different aspects of BRT to understand its effectiveness in the modern urban environments. For instance, Saptra and Widyasmara (2014) examined the disparities found in the spatial arrangement of Malaysian cities and its effect on the performance and productivity of existing BRT services. Another study conducted by Mulley and Tsai (2016) studied the impact of newly developed BRT on the uplift of residential land values in Sydney. In another study, Mansoor et al., (2016) evaluated the public opinion regarding the social and environmental impacts of BRT Lahore and found it a revolutionary step towards the modernization of transport system in Lahore. Rodriguez et al., (2016) examined the impacts of BRT development around its stops in the cities of Bogota and Quito and noticed the changes in the form of modified built area, land use change, and increased building activity, Zolnik et al., (2018) studied the types of commuters using the BRT Lahore with a special focus on female riders using the bus services. Kepaptsoglou et al. (2020) analyzed the traveler

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opinions and preferences to identify the factors controlling the choice between different, high capacity public transport modes in Multan city, Pakistan.

A limited literature is found that deals in general, specific area-based, empirical research considering the socio-economic or environmental impacts of the BRT on its surrounding commercial activities. The present study is directed towards discovering that, to what extent the presence of public transport investment has affected the commercial activities surrounding the BRT Lahore both in positive and negative manners.

Materials and methods

Study area

Lahore city was selected as the study area for the present research. Lahore is located between the coordinates 31°15′—31°45′ N latitudes and 74°01′—74°39′ E longitudes. It is bounded by district Sheikhupura on the north and west, by Kasur district on the south, by Wagah on the east. Lahore is the provincial capital of Punjab, second largest urban center of Pakistan with a population size of 11.13 million (GOP, 2017). Being the second largest urban and business hub of the country and largest city of the largest province Punjab, Lahore holds a key position in business and commerce of the state as its economy constitutes 19% of the Punjab's economy. Since the study was focused on BRT Lahore, therefore, the section from Muhammadan Anglo-Oriental (M.A.O.) College station to Kalma Chowk Station was taken as the sample area for present research (Fig.1).

Data Collection and Analysis

The present research was aimed to find out the socio-economic and environmental impacts of BRT on nearby commercial activity, especially upon wholesale and retail activities along the route. For this purpose, primary data was collected from shopkeepers of shops along the BRT route. The field survey was carried out during June and September 2017 and structured questionnaires were filled from the shopkeepers by personal interview method. 364 shops situated along the different stops of BRT route were selected through simple random sampling technique (Table 1).

Table 1 Number of surveyed shops per stop

Sr.	Stations	Frequency
1	M. A. O	32
2	Janazgah	53
3	Qurtaba Chowk	62
4	Shama Chowk	48
5	Ichra Station	76
6	Canal Station	65
7	Qaddafi Stadium	14
8	Kalma Chowk	14
	Total	364

Source: Field Survey (2017)

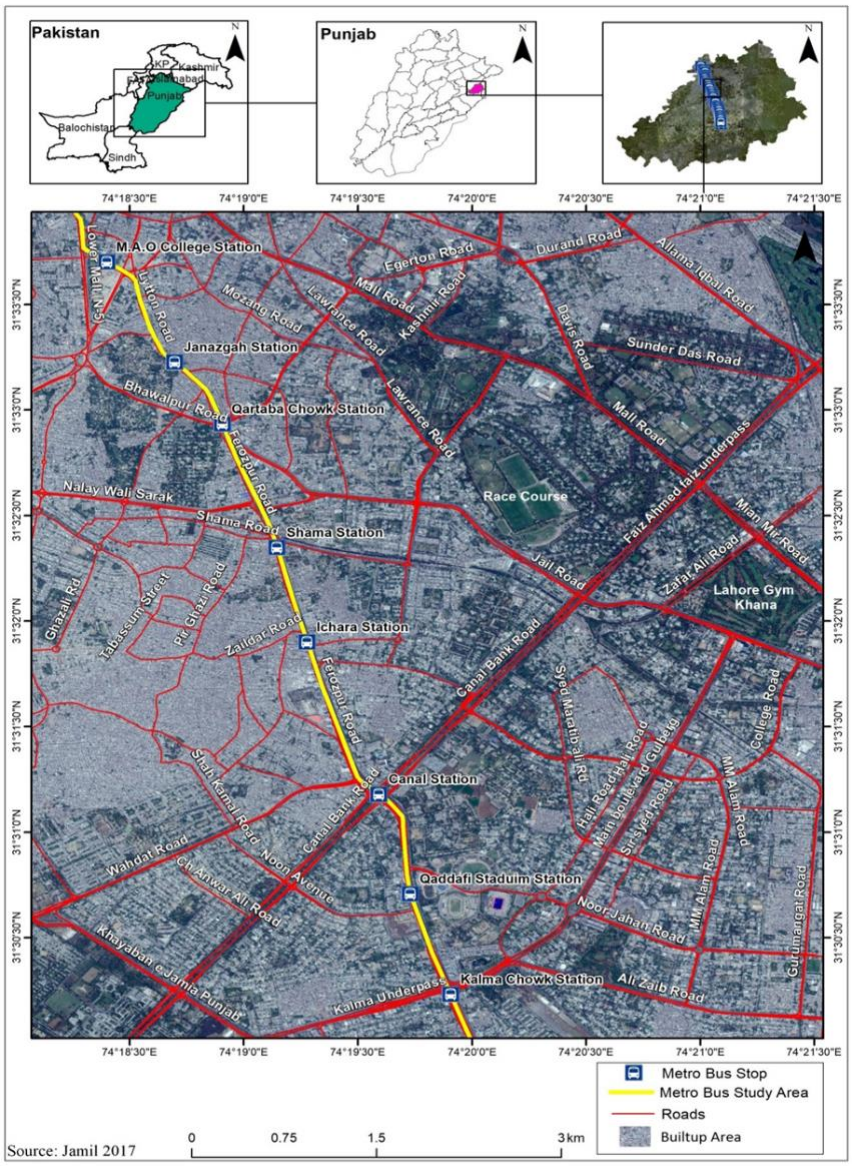

Fig.1 Map of study area

The questionnaire was comprised of three sections and 20 questions dealing with various aspects like information about shops, negative and positive socio-economic impacts of BRT development on business and trade within the study area. The shopkeepers interviewed during the field survey were male, with 40% ranging between 25 to 35 age group, while as 50% were graduates. The collected data was arranged and tabulated using Microsoft Excel 365 and was displayed through graphs. Additionally, the geographical locations of the surveyed shops were collected by using GPS device camera app of LG Stylus2 Duel and were attached with the shape file. The shape files of the study area were acquired from Google Earth Pro 7.3, those were later imported in Arc GIS 10.1 and GPS points taken through. A base map of study area was prepared which was further utilized for making spatial maps of different positive and negative impacts of BRT on commercial activity along the route, as per according to the objectives of the research.

Results & Discussion

Brief details of surveyed shops

During the survey, it was found that majority of the surveyed shops i.e. 171(47%) were several decades old and established during the period of 1981 to 1990 (Fig.2).

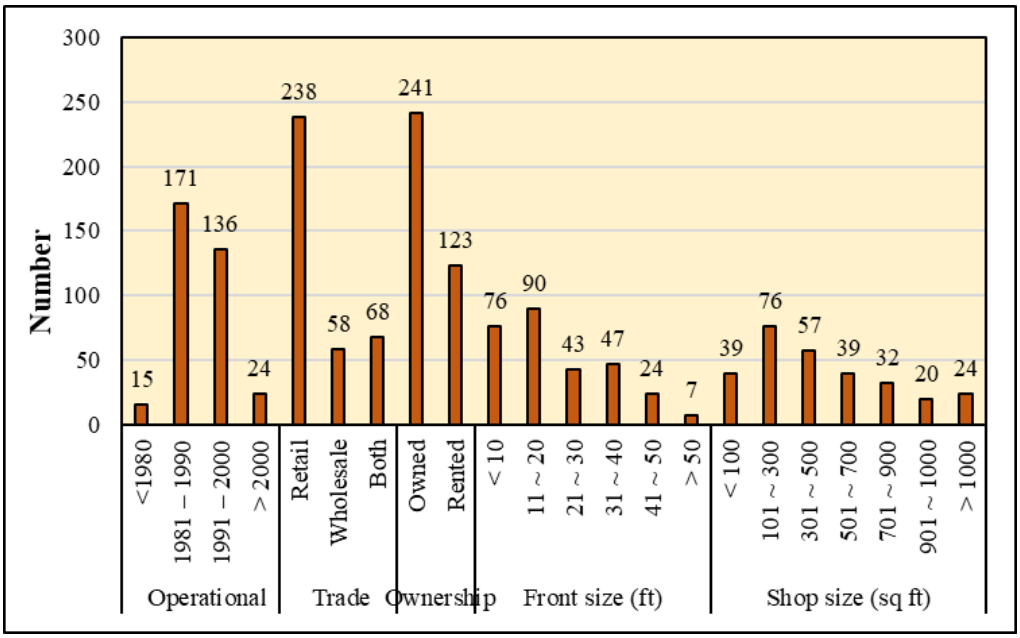

Fig.2 Graph showing operational year, trade type, ownership, front size, and size of surveyed shops

Moreover, retailing trade was found the dominant activity among the surveyed shops with 238(65%) shops indulged in retail trade, while as, 68(19%) shops dealt in both wholesale and retail trade. In addition to this, 241(66%) shops were personally owned by the shopkeepers and 123(34%) shops were rented. Furthermore, great variations were observed in the front size of surveyed shops from less than 10 ft to more than 20 ft, with 90(25%) shops having front size between 11 to 20 ft. Whereas, the total size of shop was also found quite variable from less than 100 sq. ft to more than 1000 sq. ft, with 76(21%) shop having total size between 201 to 300sq. ft and so on (Fig.2).

During the field survey, the shops visited for questionnaire filling were classified according to the commodity they were dealing in and accordingly,14 different types of shops were classified (Fig.3). The electronics were the leading group of commodities found in 41(11%) shops, followed by 35(10%) shops of furniture and foam and 35(10%) shops of Curtain and sofa cloth respectively. However, the other notable shops were those dealing in garments and fabrics 34(9%), food and bakery items 32(9%) and

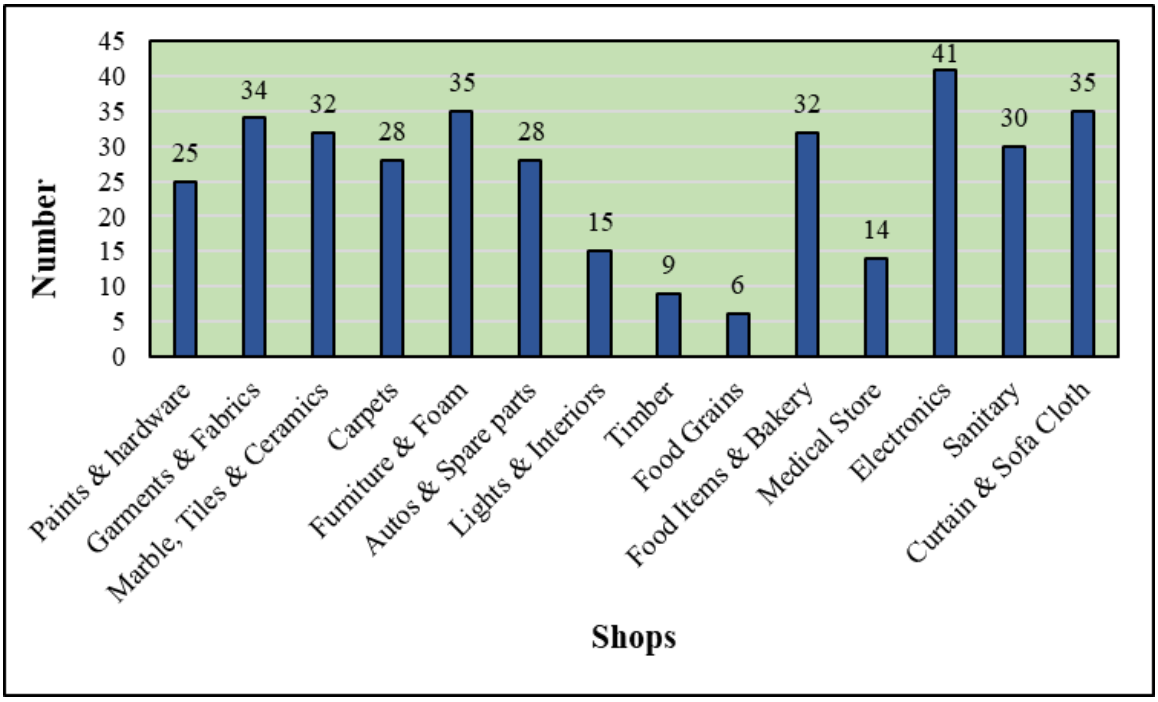

Fig.3 Graph showing commodity wise shop types in the study area

marble, tiles and ceramics 32(9%) shops correspondingly. On the contrary, shops dealing in food grains 6(2%) and timber shops 9(2%) were found very few in the study area.

Impacts of BRT development on the surrounding commercial activity

To assess the impacts of BRT development on the adjacent commercial activity in study area, a list of feasibly apparent impact, containing 12 variables mentioning negative impacts and 12 variables of positive impacts were added in the questionnaire. The shopkeepers were asked to select as many options as much were applicable in their case. The responses of shopkeepers were enumerated in Table 2.

Table 2. Socio-economic and environmental impacts of BRT Lahore on nearby commercial activity

Variables		n (%)
Negative Impacts	Reduced shop size	56 (15.4)
	Descended the level of shop	69 (19.0)
	Spoiled face value of shop	79 (21.7)
	Reduced commercial land values	83 (22.8)
	Reduced shop accessibility	52 (14.3)
	Civic facilities got affected	111 (30.5)
	Removal of parking facility	136 (37.4)
	Spoiled drainage and sewerage	99 (27.2)
	Decline in annual sales	59 (16.2)
	Reduced rate of profit	32 (8.8)
	Reduced numbers of customers	24 (6.6)
	Increase in traffic congestion	44 (12.1)
Positive Impacts	Improved parking	169 (46.4)
	Proper public lights	340 (93.4)
	Reduced traffic jam	79 (21.7)
	Improved green spaces	356 (97.8)
	Improved drainage	187 (51.4)
	Improved market outlook	145 (39.8)
	Improved pedestrian movement	17 (4.7)
	Garbage control	310 (85.2)
	Reduced environmental pollution	340 (93.4)
	Controlled Encroachment control	64 (17.6)
	Enhanced market connectivity	54 (14.8)
	Development of new projects and markets	42 (11.5)

Source: Field Survey (2017)

According to the Table 2, the most common problem faced by the shopkeepers due to BRT development was removal of parking facility. Around 136(37.4%) shopkeepers confirmed the sufferings they were facing caused by the demolition of parking because of BRT project. The second issue, highlighted was about civic facilities like electricity, water, gas and telephone line, got affected because of BRT development mentioned by 111(30.5%) shopkeepers. The third major negative impact was poor drainage and sewage problem as mentioned by 99(27.2%) shopkeepers. The construction of BRT had affected the drainage lines and the ground level of certain markets was descended which resulted in poor drainage, especially in rainy season (Fig.4).

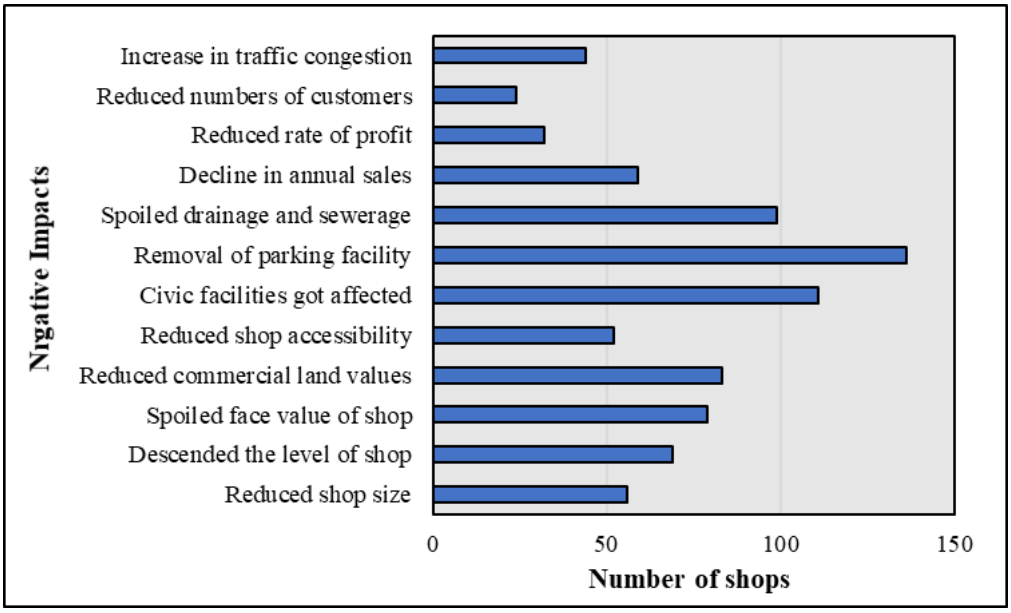

Fig. 4 Negative Impacts of BRT development on surrounding commercial activity

It was observed that the development of BRT did not affected much the commercial activity from economic point of view. The shopkeepers opted for decline in annual sale, reduced profits and reduced number of customers were only 59(16.2%), 32(8.8) and 24(6.6%) respectively (Fig.5). In general, the Metro bus project has not imposed any significant adverse impacts upon commercial and business activities on the wholesale and retail commercial activity along the route.

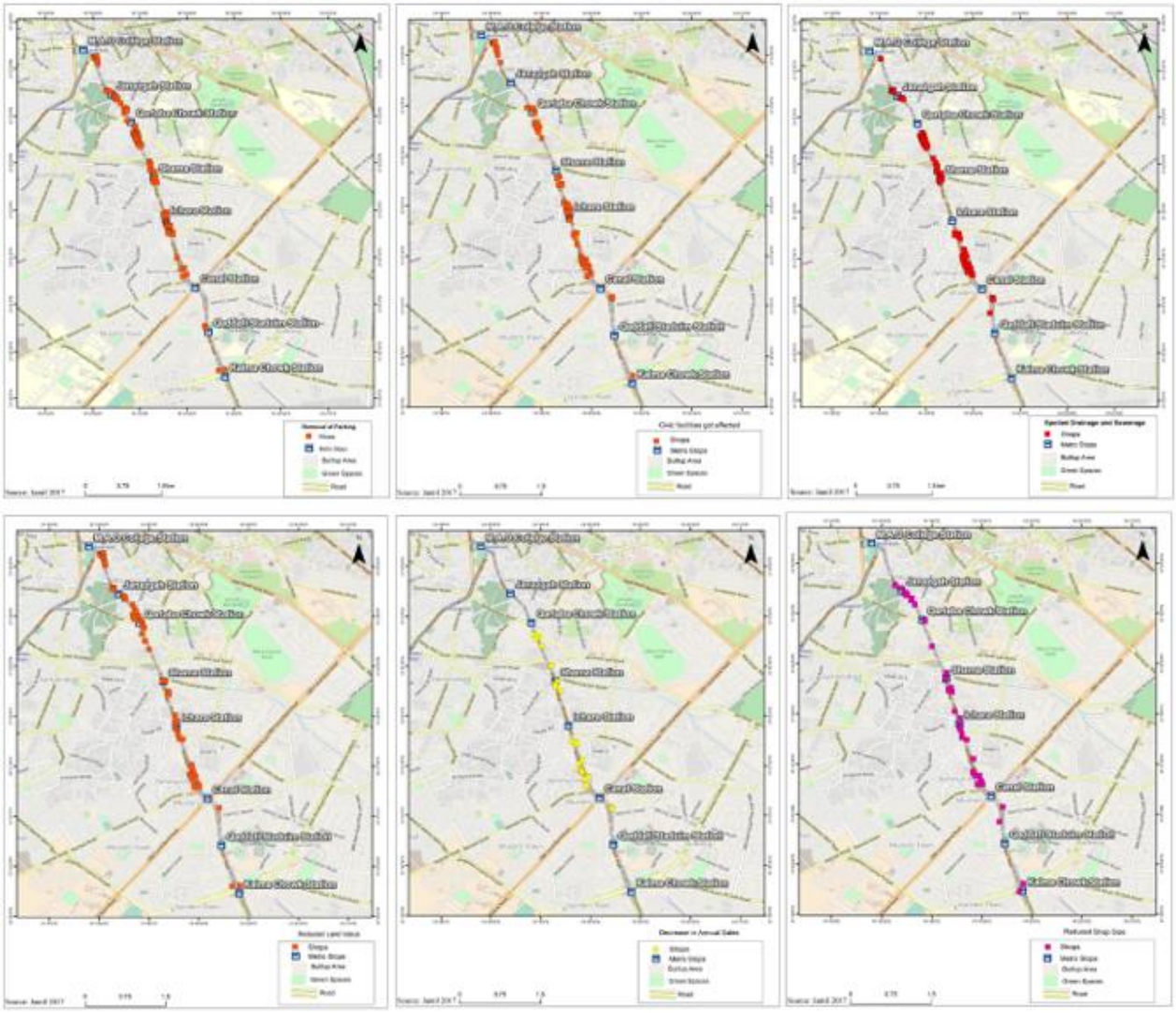

Fig. 5 Maps showing the shops affected due to BRT development in study area

Fig.5 shows the distribution of shops located between Janazgah, Qurtaba chowk and Shama stations Ichhra were worst affected by the removal of parking spaces. The issue of spoiled drainage was found prominent between Shama station to Qurtaba chowk station. Decline in annual sales was seen around Qurtuba Chowk, Shama and Canal stations and so on.

On the other hand, the development of BRT project set many positive impacts on its surrounding commercial activity in environmental and socio-economic perspective. According to 356 (97.8%) shopkeepers, the development of BRT resulted in the improvement of green spaces. 340(93.4%) shopkeepers were of the view that development of BRT helped in reduction of environmental pollution. Similarly, 310(85.3%) shopkeepers stated that the projected also proved helpful to control garbage issue in their vicinity. Besides, as per the opinion of shopkeepers, the project also contributed to some extent in the development of new market projects, encroachment control, and enhanced market connectivity (Fig. 6 & Fig. 7).

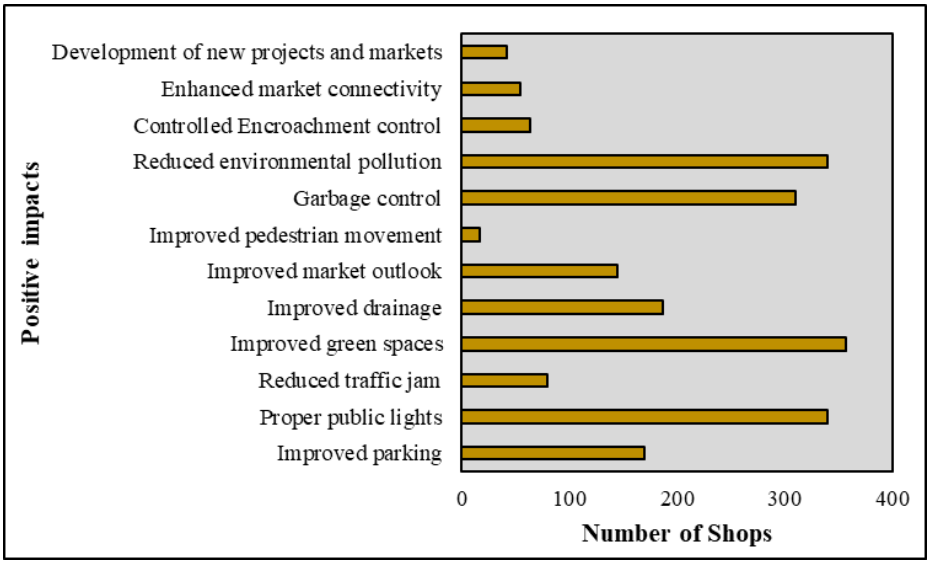

Fig. 6 Positive impacts of BRT development on surrounding commercial activity

Fig. 7 Maps showing the shops got be due to BRT development in study area

Conclusion

The development of Lahore Metro bus BRT has greatly affected the study area in many positive and negative ways; however, the positive impacts are more significant than the negative ones. This resulted in, the raised land and face values of the shops, reduced travel time for employees and customers, neat, clean, and tidy area for traders, residents and for other public, enhanced business activities, improved the traffic flow by reducing congestion at certain places and introducing safer road crossings for pedestrians. The BRT project has also added the green spaces and plants that have helped in the reduction of environmental pollution also proper public lights were also installed along the route. The areas profoundly showing such positive impacts are concentrated between Shama chowk Station to Kalma chowk Station. In short, the study shows that BRT project has not imposed any considerable negative impacts upon current business and sales in the study area. Although at some places, the shop size, front of the shop and face value of the shops have been affected, but still, it has no substantial effect on annual sales and frequency of customers before and after the development of BRT. Among the negative impacts the most prominent are the removal of parking places, spoiling of civic facilities and drainage and sewerage at some places along the route. The affected areas are found in clusters along the BRT route between MAO College, Janazgah, Shama chowk, Qurtuba chowk and Ichhra stations. The concerned authorities should initiate new BRT projects in the other metropolitans of the country for a better and efficient transport system.

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