Impact of E-Tailing on the shopping travel behavior in an emerging economy: Case study- Delhi, India

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Abstract

- E-tailing has boomed over a very short period of time in India at a CAGR of 18.13% over the past decade.
- It is estimated that 55% to 69% of the urban population uses web portals and mobile apps of various e-commerce service vendors in the mega cities of the country exhibiting the rising trend of E-tailing in India.
- E-tailing besides its impact on the retail structure has also shown its impact on the urban land use structure in terms of growth in warehouses/godowns and distribution centers; urban freight distribution channels and freight traffic induced by increased demand for last mile deliveries.
- The present paper is based on an empirical study carried out by the authors in order to assess the impact of E-tailing activities on the shopping travel behavior and the substitution effect on last mile deliveries in context of Delhi, the capital city of India
- The paper attempts to assess the market segments of both off-line and online shopper's behavior and its impact on freight traffic, urban freight distribution, energy consumption and environment.

Introduction

- The growth of e-shopping has reshaped consumers' shopping behavior. The decision-making process of shopping is becoming more and more complex with the current lifestyle and changing attitudes of consumer towards shopping, starting from the selection of shopping location to what to purchase, from where to purchase etc.
- These decisions are based on a harmonious balanced between several factors including socio-demographics, the built environment and accessibility (1-5). These demographics of shoppers eventually manifests in his mode and destination choice as he tries to optimize the uses of time, space and cost.
- Researcher have explored possibilities of reduction of shopping trips (substitution effect) and consequently the reuse of the saved travel time for other purposes/activities and trips (complementarity's effect) .There are substantial evidences from the developed countries that online shopping encourages shopping travel (7-9).
- Thus even if some errands are substituted by online purchases, other number of physical visits to a store may be necessary and unaffected or increase.
- More research is needed to verify these assumptions for different study areas and populations especially in the fast-growing countries like India.
- As many cities in India have historic cores with high densities and clustered land uses and recently also witnessing the high proliferation of e-shopping, travel mode choice and shopping environment which makes it different from developed countries.
- There are virtually no empirical studies that include the effects of shopping trips as well as all other trips carried out in terms of trip length, frequency, and modal choice in the context of Indian Cities.
- Therefore, it is important the transportation planners should explore the relationship between e-shopping and the travel behavior in India so that it can help in improvising the urban planning process in the country.

Methodology

- As part of the empirical investigation efforts a consumer survey of e-shoppers and delivery executives was conducted to assess the e-commerce travel behavior of shoppers and the patterns of deliveries made in the city.
- The consumer surveys were exclusively done in the urbanized areas of the city which covers the 97.5% of the total population in all classes of commercial centers as mentioned in the Delhi Master Plan which is based on the serviceable target population whereas delivery executives were interviewed at the identified local distribution centers of the E-tailers and at the gates of societies, neighborhoods, institutes etc.

Results

	Z Value	P Value
Gender		
Male	-2.35	0.02
Female	-5.11	0.00
Age Group		
15-20	0.34	0.73
20-30	3.89	0.00
30-40	0.83	0.20
40-50	-4.13	0.00
>50	2.63	0.00
HH Type		
Paying Guest/ Hostel	0.2749	0.39
Rent Shared Flats	0.49	0.31
Nuclear Family	0.73	0.23
Joint Family	0.73	0.06
HH Size		
1	0.23	0.41
2	0.45	0.33
3	0.71	0.24
4	0.44	0.33
>4	-1.56	0.06

	Z Value	P Value
Occupation Status		
Student	2.63	0.0043
HouseWife	-1.81	0.04
Self Employed	-4.63	0.00
PvT Employee	3.44	0.00
Govt Employee	-1.38	0.08
Others	-1.53	0.06
Income		
>25000	-1.39	0.08
25001-50000	-2.359	0.01
50001-75000	2.91	0.00
>75001	2.0618	0.02
Car Ownership		
0	-2.3124	0.01
1	1.98	0.02
2	1.10	0.14
>2	-1.55	0.06
2 Wheeler Ownership		
0	1.33	0.09
1	-0.83	0.20
2	-1.15	0.13
>2	1.05	0.15

Red : Not Significant Value Blue: Significant Value

Gender, Age Group , Occupation Structure , Income and Car Ownership are significantly different in case of selected sample.
It means these factor are the determinants of Choice of Modes of Shopping in Delhi .

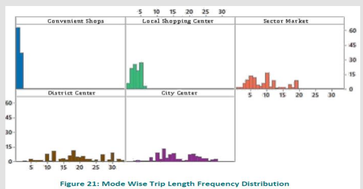


Figure 21: Mode Wise Trip Length Frequency Distribution
Source: Primary Survey, SPA, 2018

It has been noticed that the for preferred mode of transport for performing trip within the 5 km from residence is by NMT and 2 W, whereas for trips which are ranging between 5 km and more, the preferred mode are metro, Auto and Taxi.

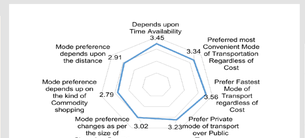


Figure 24: Travel Related Factors Determining Shopper's Travel Behaviour
Source: Primary Survey, SPA, 2018
* Factors having mean rating more than 2.75 are listed here

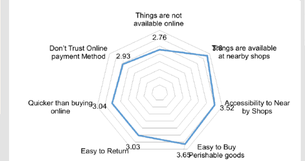


Figure 25: Preference of Shoppers for opting Offline Mode of Shopping
Source: Primary Survey, SPA, 2018
Factors having mean rating more than 2.75 are listed here

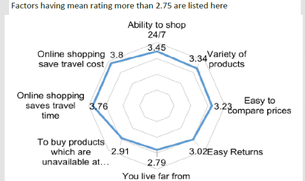
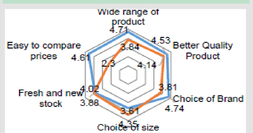


Figure 36: Influencing Factor of Online Shoppers Decision Making
Source: Primary Survey, SPA, 2018
*Mean Rating (Out of 5)

FACTORS INFLUENCE SHOPPING MODE CHOICE

Particulars	No.
Online shoppers Population	135 Lakh
Rate of Order/Capita Online Shopper	0.2
No of Deliveries/Day	27 lakhs
Total no Delivery Trips	0.82 lakh

Product Related



Service Related

Accessibility Related

Consumer Choice Modelling

U (Online) = 1.148 – 0.233* Income + 0.53*Delivery Cost- 0.138*Delivery Time-0.125*Frequency

U (Offline) = 0.68834-0.233*Income + 0.55*Travel Cost – 0.14*Travel Time - 0.125*Frequency

It has been clear that Offline shoppers has 19% and much higher probability to shift to online shopping provided their socio-economic condition improves over the period of time whereas, online shoppers does not show relatively strong probability to shift to offline mode of shopping. They would rather stick to their current practices.

SHOPPING MODE WISE TRIP ESTIMATION

Particulars		No.	%
Trips	Instore Trips	1,586,273	90.81
	Online Delivery Trips	160,449	9.19
	Total Trips	1,746,722	
VKT	VKT Instore Trips	6,017,089	47.85
	VKT Online Delivery Trips	6,559,096	52.15
	Total VKT	12576185	

SHOPPING MODE WISE TRIP ESTIMATION (including Substitute Trips)

Particulars		No.	%
Instore Trips	Instore Trips	1,586,273	73.87
	Substitute Trips	561,188	26.13
	Total Instore Trips (Including Substitute Trips)	2,147,461	
Instore VKT	VKT Instore Trips	6,017,089	66
	VKT Substitute Trips	3,062,342	34
	VKT Instore Trips (Including Substitute Trips)	9,079,431	
Online	Online Delivery Trips	160,449	
	VKT Online Delivery Trips	6,559,096	

ESTIMATED EMISSION SAVINGS

	VKT	Emission (Ton/km/day)
Online Delivery	**6407550**	**573(47%)**
Instore Shopping	3111388	548
Sustitute Trips	691594	96
Total In store Trips	**3802982**	**645(53%)**

	Online Delivery		Instore Shopping	Savings
Estimated Emission	573	>	548	-4.341
Estimated Emission After including Substitute trips	573	<	645	12.486

Conclusion

- The data analysis revealed that e-tailing substitutes an estimated 06% of the off-line shopping trips and 85% of the e-tailing deliveries made by two-wheelers.
- A comparative analysis between the commodities involved in e-tailing depicted that food products and groceries run on the hyperlocal business model whereas non-food items run on marketplace and inventory led logistics service provider model. Hyperlocal models suffice the immediate demands and shows an increased rate of substitution in shopping trips.
- In terms of operating cost, energy consumption and vehicular emissions, two wheelers have the highest share per delivery. Though the number of delivery trips are lesser than the individual in store trips performed but their longer trip lengths and multiple number of trips are adding up to the overall emissions and energy consumption.
- The reason why these conventional modes of last mile delivery vehicles are more polluting in nature is their lesser payload and longer dead kilometers. It was also observed that the number of empty backhauls is also higher in such cases which is making overall operation more harmful for the local environment

Recommendations

- In order to reduce the adverse impact on freight transportation, this study recommends a variety of measures such as use of eco-friendly vehicles with more load capacity which would help in cutting down the local emission levels by 80%, provision of locker stations at neighborhood level under the self-collection system of delivery would help in reducing the vehicle kilometer travelled by 12% and improve the delivery time by 5%, in addition to this mechanism for creation of an off-hour delivery window system for market place and inventory led logistics service providers; and demand clustering for hyperlocal freight distribution has also been suggested.