Comparing Total Time Allocation to Travel to Daily Shopping Sites in Shanghai and Beijing

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Abstract: We are running a project to conduct a series of international surveys of consumer shopping behavior in East Asian cities such as Shanghai, Beijing, Hanoi, Seoul, and Taipei. In Shanghai and Beijing, sampling from visitors at shopping sites of different shop categories we have conducted the on-site interview surveys of consumer daily shopping behavior in which we asked the respondents how often they buy seven typical commodities, how much they spend for each of them per shopping, and what kind of shopping sites they choose to buy each of these commodities. From these surveys, we have calculated what amount of time consumers allocate to travel to the sites where they choose to do daily shopping in Shanghai and Beijing. With comparing the total travel time for daily shopping in Shanghai and Beijing, we conclude that Shanghai is much more compact than Beijing with respect to the location pattern of shopping facilities viewing from consumer's shopping behavior.

Keywords: Total Travel Time; Time Allocation; Daily Shopping Behavior; Shanghai, Beijing

1. Purpose

Recently, several East Asian countries such as China, Korea, and Vietnam have accomplished rapid economic growth, and the urban environments in these countries have experienced drastic changes with respect to cultural, social, and economic life. Shanghai and Beijing are typical good examples to illustrate the above. Specifically referring to the retail environment of Shanghai, while it is only in 1997 that the new shop category, convenience store, opened there, now it is said that more than 5000 convenience stores have opened up as of 2005 (See [3]). In such a rapidly changing retail environment, it is quite important to explore how consumers change and adapt their shopping behavior to the drastic changes of retail environments.

We are running a project to conduct a series of international surveys of consumer shopping behavior in East Asian mega cities such as Shanghai, Beijing, Hanoi, Seoul, and Taipei to explore how consumers' behaviors differ among these cities and how those differences are caused by the differences in cultural backgrounds and stages

of economic development. In particular, we are concerned with the interaction between consumer behavior and the structure of retail establishment. The consumer behavior must change if the retail environment has changed. Conversely, the changes of consumer behavior must lead to the changes of retail structures. (Cf. [2], [4], [5], [6], [7])

In the project, sampling the respondents from visitors at selected shopping sites of different shop categories in Shanghai and Beijing we have conducted the on-site interview surveys of consumers' daily shopping behaviors in which picking up seven typical commodities, we asked the respondents how often they buy these commodities, how much they spend for each of them per shopping, and what kind of shopping sites they choose among seven different categories to buy each of these commodities.

Based on data obtained from these surveys, the purpose of this paper is to investigate the structure of retail environment in Shanghai and Beijing from the viewpoint of consumer shopping behavior by calculating and comparing total time (minutes per month) consumers allocate to travel to the sites where they choose to do daily shopping.

2. Surveys and Method

2.1. On-site interview surveys of consumer daily shopping behaviors

In Table 2.1, we provide overviews of the on-site interview surveys of consumer daily shopping behavior implemented in Shanghai and Beijing. The respondents are sampled randomly from the visitors at shopping sites chosen from different shop categories. The on-site interview surveys are designed to analyze how consumers utilize different kinds of shop categories in their daily shopping.

For the purpose, first we pick up seven typical commodities that cover daily shopping: fresh foods, general foods, home electric appliance, household utensils, personal belongings, street clothes, and home clothes. Next, we classify shop categories into the following seven classes: department store, suburban shopping center, specialty store, supermarket, convenience store, neighborhood shopping street, and traditional market.

In the questionnaire, we have asked the respondents how often they go shopping to buy each of seven typical commodities, how much they spend per shopping, and what kind of shop category among seven shop categories they most often choose to go to purchase each of seven typical commodities.

In Shanghai and Beijing, sampling survey sites are selected by choosing one shopping site from each of seven shop categories.

With this setup, the on-site interview surveys have been conducted for visitors at sampling shopping sites as shown in Table 2.2.

Looking at Figure 2.1, the proportions of male and female in samples from two cities almost are the same. From Figure 2.2, age distributions in samples from two cities are somewhat different. The share of age-group of 20s is quite large in Beijing. Table 2.3 shows the average incomes per month of samples from two cities.

Table 2.1 On-site Interview Surveys of Daily Shopping Behavior

Survey method	(1) On-site inerview survey for visitor at shopping sites of seven different categories
	(2) Ramdom sample from **v**isitors at sampling points of above shopping sites.
	(3) Interview survey for about 20 minutes per respondent
Questionnaire	(1) **Individual Characteristics:** Residence, Age, Gender, Occupation, etc
	(2) **Time distance (minutes) from home to sampling points**
	(3) **Shopping behavior at shopping sites visited on the day of survey**
	Main purpose, Goods purchased, Main goods to come to purchase today, Amount of purchase, Budget today, The number of visits per month, Goods purchased during the past three months, etc
	(4) **Daily shopping behavior**
	Daily shopping behavior for seven typical commodites: fresh foods, general foods, home electric appliance, household utensils, personal belongings, street clothes, and home clothes
	The number of visits per month, Average spending per visit, Shop using usually
	(5) **Usual eating out behavior**
	The number of eating out per month, Average spending per person per one eating out, Shop using usually

Table 2.2 On-site surveys of consumer behavior at different shop categories

Name of survey	*On-site survey of consumer behavior at different shop categories in Shanghai*	*On-site survey of consumer behavior at different shop categories in Beijing*
Date of survey	**March 23, 2002 (Sat) March 24, 2002 (Sun) April 13, 2002 (Sat) April 14, 2002 (Sun)**	**The beginnning of April, 2005**
Survey sites	**5 shops (5points) in Shanghai** department store, suburban shopping center, supermarket, convenience store, neighborhood shopping street	**5 shops (5points) in Beijing** department store, suburban shopping center (2 shops), supermarket, convenience store
Number of samples	**719 samlpes**	**500 samlpes**

To figure out the profiles of samples of these surveys, we give summary statistics in Figure 2.1, Figure 2.2 and Table 2.3.
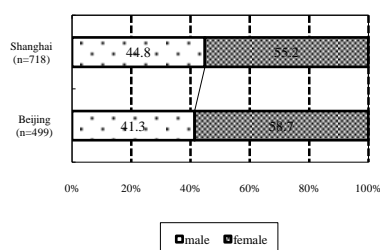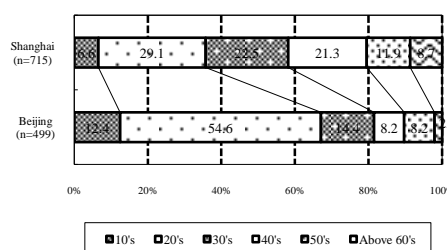

Figure 2.1 Gender

Figure 2.2 Age

Table 2.3 Average income (unit: Yuan per month)

Shanghai 2002 (n=603)	Beijing 2005 (n=388)
1,448	2,386

2.2. Method

Here we explain how to calculate the total time consumers allocate to travel to the shopping sites they choose to do daily shopping from data obtained from the

above surveys. Unfortunately in the questionnaire we did not ask the respondents about the time distance from their home to the shop categories they chose as shopping sites to do daily shopping. Hence as the substitute variables for the respondent's time distances to seven shop categories we employ the sample averages of the respondents' time distances from their home to the shopping sites selected as survey points to represent seven shop categories. Thus every respondent for each city has the same time distance to each shop category.

1) Time distance to each shop category

In the on-site surveys of consumer behavior at different shop categories shown in Table 2.2, we have asked the respondents about their travel time distance from their home to the shopping site where they were interviewed. Since the shopping site is selected as a survey point that represents each of seven different shop categories, with use of this question we can calculate the sample average of travel time distance to each shop category.

In Table 2.4 we give the sample average of time distance to each shop category. While we classify seven shop categories, we did not set up survey points for all shop categories. Thus we could not calculate the sample averages of time distance for the following shop categories: specialty store and traditional market in Shanghai, and specialty store, neighborhood shopping street, and traditional market in Beijing. As for these missing values, we assume the hypothetical values to fill the missing values in such a neutral way that they do not affect the differences between Shanghai and Beijing.

Table 2.4 The average time distance for each shop category (unit: minute)

shop categories	Shanghai	Beijing
department store	36	37
suburban shopping center	30	45
specialty store	25^{*}	25^{*}
supermarket	18	19
convenience store	14	40
neighborhood shopping street	19	19^{*}
traditional market	10^{*}	10^{*}

* Hypothetical values

2) Calculating total time allocation to travel to daily shopping sites

Let $AveT_d$ denote this sample average of time distance to shop category d. Let f_{ig} be the purchase frequency per month that sample i purchases the commodity group g and let d_{ig} be the shop category that sample i chooses most often to visit to purchase the commodity group g. Let M_{ig} denote the travel time that sample i allocates to travel to shopping sites to purchase the commodity group g. Then M_{ig} can be expressed as $M_{ig} = f_{ig} \cdot Avg\,T_{d_{ig}}$. Hence the total time $TotM_i$ for sample i to allocate to travel to shopping sites for daily shopping becomes:

$$TotM_i = \sum_g M_{ig} \; .$$

3. Results

3.1. Shop category chosen for seven typical commodities

In Figure 3.1 to Figure 3.7, we show the results of analysis as to what kind of shop category the respondents most often choose to purchase each of seven kinds of commodities. As for fresh food, we see from Figure 3.1 that both of Shanghai and Beijing consumers show the similar pattern of choice of shop categories. While consumers in both cities are still choosing traditional markets, they mainly use two shop categories of suburban shopping centers and supermarkets. As for general foods in Figure 3.2, the choice pattern of shop categories almost are the same as fresh foods except the use of traditional markets.
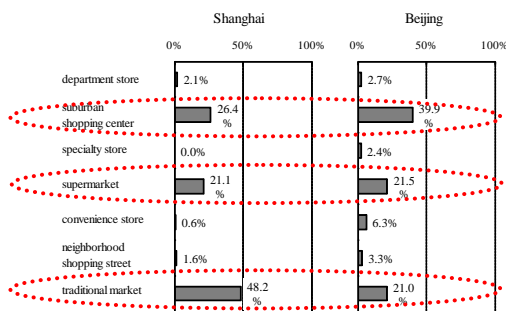

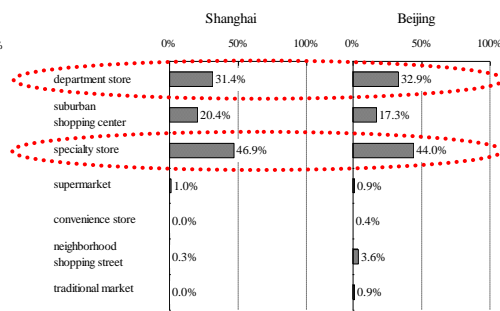**Figure 3.1 Shop category chosen for fresh foods**

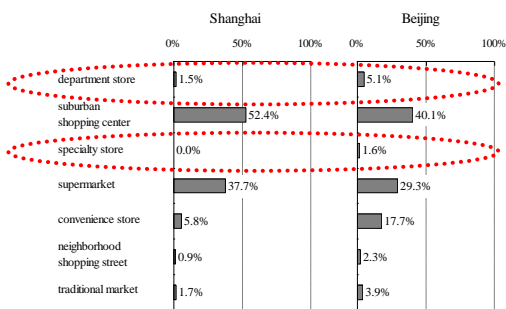**Figure 3.3 Shop category chosen for home electric appliance**
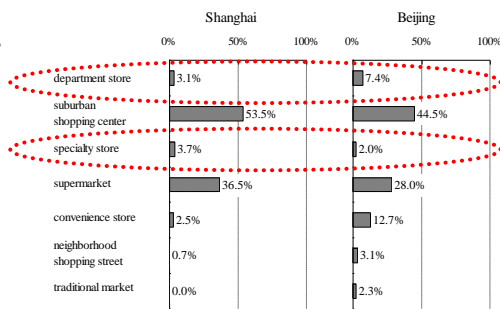

Figure 3.2 Shop category chosen for general foods
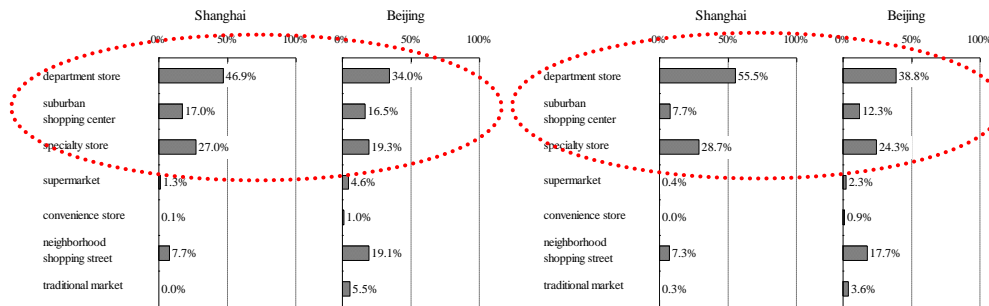

Figure 3.4 Shop category chosen for household utensils

Shanghai   Beijing

department store | 46.9% | 34.0%
suburban shopping center | 17.0% | 16.5%
specialty store | 27.0% | 19.3%
supermarket | 1.3% | 4.6%
convenience store | 0.1% | 1.0%
neighborhood shopping street | 7.7% | 19.1%
traditional market | 0.0% | 5.5%

Figure 3.5 Shop category chosen for Personal belongings

Shanghai   Beijing

department store | 55.5% | 38.8%
suburban shopping center | 7.7% | 12.3%
specialty store | 28.7% | 24.3%
supermarket | 0.4% | 2.3%
convenience store | 0.0% | 0.9%
neighborhood shopping street | 7.3% | 17.7%
traditional market | 0.3% | 3.6%

Figure 3.7 Shop category chosen for home clothes

Shanghai   Beijing

department store | 36.7% | 32.2%
suburban shopping center | 31.9% | 22.9%
specialty store | 13.4% | 12.8%
supermarket | 7.0% | 5.9%
convenience store | 0.6% | 1.8%
neighborhood shopping street | 10.1% | 19.3%
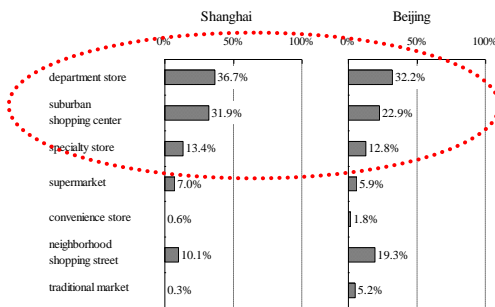traditional market | 0.3% | 5.2%

Figure 3.6 Shop category chosen for street clothes

As for home electric appliance in Figure 3.3, the share of specialty stores is large but the department stores also are chosen much as the purchase destination. From Figure 3.4 we know suburban shopping malls and supermarkets are two major categories chosen for household utensils.

The results for personal belongings, street clothes and home clothes are shown in Figure 3.5 to Figure 3.7 respectively. We also see here that customers in Shanghai and Beijing are highly supporting the three modern shop categories of department stores, suburban shopping centers, and specialty stores.

However, we also can find that the shares of traditional retail shop categories like neighborhood shopping streets and traditional markets turn out to be high for some kinds of commodities. For instance, the probability to choose traditional markets for fresh foods is the highest in Shanghai (48.2%), and 21.0 % in Beijing. Also we notice that the choice probabilities of neighborhood shopping streets for personal belongings, street clothes and home clothes are about 20% in Beijing. Whether or not traditional shop categories like neighborhood shopping streets and traditional markets can continue to exist in the future critically depends on whether or not they can get supports from customers so that of quite important is to keep attention to consumer behaviors.

3.2. Average frequency to purchase seven typical commodities

Now we present in Table 3.1 the results of average frequency per month to purchase each of seven kinds of typical commodities. Look at the rightmost column of the table, each cell of which equals the row sum of shopping frequency per month of seven typical commodities. In this paper, for simplicity we assume that there is no joint shopping among seven typical commodities and regard this sum as the total frequency per month of daily shopping for purchasing the whole range of commodities. The total frequency per month for daily shopping becomes 20.1 times per month in Shanghai and 22.1 times per month for Beijing.

From the table, we notice that consumers in Shanghai and Beijing show similar tendency for purchase frequency of seven typical commodities. Differences can be seen for general foods, that is, 9.52 in Beijing vs. 4.78 times per month in Shanghai, for fresh foods, 13.06 in Shanghai vs. 10.72 in Beijing, and for household utensils, 1.28 in Shanghai vs. 0.72 in Beijing.

Table 3.1   Average frequency to purchase each of seven kinds of commodities

city \ commodity	Average of frequency to go shopping (times per month)							
	fresh foods	general foods	home electric appliance	household utensils	personal belongings	street clothes	home clothes	Total
Shanghai	13.06	4.78	0.06	1.28	0.34	0.26	0.32	20.10
Beijing	10.72	9.52	0.07	0.72	0.39	0.34	0.36	22.12

3.3. Total time allocation per month to travel to shopping sites chosen to purchase seven typical commodities in Shanghai and Beijing

In Table 3.2, we demonstrate the result of calculation of total time allocation to travel to shopping sites chosen for buying seven kinds of typical commodities in Shanghai and Beijing.

The rightmost column of the table is composed of the row sums of allocations of travel time per month to shopping sites chosen for purchasing seven kinds of typical commodities in Shanghai and Beijing. Assuming that there is no joint shopping among seven typical commodities we can regard them as the total time allocations to travel to shopping sites that consumers in Shanghai and Beijing choose to purchase the whole range of commodities.

Table 3.2 Travel time allocation for purchasing typical commodities

city \ commodity	Allocation of travel time to shopping sites by seven kinds of typical commodities (minutes per month)							
	fresh foods	general foods	home electric appliance	household utensils	personal belongings	street clothes	home clothes	Total
Shanghai	193	110	2	31	10	8	9	351
Beijing	348	327	2	26	12	11	12	897

Comparing those in Shanghai and Beijing we notice that the total travel time allocation in Shanghai, 351 minutes, is much smaller than that in Beijing, 897 minutes. Since the total purchase frequency for whole daily commodities shows similar tendency in Shanghai and Beijing, the cause of this big difference in total travel time allocation can be attributed to the difference in time distances to

shopping sites consumers choose to buy seven kinds of typical commodities.

With these considerations, we may conclude that the welfare of consumers in Shanghai is higher than that of Beijing. In other words, the physical structure of retail environment in Shanghai is much more compact than that of Beijing.

The concept of compact city has been attracting a great deal of attention these days from the various concerns such as aging society, ecology and energy saving society. But as far as we know, there are few researches that directly tackle the problem of compactness from the empirical viewpoint of human behavior.

4.   Conclusion and Further Researches

While time geography (Cf. [1]) has been concerned, there have been no attempts to calculate and compare the total travel time to shopping sites in different cities.

In this paper, for the first time we have calculated the total time allocation to travel to shopping sites consumers choose to do daily shopping for typical commodities in Shanghai and Beijing and demonstrated that the structure of retail environment in Shanghai is much more compact than in Beijing. This result may coincide with the intuition about physical compactness of each city if you have experience to walk around city center retail environments at both cities.

While the suburban shopping malls and convenience stores already had been spread out in Shanghai in 2002, the year of Shanghai survey, suburban shopping malls and in particular, convenience stores were very few in Beijing even in 2005, the year of Beijing survey. In fact, according to [3], the number of convenience stores opened in Shanghai is about three times as many as in Beijing in 2005.

While we have indicated an interesting result the detailed further study is needed to measure individual time distances the respondents spend to travel to the shopping sites they choose to avoid the use of hypothesized distance data employed here. Further studies also should be done to compare the cities in Japan, Korea and other East Asian cities from the viewpoint of travel time allocation for daily shopping.

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