

Buyers-to-Shoppers Ratio of Shopping Malls:

A Probit Study in Hong Kong

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ABSTRACT:

Buyers-to-shoppers ratio (i.e. conversion rate) has long been one of the commonly adopted metrics in assessing retail performance of shopping malls, but it is almost always relied on interviews, consumer surveys and questionnaires. These methods are intrinsically problematic in ascertaining the trustworthiness of the responses. This paper is probably the first objective study on the buyers-to-shoppers ratio based on actual observations in shopping malls in Hong Kong. A probit model is used to study factors affecting the ratio. The results show that consumer-surveys seriously over-estimate the ratio.

KEYWORDS:

Shopping mall, buyers-to-shoppers ratio, probit model

INTRODUCTION

Shopping and buying are two different activities, but are inextricably intertwined in a shopping mall environment. Retailers take pains to attract shoppers to get into their shops to buy their commodities, i.e. converting a shopper into a buyer. Shoppers, on the contrary, often enjoy shopping itself with or without buying anything. Thus, the performance of retailers is often measured, among others, by this buyers-to-shoppers ratio, which is also coined as the conversion rate in the retail industry. This ratio enumerates the proportion of people visiting a shop actually making a purchase there. This information is of paramount importance to both the mall owner and retailers, because the determination of rent in a mall is commonly dependent of the shoppers' flow, yet the actual earnings of a retailer in a mall is dependent of the buyers' flow. Various advanced technologies have been developed in counting shoppers' flow, including the FootPath Technology (Path Intelligence, 2008) and the Footfall Index (Experian Footfall, 2008), but very few studies have been carried out on buyers' flow.

There have been very few scientific studies on the buyers-to-shoppers ratio, especially in the Asia-Pacific region. Worse still, almost all relevant previous studies (e.g. Underhill, 1999; Soriano, 2005; 2006; 2007) rested on the mere application of the ratio for benchmarking purposes. Research on factors determining the ratio of a retail facility has not yet been scientifically explored. In fact, studies in this field are definitely worthwhile because they provide insights to retailers and mall owners to formulate their marketing and valuation strategies. Thus, this paper aims to study the buyers-to-shoppers ratio of shopping malls in Hong Kong and it is probably the first study on this ratio in Hong Kong. In addition, a probit analysis is employed to investigate factors affecting the ratio. The findings of the analysis offer valuable information to the retailing practitioners and mall owners in rent determination.

More importantly, this study measures the buyers-to-shoppers ratio by actual observations rather than by traditional consumer surveys. It highlights the general problems in retail studies using traditional consumer surveys and interviews.

The arrangement of this paper is as follows: the next section is a literature review on the buyers-to-shoppers ratio of a shopping mall. Then, the methodology, the empirical data, and the results of the buyers-to-shoppers ratio study are discussed before presenting the conclusions.

LITERATURE REVIEW

Buyers-to-Shoppers Ratio

Buyers-to-shoppers ratio is the proportion of the number of buyers to the number of shoppers in a retail facility, which is also commonly known as the conversion rate. For example, Underhill (1999) reported that the overall conversion rate in the United States was 48 percent (i.e., 48 percent of shoppers bought something in shopping malls in the United States). Veronica Soriano also conducted a series of shopping mall studies using conversion rate (Soriano, 2005; 2006; 2007). For example, Soriano (2005) provided a breakdown for the conversion rates, such as the Department Store Conversion Rate and the Mall Shop Conversion Rate for different regions and for different-sized malls. She found that the shopping mall conversion rates for the age groups between 25 and 34 years old, and over 65 years were the highest (around 67%) in the United States in 2004. Later, Soriano (2006) found that the Department Store Conversion Rate ranged from 55 percent to 60 percent and from 43 percent to 77 percent for the Mall Shop Conversion Rate in different regions in 2005. Interestingly, she found in 2005 that Asian shoppers had the highest conversion rate (69 percent).

It is noteworthy that almost all previous surveys on the buyers-to-shoppers ratio of shopping malls were based on consumer surveys (questionnaires or interviews) with shoppers. For example, Soriano's (2006) shoppers profile was made by conducting 21,000 exit interviews at 56 regional and super-regional malls. There are also various shoppers' surveys in Hong Kong, and the buyers-to-shoppers ratio could be derived from the survey questions. For example, Hui et al. (2005) have carried out questionnaire surveys in shopping malls in Hong Kong and received 971 responses from shoppers in three large-scale shopping malls in three districts as shown in Table 1. This paper will study on the same three shopping malls to compare the findings by

means of the two different approaches. The buyers-to-shoppers ratio of shops in these three shopping malls was very high, for example, the average ratios in shops selling apparels, audio video/electrical and pharmacy/health care were about 53%, 43% and 69%, respectively.

Table 1 Buyers-to-shoppers ratio in three shopping malls
(by face-to-face questionnaires)

Name of the Mall	New Town Plaza (NTP)	Maritime Square (MT)	Tuen Mun Town Plaza (TMTP)	
Location (Region)	Shatin	Tsuen Wan	Tuen Mun	Average
No. of Respondents	297	326	348	323.67
Apparels	56.0%	50.0%	54.4%	53.47%
Leather and shoes	57.6%	42.1%	46.7%	48.80%
Restaurants	89.6%	93.6%	91.1%	91.43%
Book/gift shops	67.7%	57.9%	61.1%	62.23%
Audio video/electrical	53.7%	40.0%	35.7%	43.13%
Cosmetics/skincare	60.0%	82.4%	45.7%	62.70%
Furniture/home decoration	50.0%	64.3%	45.0%	53.10%
Supermarkets	81.2%	77.9%	83.3%	80.80%
Toy shops	53.6%	56.8%	53.6%	54.67%
Ornaments/clocks	36.4%	50.0%	33.3%	39.90%
Entertainment	61.9%	66.7%	38.1%	55.57%
Pharmacy / health care	57.1%	50.0%	100.0%	69.03%
Bakery	100.0%	50.0%	100.0%	83.33%
Others	57.1%	52.2%	64.7%	58.00%
Average	62.99%	59.56%	60.91%	61.15%

In fact, most of the previous retail studies were based on consumer surveys (questionnaires or interviews). For example, Marjanen (1995), Arentze and Timmermans (2001), Dennis et al. (2002), Wong and Yu (2003) and Suárez et al. (2004), to name just a few. Yet, the reliability of the data so obtained is always

subject to challenges because abounding studies suggest that respondents psychologically tend to say “yes” in face-to-face questionnaire surveys in some occasions (e.g. Wells and Dames, 1960; Suchman and Jordan, 1990). Therefore, shoppers, when being asked if they have made any purchases during their shopping trips, tend to give positive responses, which results in skewed survey results in the buyers-to-shoppers ratio studies. UIE (2002) also found that consumer survey results could be strongly biased in studies of impulse purchase. In this regard, we adopt direct observation approach on the behaviors of shoppers by recording whether they made purchases in a shop or not. The results in the next section contrast significantly with the above results obtained from the face-to-face questionnaire surveys.

Predator Success Rate

Currently, buyers-to-shoppers ratio of shopping mall is, at best, a metric for benchmarking; it is rarely the subject of scientific research. The reason behind is probably the lack of a theoretical model explaining what drives the buyers-to-shoppers ratio in a shopping mall. Very often, researchers rely on casual observation and experience. For instance, Soriano (2006) discussed the influences of shoppers’ characteristics (e.g. sex, age and ethnicity) and malls’ characteristics (e.g. locality and size) on buyers-to-shoppers ratio of shopping malls. However, there are neither theoretical justifications nor empirical tests for these postulates. In this regard, the authors would like to fill in the gap by applying the eco-mall model developed by Yiu and Yau (2006).

Theoretically, retailing environment of a shopping mall resembles an ecosystem where predators and prey co-exist. In ecology, the success rate of predation has been intensively studied, both theoretically and empirically. Prey density, prey handling time and prey encounter rate have been considered as the major factors contributing to the predator success rate (Holling, 1959, 1966). Analogously, shoppers’ density, sale and purchase handling time, and shoppers’ encounter rate are factors affecting the probability of converting a shopper to a buyer. These theoretical models have also been well tested empirically in ecology (e.g. Nielsen, 1999; Redpath and Thirgood, 1999; Wanink and Zwarts, 1985).

Encounter rate is in turn dependent of the (1) duration that the shopper stays in the shop and (2) the spatial environment of the shop, which may affect the probability of a shopper choosing it (Wee and Tong, 2005). Likewise, seasonal events (e.g. festivals) and holidays may stimulate shoppers' impulses to buy, resulting in a higher encounter rate of shoppers (Roslow *et al.*, 2000)

Consumer Behavior

The predator success rate also depends on its attack efficiency, which is affected by both the predator's behavior and the prey's capability to defense (or to escape). It therefore suggests that the buyers-to-shoppers ratio depends on the characteristics of shoppers and retailers, such as the type of commodities and brand name of retailers; the gender, age, and ethnicity of shoppers.

Similar retail studies on impulse buying behavior also agree with this line of thought. For example, young people are found to have higher impulse buying tendencies than older individuals (Wood, 1998; Verplanken and Herabadi, 2001), and females are more likely to be impulse buyers than males (Coley and Burgess, 2003; Dittmar *et al.*, 1995). Besides, impulse buying behavior is found to vary with the products being sold (Bellenger *et al.*, 1978) and the deal-proneness of the shoppers (Thomas and Garland, 1996).

The timing of shopping is crucial in order to convert shoppers into buyers. Grünhagen *et al.* (2003) found by interviews that shopping on weekends was generally viewed as a "necessary evil" rather than an enjoyable pursuit. They suggested that Saturday shopping involved a strong task orientation, while Sunday shopping was more recreational in nature. It implies that different days in which shopping is undertaken may affect the motivation of shoppers, and hence, their buying behavior.

Yet, most of the previous studies did not differentiate between shopping and buying until recently when Soopramanien and Robertson (2007) studied the factors affecting purchasing decisions of on-line browsers and on-line buyers by logistic regression model. Unfortunately, their study relied again on questionnaire survey results.

METHODOLOGY AND DATA

Three enumerators conducted nine direct observational surveys in the three large-scale shopping malls at three districts of Hong Kong: Shatin, Tsuen Wan, and Tuen Mun, from September 20 to October 22, 2005, including two weekdays and one weekend. The enumerators carried out each observation for about 30 minutes at the shop-front of a shop at a mall; and made records of the number and characteristics of shoppers who went into the shop. They also counted how many shoppers did buy products in the shops. We confined the study to just three types of shop: apparel, pharmacy/health care, and audio video/electrical appliances, where purchases can easily be observed at the cashier. We also confined our study to chain shops of the same brand name at the same periods of time at the three malls, so as to keep other things being equal.

The three malls are of similar scale, and are located at three residential districts of large number of households as shown in Table 2. There are 191,182, 94,912 and 162,492 households in the three districts, respectively. The three types of shops are famous chain stores for apparels (Giordano), daily merchandises (Mannings) and electrical appliances (Fortress). The numbers of their outlets in October 2008 are 45, 242 and 46, respectively. Their products, marketing strategies, and shop designs are highly standardized among all chain shops in the city.

Table 2: The Three Shopping Malls

	Mall 1	Mall 2	Mall 3
Name of the Mall	New Town Plaza (NTP)	Maritime Square (MT)	Tuen Mun Town Plaza (TMTP)
Location (Region)	Shatin	Tsuen Wan	Tuen Mun
Year of Operation	1982	1998	1988
Total Area	2,000,000 s.f.	500,000 s.f.	1,000,000 s.f.
No. of Storey	8	4	5
No. of Shops	162	140	400

Altogether, we collected 810 observations (shoppers), 540 of them during weekdays and the remaining 270 during a weekend. In other words, our 3x3x3 data are actual observations of buyers-to-shoppers ratio at 3 types of chain shop, of 3 shopping malls, on 3 days. Table 3 below summarizes the places and the time that the data was collected.

Table 3: Where and when did the data collected

		Mall 1	Mall 2	Mall 3
Name of the Mall		New Town Plaza (NTP)	Maritime Square (MT)	Tuen Mun Town Plaza (TMTP)
Location (Region)		Shatin	Tsuen Wan	Tuen Mun
Shop Type	Name of the Shop			
20 September 2005 (Weekday)				
Apparel	Giordano	11:50 – 12:17	14:25 – 15:06	17:40 – 18:03
Pharmacy / Health Care	Mannings	11:20 – 11:50	13:53 – 14:18	16:51 – 17:17
Audio Video /Electrical Appliances	Fortress	12:22 – 12:50	15:15 – 15:57	18:13 – 18:32
		21 October 2005 (Weekday)	18 October 2005 (Weekday)	20 October 2005 (Weekday)
Apparel	Giordano	11:49 – 12:16	11:51 – 12:52	12:30 – 13:10
Pharmacy / Health Care	Mannings	11:20 – 11:51	11:51 – 12:33	13:14 – 13:52

Audio Video /Electrical Appliances	Fortress	12:15 – 12:40	12:36 – 12:57	14:15 – 14:59
		16 October 2005 (Weekend)	22 October 2005 (Weekend)	16 October 2005 (Weekend)
Apparel	Giordano	15:41 – 16:08	14:25 – 15:06	13:00 – 13:34
Pharmacy / Health Care	Mannings	13:09 – 15:13	13:53 – 14:18	13:45 – 14:13
Audio Video /Electrical Appliances	Fortress	16:31 – 17:04	15:15 – 15:57	15:00 – 15:44

The information recorded in each observation includes (1) whether the shopper buys; (2) sex and age group of the shoppers (estimated by the enumerators); (3) how long does the shopper stay in the shop; (4) types of shop; (5) time (weekday or weekend); and (6) place (mall); as defined in Table 4.

Table 4 Definitions of the variables.

Variable		Definition
Buyer		A dummy variable indicating whether the shopper has bought something
Staying Time (D)		Time (in minutes) spent by the shopper in the shop
Gender and Age Group	Female Male	A dummy variable indicating whether the shopper is female A dummy variable indicating whether the shopper is male (omitted in the probit model to avoid collinearity)

(S)	Teenagers	A dummy variable indicating whether the shopper is a teenager
	Adults	A dummy variable indicating whether the shopper is an adult
	Elderly	A dummy variable indicating whether the shopper is a senior citizen (omitted in the probit model to avoid collinearity)
Shop Type (R)	Apparels	A dummy variable indicating whether the shop sold apparels
	Pharmacy / Health Care	A dummy variable indicating whether the shop sold pharmacy / health care / daily merchandises
	Audio Video /Electrical Appliances	A dummy variable indicating whether the shop sold audio video / electrical appliances (omitted in the probit model to avoid collinearity)
Day (T)	Weekend	A dummy variable indicating whether the observation was made during the weekend
	Weekday	A dummy variable indicating whether the observation was made during the weekday (omitted in the probit model to avoid collinearity)
Mall (L)	NTP	A dummy variable indicating whether the mall is NTP
	MT	A dummy variable indicating whether the mall is MT
	TMTP	A dummy variable indicating whether the mall is TMTP (omitted in the probit model to avoid collinearity)

In other words, all variables are dummy variables (either yes or no), except the Staying Time. Table 5 shows the summary statistics of the variables. Out of the 810

observations of shoppers, there were 263 buyers, and the average buyers-to-shoppers ratios in shops selling apparels, audio video/electrical appliances, and pharmacy/health care are 25.93%, 16.30% and 55.17, respectively, which are much lower than the ones obtained from questionnaires (53%, 43% and 69%, respectively) as shown in Table 6, although the rank of the three remains the same in the two studies. Table 7 further shows the shoppers-to-buyers ratios in weekday and in weekend.

Table 5 Summary statistics of the variables.

Variable	Mean (or Numbers)	Standard Deviation	Minimum	Maximum
Staying Time (D)	5.01	4.96	1.00	38.00

Variable	Numbers	
Buyer	263	
Gender and Age Group (S)	Female	405
	Male	405
	Teenagers	265
	Adults	448
	Elderly	97
Shop Type (R)	Apparels	270
	Pharmacy / Health Care	270
	Audio Video /Electrical Appliances	270
Day (T)	Weekend	270

	Weekday	540
Mall (L)	NTP	270
	MT	270
	TMTP	270
Total No. of Observations		810

Table 6 Buyers-to-shoppers ratio in the three shopping malls
(Panel A: by direct observations; Panel B: by face-to-face questionnaires)

Name of the Mall	NTP	MT	TMTP	Average
PANEL A: By Direct Observations				
No. of observations	90	90	90	90
Apparels	20.0%	26.7%	31.1%	25.93%
Audio video/electrical	18.9%	18.9%	11.1%	16.30%
Pharmacy / health care	60.0%	53.3%	52.2%	55.17%
PANEL B: By Face-to-Face Questionnaires				
No. of observations	297	326	348	323.67
Apparels	56.0%	50.0%	54.4%	53.47%
Audio video/electrical	53.7%	40.0%	35.7%	43.13%
Pharmacy / health care	57.1%	50.0%	100.0%	69.03%

Table 7 Buyers-to-shoppers ratio in the three shopping malls (by direct observations)
(Panel A: in weekdays; Panel B: in weekend)

Name of the Mall	NTP	MT	TMTP	Average
PANEL A: Weekdays				
No. of observations	60	60	60	60
Apparels	20.0%	20.0%	23.3%	21.1%
Audio video/electrical	13.3%	16.7%	10.0%	13.3%
Pharmacy / health care	61.7%	48.3%	48.3%	52.8%

PANEL B: Weekend				
No. of observations	30	30	30	30
Apparels	20.0%	40.0%	46.7%	35.6%
Audio video/electrical	30.0%	23.3%	13.3%	22.2%
Pharmacy / health care	56.7%	63.3%	60.0%	60.0%

Microscopically, the factors affecting the probability of having a shopper buying the products can be estimated by a binary probit model as shown in Equation (2):

$$\Pr(\text{Buyer} = 1 | x_i, \beta) = \Phi(x_i' \beta) \quad (2)$$

where Φ is the cumulative distribution function of the standard normal distribution and x_i is a vector of the explanatory variables for the purchases, and β is a vector of the coefficients of the variables. The explanatory variables in the binary probit model include (1) the characteristics of each shopper (S) – gender and 3 age groups, (2) the characteristics of each retailer (R) – 3 types of shop, (3) the day (weekday or weekend) of each shopper's visit (T), (4) each shopper's duration of stay in the shop (D), and (5) the location of the shop (L). In other words, Equation (2) becomes:

$$\Pr(\text{Purchases} = 1 | x_i, \beta) = \beta_0 + \sum_{j=1}^3 \beta_j S_j + \sum_{k=1}^2 \beta_k R_k + \beta_6 T + \beta_7 D + \sum_{l=1}^2 \beta_l L_l + u \quad (3)$$

where β_i (for $i = 0, 1, 2, 3, \dots, 9$) are vectors of the coefficients to be estimated and u represents the stochastic terms.

Individual difference in shoppers' attitude and value is not considered in the above binary probit model because they are not directly observable and the number of observations is big enough to eliminate them out.

RESULTS AND DISCUSSIONS

Tables 6 and 7 show the buyers-to-shoppers ratios directly observed at the malls. First, they are much smaller than that obtained from the questionnaires in the

same malls. These results raise concerns over using questionnaires and interviews in the buyers-to-shoppers ratio study, and the retail study in general. Second, pharmacy/health care shops had a much higher buyers-to-shoppers ratio than the other two, especially during weekdays. This phenomenon is reasonable, as the time taken to handle each prey is much shorter in pharmacy/health care shops, where many daily necessities are sold. The similarity of the buyers-to-shoppers ratios among different malls and at different days indicates that the prey density for pharmacy/health care shops is quite uniform among the samples. Third, buyers of audio video/electrical appliances tend to shop on weekends, which is also reasonable as it takes longer time to compare the specifications of the appliances. Fourth, malls of NTP and MT generally had higher buyers-to-shoppers ratios than the one in TMTP, which is in line with the household income differences among the three districts. The median household income levels in 2006 of the three districts were HK\$18,596, HK\$18,464 and HK\$14,518 respectively. Further studies on the demographics and prey densities of the three districts may empirically explain these differences. These results are very useful not just for sales analyses of retailers and mall owners, but also for helping them determine rental level.

Table 8 shows the results of the binary probit model of Equation (3). The results were significant at the 10% level statistically for six explanatory variables (including the constant term). The signs of the coefficients were expected and the explanatory power of the model was reasonably high (39 percent).

Table 8 Results of the Probit Model (Equation 3)

Dependent Variable: Buyer

Method: ML - Binary Probit (Quadratic hill climbing)

Included observations: 810

Convergence achieved after 4 iterations

Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Constant	-2.2513	0.2313	-9.7346	0.0000
Staying Time	0.1246	0.0115	10.8787	0.0000
Female	0.0337	0.1040	0.3242	0.7458

Apparels	0.7060	0.1451	4.8660	0.0000
Pharmacy/health care	1.4594	0.1383	10.5526	0.0000
Weekend	0.2510	0.1088	2.3064	0.0211
Teenagers	0.3035	0.1803	1.6832	0.0923
Adults	0.2585	0.1725	1.4988	0.1339
NTP	-0.0186	0.1275	-0.1461	0.8838
MT	-0.0572	0.1293	-0.4428	0.6579
Standard error of regression	0.3885	Akaike info criterion		0.9675
Sum of squared residuals	120.75	Schwarz criterion		1.0255
Log likelihood	-381.83	Hannan-Quinn criterion		0.9898
Restricted log likelihood	-510.5877	Average log likelihood		-0.4714
LR statistic	257.5095	McFadden <i>R</i> -squared		0.2522
Probability (LR statistics)	0.0000			

First, the coefficient of STAYING TIME was positive and significant at the 1% level, implying that shoppers staying longer at the shop were more likely to buy, as staying time increased the encounter rate. Second, female shoppers were more likely to make purchases, but the result is not statistically significant. Third, apparel and pharmacy/health care shops had a higher probability of sale. The probability of sale in pharmacy/health care shops almost doubles that of the apparel shops, keeping other things being equal. This concurs with our expectation, as audio video/electrical appliances are generally more expensive and are not necessities. More shoppers in shops selling audio video/electrical appliances are just gathering information and comparing specifications of the appliances, rather than buying them. Fourth, shopping in weekend had a much higher probability of sale (statistically significant at the 5% level), and this is in line with the theory of prey density during weekends. Fifth, both teenagers and adults were more likely to make purchases, and this agrees with Friedman's (1957) seminal theory of permanent income that the elderly would be more conservative in spending due to the shorter flow of income in the future. However, the probability of buying among adults was not statistically significant. Last, the differences in the probability of sales among the three malls were not statistically significant (i.e., there was no difference among the probability of a

shopper buying products at the three malls). The independence of the probability on location made the above model highly generalized.

CONCLUSIONS

This paper achieves at least two objectives. First, it is the first attempt to directly observe the buyers-to-shoppers ratio in shopping malls without asking shoppers. Second, a novel model based on ecology metaphor is adopted to test the factors affecting the buyers-to-shoppers ratio, which is probably the first empirical attempt ever. The probit model adopted for this study can be used to predict the number of shoppers who buy. Or put it another way, the model can predict the probability of sale of a particular type of shop, given the characteristics of shopper and time. With this model, the prediction results can give developers or mall owners insights in the sale performance of their malls instead of just relying on the shoppers' flow data. Better marketing strategies and rent determination can then be formulated. Admittedly, the probit model in this study is not without limitations. Further studies on other factors, such as the configuration of a mall and the size of shoppers, affecting the buyers-to-shoppers ratio are necessary.

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References

- Arentze, T.A. and Timmermans, H.J.P., 2001. Deriving performance indicators from models of multipurpose shopping behaviour. *Journal of Retailing and Consumer Services* 8 (6), 325-334.
- Bellenger, D.N., Robertson, D.H. and Hirschman, E.C., 1978. Impulse buying varies by products. *Journal of Advertising Research* 18 (6), 15-18.
- Coley, A. and Burgess, B., 2003. Gender differences in cognitive and affective impulse buying. *Journal of Fashion Marketing and Management* 7 (3), 282-295.

- Dennis, C., Marsland, D. and Cockett, T., 2002. Central place practice: shopping centre attractiveness measures, hinterland boundaries and the UK retail hierarchy. *Journal of Retailing and Consumer Services* 9(4), 185-199.
- Dittmar, H., Beattie, J. and Friese, S., 1995. Gender identity and material symbols: objects and decision consideration in impulse purchases. *Journal of Economic Psychology* 16 (3), 491-511.
- Experian Footfall, 2008. Retail Footfall Index, homepage at http://www.footfall.com/footfall_index.asp, retrieved on 15 October 2008.
- Friedman, M., 1957. *A Theory of the Consumption Function*. Princeton University Press, Princeton, New Jersey.
- Grünhagen, M., Grove, S.J. and Gentry, J.W., 2002. The dynamics of store hour changes and consumption behavior. *European Journal of Marketing* 37 (11/12), 1801-1817.
- Holling, C.S., 1959. Some characteristics of simple types of predation and parasitism. *Canadian Entomologist* 91, 385-398.
- Holling, C.S., 1966. The functional response of invertebrate predators to prey density. *Memoirs of the Entomological Society of Canada* 48, 1-86.
- Hui, E.C.M., Yiu, C.Y., Luk, S.T.K., Ip, W.C., Lam, S.S.M. and Ho, H.M., 2005. Retail Positioning Survey Report for Development above / adjacent to KCRC New Railway Projects, The Hong Kong Polytechnic University, 30 September 2005 (Unpublished).
- Luo, X., 2005. How does shopping with others influence impulsive purchasing. *Journal of Consumer Psychology* 15 (4), 288-294.
- Marjanen, H., 1995. Longitudinal study on consumer spatial shopping behaviour with special reference to out-of-town shopping: Experiences from Turku, Finland. *Journal of Retailing and Consumer Services* 2(3), 163-174.
- Nielsen, O.K., 1999. Gyr Falcon predation on ptarmigan: numerical and functional responses. *Journal of Animal Ecology* 68 (5), 1034-1050.

- Path Intelligence, 2008. FootPath Technology, homepage at <http://www.pathintelligence.com/website-prodnserv.htm>, retrieved on 15 October 2008.
- Redpath, S.M. and Thirgood, S.J., 1999. Numerical and functional responses in generalist predators: hen harriers and peregrines on Scottish grouse moors. *Journal of Animal Ecology* 68 (5), 879-892.
- Roslow, S., Li, T. and Nicholls, J.A.F., 2000. Impact of situational variables and demographic attributes in two seasons on purchase behaviour. *European Journal of Marketing* 34 (9/10), 1167-1180.
- Soopramanien, D.G.R. and Roberston, A., 2007. Adoption and usage of online shopping: An empirical analysis of the characteristics of “buyers” “browsers” and “non-internet shoppers”. *Journal of Retailing and Consumer Services* 14, 73–82
- Soriano, V.V., 2005. The time-pressed mall shopper: less time, fewer trips, but more spending per visit. *ICSC Research Review* 12 (2), 4-8.
- Soriano, V.V., 2006. Converting browsers into spenders: mall shoppers spend more time and money. *ICSC Research Review* 13 (2), 9-13.
- Soriano, V.V., 2007. U.S. mall shoppers get efficient: diverging paths between spending and shopping time. *ICSC Research Review* 14 (2), 38-42.
- Suárez, A., del Bosque, I.R., Rodríguez-Poo, J.M. and Moral, I., 2004. Accounting for heterogeneity in shopping centre choice models. *Journal of Retailing and Consumer Services* 11 (2), 119-129.
- Suchman, L. and Jordan, B., 1990. Interactional troubles in face-to-face survey interviews. *Journal of the American Statistical Association* 85 (409), 232-241.
- Thomas, A. and Garland, R., 1996. Susceptibility to Goods on Promotion in Supermarkets. *Journal of Retailing and Consumer Services* 3(4), 233-239.
- UIE, 2002. What Causes Customers to Buy on Impulse?, E-commerce White Paper, User Interface Engineering, available at <http://www.uie.com/publications/whitepapers/ImpulseBuying.pdf>
- Underhill, P., 1999. *Why We Buy: The Science of Shopping*, Simon and Schuster, New York.

- Verplanken, B. and Herabadi, A., 2001. Individual differences in impulse buying tendency: feeling and no thinking. *European Journal of Personality* 15 (1), 71-83.
- Wanink, J. and Zwarts, L., 1985. Does an optimally foraging oystercatcher obey the functional response?. *Oecologia* 67 (1), 98-106.
- Wee, L.K.N. and Tong, K.W., 2005. *The 4Rs of Asian Shopping Centre Management*, Marshall Cavendish, Singapore.
- Wells, W.D. and Dames, J., 1962. Hidden errors in survey data. *Journal of Market* 26 (4), 50-54.
- Wong, G.K.M. and Yu, L., 2003. Consumers' perception of store image of joint venture shopping centres: first-tier versus second-tier cities in China. *Journal of Retailing and Consumer Services* 10(2), 61-70.
- Wood, M., 1998. Socio-economic status, delay of gratification, and impulse buying. *Journal of Economic Psychology* 19 (3), 295-320.
- Yiu, C.Y. and Yau, Y., 2006. An ecological framework for the strategic positioning of a shopping mall. *Journal of Retail & Leisure Property* 5 (4), 270-280.