A necessary evil or an income driver? A preliminary study of public space in retail facilities in Hong Kong

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Abstract

While a great deal of research attention has been placed on the linkages between tenant mix and rental income in a retail facility, the facility's physical attributes have never been seriously studied. In fact, whether a retail facility, particularly a planned shopping centre, succeeds or perishes, depends very much on the physical design of the facility. To straddle the current research gap, this study focuses on the provision of public space, including atria, passageways and other circulation areas for the patrons, in the retail facilities in Hong Kong. Employing the data of 118 planned shopping centres, the authors empirically study the relationship between the overall rental levels of the centres and the percentages of floor space in the centres designated as public space. The results of the regression analysis show that the annualised rental incomes of the centres increase at a decreasing rate with the ratios of public floor space to retail floor space in the centres. There is an optimal upper limit for the ratio of 1.32. The findings of this study have far-reaching implications in the strategic planning and management of planned retail facilities.

Keywords:

public space, retail facilities, rent, regression analysis, Hong Kong

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INTRODUCTION

Literature on retail facilities is plentiful and one of the main streams in this field of study is perhaps the performance measurement of retail facilities. There are a number of measures of retail facility performance such as footfall, turnover and rental income. In particular, rental incomes of retail facilities have long been the central focus among academia. As the direct factor to the sustainability of a retail facility, studies investigating the determinants of retail rentals abound. While a great deal of research attention has been placed on the linkages between tenant mix, lease term and rental income in a retail facility, the facility's physical attributes have never been seriously studied. In fact, the success of a retail facility depends on a number of factors such as locality, positioning, tenant mix, layout and design, and promotional activities.¹ There is no reason as to why empirical studies on retail rental focus only on location and 'soft' factors like tenant mix and lease term. As a good practice, the configuration of a retail facility should seek to maximise locales, through strategic space planning, and the designer or operator should attempt to balance spatial potentials among different uses for the maximal overall rental profit. Yet, retail facility configurations have seemingly been largely ignored in the literature of retail facilities.

To straddle the current research gap, this paper sets out to study the provision of public space, including atria, passageways and other circulation areas for the patrons, in the retail facilities in Hong Kong. This study is stimulated by the dual nature of public space in a retail facility. On the one hand, public space, mainly serving circulation purpose, is regarded as a necessary evil in the design of a retail facility. The floor areas so dedicated are not income generating. On the other hand, public space provides venues for promotional activities, helps to enhance the amiability of the shopping environment and facilitates the dissemination of retail information. In view of these opposite forces, it is valuable to investigate the effects of public space provision on the overall rental level of a retail facility.

By means of regression analysis, the rental levels of 118 planned shopping centres in Hong Kong are studied. We find a quadratic relationship between the annualised net rentals of the shopping centres and the ratios of floor area dedicated to public space to floor area dedicated to retail space in the centres. Simply speaking, the rental increases with space ratio at a decreasing rate, keeping other things constant. The findings in this study have far-reaching practical implications. The operators of retail facilities cannot deliberately manipulate the public space because an optimal area of public space, in relation with the area of retail space, should be maintained.

PUBLIC SPACE IN A RETAIL FACILITY

Public space is one of the indispensable elements in a retail facility, no matter if it is a mall, planned shopping centre or department store. Generally speaking, public space in a retail facility is the non-business space allocated for the patron's circulation, waiting and window-shopping. Common examples of public space are atria, passageways and resting space. Generally speaking, public space in a retail facility plays

roles in functional composition and environmental profusion in the facility.² Besides, it offers space for promotional events and displays and social amenity. The relevance of public space characteristics to consumer behaviours and perceptions has also been well documented.^{3,4}

Public space for circulation

The circulation of patrons is very important to businesses run in a retail facility. Well-planned circulation routes, in companion with well-thought-out layouts, can avoid dead-ends and increase the footfalls in different shops in the retail facility. Given that the major function of public space in a retail facility is to serve as a means of patron circulation or communication, its provision is considered essential in terms of functionality. To go into further details, pedestrian level of service⁵ enjoyed by patrons has a strong link with the characteristics of the public space. If too little space is allocated for public passage, overcrowding may result. Crowding was considered as an essential component of the social setting affecting consumer behaviour in a retail facility.⁶ Generally speaking, a high level of crowdedness discredits shoppers' satisfaction.⁷ Empirical evidence of the effects of perceived crowding on shopping attitude and behaviour in a shopping centre has been well documented.^{8,9} On the whole, a perception of overcrowding does hinder the intent of purchase by patrons in a retail facility. Apart from avoiding the over-crowding effect, seating facilities in the common area allow shoppers to take rest and refresh after exciting shopping activities and therefore avoid fatigue. This, on the one hand, can reignite the shopping incentives of shoppers and, on the other hand, maintain big enough clusters staying at the retail facility.

Public space for promotion

Primarily, shopping is an economic activity for the exchange of commodities. Therefore, it is indisputable to say that shopping links the world of production and marketing to that of ownership and possession.¹⁰ Yet, apart from actual economic exchange of money and commodities, shopping can be regarded as leisure and opportunity for social interaction.¹¹ Therefore, other than selling space, retail facilities also provide space for social gatherings and related activities.^{12,13} These activities often take place in the public spaces, aside from restaurants and entertainment accommodations in the retail facilities. In addition, public space such as atria and wide walkways can be used for marketing and promotional activities like exhibitions and art performances. These events are of increasing importance to the success of a retail facility because they help to differentiate the facility from the others through image building, and ultimately stimulate sales in the facility.^{14,15}

Furthermore, spacious circular space can facilitate the dissemination of retail information. For example, a wider walkway allows patrons to window-shop more comfortably. Also, given the same length, a wider corridor gives a deeper vision so that more shops are visible in the corridor. With a large common space, more directional signage indicating the shopper's location and promotional offers can be placed. More prominent information counters can be set up to handle patrons' enquiries. This helps the patrons in way-finding and spotting the desired shops.

Table 1: Definitions of the variables in the explanatory model

Variable	Definition
RENT	Annualised net rental level per unit area of the shopping centre as at 31st July 2005 (measured in HK\$ per m ²).
AGE	Age of the shopping centre (measured in years).
AREA	Total internal floor area of the shopping centre (measured in m ²).
SHOP	Number of shops in the shopping centre.
OCC	Occupancy rate of the shopping centre (measured in percentage).
PTRR	Ratio of floor area dedicated to public space to floor area dedicated to retail space in the shopping centre.
DC	Dummy variable, which equals one if the shopping centre is located in a district centre, and zero otherwise.
EC	Dummy variable, which equals one if the shopping centre is located in an estate centre, and zero otherwise.
HKI	Dummy variable, which equals one if the shopping centre is located on the Hong Kong Island, and zero otherwise.
KLC	Dummy variable, which equals one if the shopping centre is located in Kowloon Central, and zero otherwise.
KLE	Dummy variable, which equals one if the shopping centre is located in Kowloon East, and zero otherwise.
KLW	Dummy variable, which equals one if the shopping centre is located in Kowloon West, and zero otherwise.
KWC	Dummy variable, which equals one if the shopping centre is located in Kwai Chung, and zero otherwise.
MOS	Dummy variable, which equals one if the shopping centre is located in Ma On Shan, and zero otherwise.
TKO	Dummy variable, which equals one if the shopping centre is located in Tseung Kwan O, and zero otherwise.
TMN	Dummy variable, which equals one if the shopping centre is located in Tuen Mun, and zero otherwise.
TPO	Dummy variable, which equals one if the shopping centre is located in Tai Po, and zero otherwise.

Public space as a nonincome-generating evil

In view of the above arguments, there is a general need for the provision of public space in a retail facility. In spite of this need, public space is generally regarded as a necessary evil by many operators of retail facilities. The rationale behind it is rather straightforward. In cases of estate centres, which seldom need promotional campaigns to attract shoppers, the operators of the centres attempt to squeeze the floor areas allocated as public space. It may be more profitable for the centre operators to have as much floor space as possible leased to the tenants simply because public space is not incoming generating. Needless to say, the operators cannot unlimitedly downsize the public space. At least, a minimum width of passageway has to be maintained in order to comply with the fire safety regulations.

METHODOLOGY OF THE STUDY

To reiterate, the aim of this study is to explore the changes of the overall rental levels of retail facilities in response to the variations in public space provision. Since there are a number of factors, such as the facility's age, type, scale and location, which may pose effects of retail rentals, we need to control all these factors in order to have a *ceteris paribus* study of the relationships between rental and public space. For that reason, we employ a multiple regression technique in this study.

Explanatory model of retail rental

Generally speaking, the overall rental level of a retail facility can be expressed as a function of a number of factors such as location, physical characteristics (eg, age, floor area and number of shops) and type of facility. On this premise, we develop an explanatory mode of retail rentals for planned shopping centres in Hong Kong. Generically, the function of retail rental is expressed as

$$RENT = f(AGE, AREA, SHOP, OCC, PTRR, DC, EC, HKI, KLC, KLE, KLW, KWC, MOS, TKO, TMN, TPO) \quad (1)$$

The definitions of the variables in equation (1) are shown in Table 1. In this explanatory model, our focus is placed on the variable *PTRR*. From the arguments laid down above, this variable poses both positive and negative forces on the overall rental level of a shopping centre. In this regard, it is hypothesised in this study that the annualised unit rental of a planned shopping centre increases with its public-to-retail space ratio at a decreasing rate. In other words, the hypothesis should say *there is an optimal maximum ratio of pubic-to-retail space in the shopping centres under investigation*. To practically test the hypothesis, the generic model in equation (1) is developed into

$$\begin{aligned} LN(RENT) = & \alpha_0 + \alpha_1 AGE + \alpha_2 AREA + \alpha_3 SHOP \\ & + \alpha_4 OCC + \alpha_5 PTRR + \alpha_6 PTRR^2 + \alpha_7 DC \\ & + \alpha_8 EC + \beta_1 HKI + \beta_2 KLC + \beta_3 KLE \\ & + \beta_4 KLW + \beta_5 KWC + \beta_6 MOS + \beta_7 TKO \\ & + \beta_8 TMN + \beta_9 TPO + \varepsilon \end{aligned} \quad (2)$$

where α_i (for $i=0, 1, 2, \dots, 8$) and β_j (for $j=1, 2, 3, \dots, 9$) are coefficients to be estimated and ε is the stochastic term. A semi-log specification is employed in equation (2) for two reasons. First, the optimal functional form of the model is not known *a priori*, so it is more convenient to take a simple functional form as a start. Secondly, taking the natural logarithm of the dependent variable can eliminate the potential problem of heteroscedasticity. We expect the estimated coefficients α_5 and α_6 to be positive and negative, respectively. Other variables such as building age, internal floor area, number of shops and occupancy rate are incorporated in the model to control their probable effects on retail rental.¹⁶ Two sets of dummy variables are also included to have variations in the type and locality of the shopping centre. For the shopping centre type and location dummies, local centres and location in Yuen Long are the base cases, respectively.

Table 2: Summary statistics of the data

Characteristics	Maximum	Mean	Minimum	Standard deviation
Annualised net rental level (HK\$ per m ²)	6,976.80	2,957.04	645.40	1,018.76
Age of centre (years)	29.00	13.84	2.00	7.81
Total internal floor area (m ²)	37,161.10	7,914.03	1,567.60	5,065.35
Number of shops	323.00	75.06	2.00	54.61
Occupancy rate (%)	100.00	91.21	51.00	9.30
Area ratio of public space to retail space	160.07	65.71	28.30	19.27

Descriptions of data

Rental data of retail properties, particularly planned shopping centres, are often treated as trade secrets in the property markets. As a result, collection of retail rental data is always a thorny task in Hong Kong. Luckily, the initial public offer of the Link REIT in 2005 provides a valuable source of data for our analysis. The Link REIT is composed of a portfolio of properties, including car parks and retail facilities, acquired from the Hong Kong Housing Authority, which is a government body responsible for determining and implementing public housing programmes in Hong Kong. As of the end of March 2007, the assets in the Link REIT's portfolio included 180 properties, of which 149 were integrated retail and car park facilities, two were stand-alone retail facilities and 29 were stand-alone car park facilities.¹⁷ These properties offer a total internal floor area of approximately one million square metres of retail space, estimated for 9.6 per cent of Hong Kong's total private retail space.¹⁸

The Link REIT was first launched in the Hong Kong Stock Exchange in November 2005 and the prospectus contained detailed information regarding retail facilities in the portfolio.¹⁹ The set of information includes annualised retail incomes, ages, total floor areas, shop counts and occupancy rates of the retail facilities.²⁰ As for the areas of the floor space designated as public space and retail space, the data can be obtained from the building plans of the retail facilities. In total, 36 district centres, 51 local centres and 31 estate centres in the portfolio are investigated. Table 2 presents the descriptions of the data for the regression analysis. Figures 1 and 2 are photos of two shopping centres under investigation.

ANALYSIS RESULTS AND DISCUSSIONS

Results of the regression analysis

The results of the regression analysis are summarised in Table 3. The adjusted R^2 for the regression is 0.642, which means that about 64.2 per cent of variation in the dependent variable can be explained by the variations in the explanatory variables in equation (2). Building age is found to have a negative and statistically significant (at the 1 per cent level) correlation with the overall rental level. The reason behind is straightforward because the retail facilities may deteriorate as they age.

Figure 1: The interior of Lung Cheung Shopping Centre [photo taken by Yau]

Figure 2: The interior of Tsz Wan Shan Shopping Centre [photo taken by Yau]

Table 3: Results of the regression analysis

Variable	Coefficient	Standard error	t-Statistic	
Constant	7.759	0.274	28.317	***
AGE	-0.023	0.003	-9.121	***
AREA	-1.28×10^{-5}	-6.15×10^{-6}	-2.087	**
SHOP	0.001	0.001	2.615	**
OCC	-0.003	0.002	-1.650	
PTRR	0.016	0.004	4.281	***
PTRR ²	-5.92×10^{-5}	0.001	-3.281	***
DC	0.087	0.057	1.555	
EC	-0.182	0.051	-3.581	***
HKI	-0.151	0.090	-1.681	
KLC	0.031	0.082	0.385	
KLE	0.014	0.086	0.165	
KLW	-0.112	0.087	-1.291	
KWC	-0.197	0.090	-2.203	**
MOS	0.055	0.080	0.700	
TKO	0.102	0.116	0.888	
TMN	-0.012	0.084	-0.144	
TPO	0.013	0.086	0.151	
R ²	0.697	F-statistic		12.829***
Adjusted R ²	0.642	Dependent variable		LN (RENT)
Number of observations	118	Number of included observations		113

Notes: (1)***Significant at the 1 per cent level; **significant at the 5 per cent level; and*significant at the 10 per cent level

(2) Outliers (with absolute value of residual larger than 0.5) are excluded from the estimation

The physical (and also functional) depreciation should be reflected in the decrease in the rental level.

On the other hand, it is interesting to see opposite results representing the effects of the shopping centre's internal floor area and the number of shops present on retail rental. The regression results indicate a negative and statistically significant (at the 1 per cent level) correlation between the shopping centre's internal floor area and rental level but a positive and statistically significant (at the 5 per cent level) correlation between the number of shops and the retail rental. These findings suggest that if the total internal floor area of a shopping centre is kept constant, more shops present in the centre attract higher rental incomes for the mall operators. This confirms our common belief that more shops in a shopping centre means a greater variety of products and brands, which is favourable for comparison shopping. Conversely, once the number of shops is fixed, the overall rental is higher for a smaller shopping centre. This means that a smaller average shop size gives a higher rental to a shopping centre. Collectively speaking, retail tenants (and also shoppers) may prefer greater variety in the tenant mix rather than larger average shop size. Besides, it is also fascinating to see that occupancy rate has no significant effect on the rental level.

Our focus then turns to the coefficients α_5 and α_6 . Coefficient α_5 is estimated to be positive and statistically significant (at the 1 per cent level) while coefficient α_6 is negative and statistically significant (at the 1 per cent level). These findings imply that the overall rental levels of the shopping centres under investigation increase with the public-to-retail

Figure 3: The relationship between annualised net rental and public-to-retail-space ratio

space ratio at a decreasing rate. In other words, the hypothesis that there exists an optimal maximum ratio of public-to-retail space in a shopping centre is not rejected by the empirical findings in this rental study.

Discussions of the findings and implications

From the results of regression analysis, the annualised net rental of a shopping centre increases with the public-to-retail space ratio up to a maximum point, after which the relationship reverses. As is graphically illustrated in Figure 3, the maximum rental is reached when the ratio is 1.32 (or 132 per cent). One of the most far-reaching implications of the findings is that the developer or designer of a planned retail facility cannot deliberately overload the retail facility with public space. With a view to the maximisation of overall rental income achievable, the usable floor space within the retail facility should be assigned for public space subject to an optimal maximum limit. The same also applies to the strategic management of the retail facility, subsequent to completion of the facility. The operator cannot freely manipulate public-to-retail space ratio in order to boost the rental level in a retail facility.

Perhaps, the diminishing marginal benefit of the public space in a planned retail facility can be explained by the eco-mall metaphor developed by Yiu and Yau.²¹ Applying their 'eco-mallology', public space in a shopping centre can be taken as a kind of organism preying on the patrons in the mall-ecology. On the one hand, mutualism is the best description of the relationship between public space and most other retailers in a shopping centre. The public space attracts patrons to the shopping centre and the retailers in the centre feed on these patrons. Therefore, public space is a magnet for certain retailers, which is favourable to the leasing of retail space of the shopping centre. On the other hand, too much space designated as public space can result in a muddle. The shopping centre operator cannot take excessive public

space in their diet; otherwise, his or her health (analogous to financial performance, ie, rental income) will be unduly affected. In a word, there should be an optimal mix of public space and retail space in a shopping centre.

CONCLUDING REMARKS

Although literature on the determination of rents in retail facilities abounds, focus has been placed on the effects of tenant mixes and lease terms. Yet, the configurations of these facilities have never been seriously investigated in previous rental studies. In fact, the performance of a retail facility, in terms of patronage level, sales volume and rental income, very much depends on the design of the facility. In particular, the provision of public space plays a critical role in the success of the facility. In this light, this paper provides a preliminary study to empirically study the effect of public space on the overall rental income of a retail facility. Using the data of 118 planned shopping centres, we found that the annualised rental incomes of the centres decreased at a decreasing rate with the percentage of floor space in the centres designated as public space.

The findings presented in this paper have far-reaching practical implications. While designing their retail facilities, particularly planned shopping centres, developers should recognise the importance of public space in a retail facility. Although public space is considered as an inevitable evil as it seldom generates income directly for the mall operators, it facilitates promotional activities and helps create a 'good' atmosphere to stimulate sales in the retail facility. Therefore, a balance should be struck between the two forces. As implied by the analysis results, the annualised net rental of a shopping centre reaches its maximum when the ratio of floor area dedicated to public space to floor area dedicated to retail space in the centre is 1.32, keeping other things constant.

The study presented in this paper, however, is not without limitation. The retail facilities investigated in this study were divested from the Hong Kong Housing Authority. In other words, these facilities were designed and developed by the department under the same institutional constraints. We suggest that retail facilities in the private sector should be studied, although developers and operators hesitate to release rental information regarding their retail facilities. In addition, apart from rental income, the effects of public space on the conversion rate or sales volume can also be further explored.

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References and Notes

1. Wee, L.K.N. & Tong, K.W. (2005). *The 4Rs of Asian Shopping Centre Management*, Marshall Cavendish, Singapore.
2. Fei, T. & Shi, Y. (2006). Manifestation morphology of the circulation space in shopping centres. *Low Temperature Architecture Technology*. 2, 23–24.

3. Hackett, P.M.W., Foxwall, G.R. & Van Raaij, W.F. (1993). Consumers in retail environment, in Garling, T. and Golledge, R.G. (eds.), *Behavior and Environment: Psychological and Geographic Approaches*, Elsevier Science, Oxford, pp. 378–399.
4. Oppewal, H. & Timmermans, H. (1999). Modeling consumer perception of public space in shopping centers. *Environment and Behavior*. 31, 45–65.
5. Pedestrian level of service (LOS) is a concept developed by John J. Fruin in 1970 for the transportation experts to benchmark the service quality of the circulation facilities or devices, such as walkways and tunnels. Using the LOS concept, experts can typify the performance of the facilities in terms of speed, travel time, maneuvering flexibility, and comfort and convenience.
6. Harrell, G., Hutt, M. & Anderson, J. (1980). Path analysis of buyer behavior under conditions of crowding. *Journal of Marketing Research*. 17, 45–51.
7. Saegert, S. (1973). Crowding: Cognitive overload and behavioral constraint, in Preiser, W. (ed.), *Environmental Design Research: Volume 2*, Hutchinson&Ross, Stroudsburg, pp. 254–261.
8. Eroglu, S.A., Machleit, K. & Barr, T.F. (2005). Perceived retail crowding and shopping satisfaction — the role of shopping values. *Journal of Business Research*. 58, 1146–1153.
9. Yildirim, K. & Akalin-Baskaya, A. (2007). Perceived crowding in a café/restaurant with different seating densities. *Building and Environment*. 42, 3410–3417.
10. Lunt, P.K. & Livingstone, S.M. (1992). *Mass Consumption and Personal Identity: Everyday Economic Experience*, Open University Press, Buckingham.
11. Newby, P. (1993). Shopping as leisure, in Bromley, R.D.F. and Thomas, C.J. (eds.), *Retail Change: Contemporary Issues*, University College London Press, London, pp. 208–228.
12. Lewis, G.H. (1990). Community through exclusion and illusion: The creation of social worlds in an American shopping mall. *The Journal of Popular Culture*. 24, 121–136.
13. Feinberg, R.A., Sheffler, B., Meoli, J. & Rummel, A. (1989). There's something social happening at the mall. *Journal of Business and Psychology*. 4, 49–63.
14. LeHew, M.L.A. & Fairhurst, A.E. (2000). US shopping mall attributes — an exploratory investigation of their relationship to retail productivity. *International Journal of Retail & Distribution Management*. 28, 261–279.
15. Kirkup, M.H. & Rafiq, M. (1999). Marketing shopping centres: Challenges in the UK context. *Journal of Marketing Practice: Applied Marketing Science*. 5, 119–133.
16. Certainly tenant mix should be one of the major determinants of the overall rental income of a planned shopping centre, as suggested by the literature. However, since there has been so far no well-established indicator of tenant mix in a shopping centre. In other words, without a widely-acceptable benchmarking tool, any effort to study the effect of tenant mix on retail rental level is in vain.
17. The Link Real Estate Investment Trust (2007). *Annual Report 2007*, The Link Real Estate Investment Trust, Hong Kong.
18. Rating and Valuation Department (2007). *Hong Kong Property Review 2007*, Rating and Valuation Department, Hong Kong.
19. The launch of the Link REIT has grabbed the attention of investors throughout the world because it was the world's biggest REIT initial public offering ever and thus, the world's biggest publicly traded REIT on record. Currently, the Link REIT has the highest capital value, which outweighs the summation of all the others launched in the Hong Kong Stock Exchange.
20. The Link Real Estate Investment Trust (2005). *Global Offering — The Link Real Estate Investment Trust*, The Link Real Estate Investment Trust, Hong Kong.
21. Yiu, C.Y. & Yau, Y. (2006). An economic framework for the strategic positioning of a shopping mall. *Journal of Retail and Leisure Property*. 5, 270–280.