



Modes of condominium management: a principal-agent perspective

Modes of
condominium
management

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Abstract

Purpose – Condominium is a dominant form of home ownership in metropolitan areas within Asia. Yet managing and up-keeping such homes poses a challenge to most condominium owners, with larger condominiums equipped with sophisticated facilities becoming increasingly popular. This paper attempts to develop a model, based on a principal-agent theoretical perspective, which provides a conceptually vigorous representation of condominium management modes: owner-management; direct labour and third party agent-managed modes.

Design/methodology/approach – Parallel surveys were conducted in Taipei and Hong Kong to offer empirical evidence of the model.

Findings – From the logistic analysis which this paper conducts, it is argued that not only does the choice of management mode reflect the quest for better management service: the mediation effect of agency costs between the lay members of home owner organisations and their leadership, as well as issues between the owners and the professional management agents, is also significant.

Originality/value – Findings in this paper would help to enhance understanding of the practices used in condominium management and the factors that influence the choice of management mode.

Keywords Buildings, Property management, Hong Kong, Taiwan

Paper type Research paper

Introduction

Large cities are increasingly built up in Asia where scarcity of land created by rapid urbanisation compels residential development to adopt a high-rise and high-density form. The escalating popularity of owner occupation in the last couple of decades also makes condominium the prevalent and popular form of residential development. Yet many buildings which are only decades old exhibit dilapidation and obsolescence. Lack of proper management is often one of the major causes of such rapid decay. In the area of condominium management, most empirical research has focused primarily on the impact of a dichotomised management mode, of owners' (residents') management as opposed to



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professional (third party) management agents (Sirmans *et al.*, 1999; Rosenberg and Corgel, 1990; Chen, 1999; He, 1992; Zee, 1995; Kuo, 1997). However, as argued by Yip and Forrest (2002), intrinsic contradictions embedded in the mix of individual and collective ownership of condominium units and its discouraging effect on participation of owners/residents in management make the issue of condominium management more complex. Hence, to understand the mechanism behind the choice of condominium management approach would enhance our comprehension of the complex interaction involved in the final choice of management mode from a conceptual point of view.

We would like to achieve two objectives in this paper. The first is to develop a typology of condominium management modes beyond the owner(lay)-professional agent phenomenon which is an over-simplification of what is being practiced in reality. The principal-agent theoretical perspective is employed as the analytical tool. The second objective is to explore empirically, with data from two parallel surveys in Taipei and Hong Kong, factors that are significant to the choice of condominium management modes. The following part of this paper will begin with the development of a typology of management modes, followed by a description of the research methods. The next section of the paper will give an account of the empirical findings from the logistic regression models and the next section, a discussion on the important observations from the research.

Agency theory and modes of condominium management

Whenever one individual depends on the action of another, an agency relationship arises (Pratt and Zeckhauser, 1991, p. 2).

Necessitated by the need to act collectively, the mechanics of condominium management is thus seen analogous to a principal-agent (agency) relationship. An agency relationship is defined as:

[...] a contract under which one or more persons (the principals) engage another person (the agent) to perform some services on their behalf which involves delegating some decision making authority to the agent (Jensen and Meckling, 1976, p. 308).

It incurs agency cost in three aspects:

- (1) monitoring (to ensure that the interests of the principal(s) are upheld);
- (2) bonding (to ensure that interests of the principal(s) are not harmed or for the agent to acquire the necessary credentials as proof of his/her capability for the job); and
- (3) residual loss (dead weight loss resulting from the impossibility to reconcile the divergence of interests) (Jensen and Meckling, 1976).

In a competitive environment, organisations that survive better are those that can minimise their agency cost (Fama and Jensen, 1983). It is not surprising to find "Third Party" property management agents (see section on "Typology"), with the apparent agency problems associated with condominium management, become the focus of many research (for instance, Chinloy and Maribojoc, 1998; Sirmans *et al.*, 1999; Rosenberg and Corgel, 1990). Yet, most such research are conducted on rental properties with a sole (or dominating) owner and compensation for the service of the "Third Party" management agents is pegged with the rental income from the properties. This is not the case with

residential properties with large proportion of resident owners in which the management agents are not rewarded with reference to rental income. At the same time, the “dichotomised” mode of management as mentioned are but two among the variety of management arrangements in practice. Wekerle *et al.* (1980) introduces a third mode of management, partnership management, in which residents participate heavily in making decision whilst implementation is delegated to specialised contractors. This mode is, in fact, a valuable contribution to the study of condominium management. Yet, the above classification *per se* cannot precisely reflect the conceptual rigor in the depiction of the various management modes.

To improve on the conceptual clarity and representativeness of the classification, our new typology of condominium management modes is constructed along an agency theoretical perspective as well as the dual dimensional functions of an organisation laid down by Fama and Jenson (1983): the decision management (execution of ratified decisions) and decision control (ratifying the decided initiatives and monitoring the implementation). In a principal-agent theoretical framework, the residual claimants of any given business are the shareholders, the decision control agents its directors (of the board) and the decision management agents, its ordinary employees. Two tiers of agency relationship exist in a corporation: the one between the decision control and the decision management agents and the other between the residual claimants and the decision control agents. Along the functional continuum of decision control (decision making) and decision management (implementation), four ideal types of management modes can be isolated (Table I).

The first mode is “owner managed” in which both the decision control and decision management functions are assumed by the owners. In practice, owners would perform the majority of the management tasks and, in turn, monitor their peers. The second type is the “direct labour” management mode in which on-site service staff of the agents (or their subcontractors in respect) are employed to perform the decision management functions whilst owners would act as decision control agents, monitor the performance of the on-site staff and ratify, on a regular basis, decisions for implementation. The third mode is “third party managed” in which both decision control and decision management are borne by independent agents who would hire their own staff and monitor their performance. The owners would only take up the shareholder’s role in drawing up the optimal contract for the management agent and choosing the management company from bidders of contract. The fourth type is tentatively labelled “delegated control” in which the owners would perform the routine management tasks and delegated the decision control functions to independent agents. This mode is regarded as impractical in reality. Therefore, we would only look at the first three management modes (owner managed, direct labour and third party managed) as plausible modes of condominium management.

Decision management (decision implementation)	Decision control (decision making)	
	Owners	Independent agents
Owners	Owner managed	Delegated control ^a
Independent agents	Direct labour	Third party managed

Note: ^a Not expected to be found in real practices

Table I.
Typology of mode of
condominium
management

Data and methodology

“Owners’ corporation” is the legal entity for the management of condominiums in Hong Kong with its structure and operation mirroring that of an incorporated business undertaking. Office bearers of these corporations (who form the management committees of the corporation) are elected in the annual general meetings of residents, and voting rights are divided among shares held by owners. Power of these owners’ corporations is circumscribed by:

- relevant ordinances (e.g. the Building Ordinance, Building Management Ordinance, planning restrictions, etc.);
- land lease restrictions (almost all land in Hong Kong are on lease-hold); and
- the Deed of Mutual Covenant (i.e. contractual relationships binding on the behaviour of individual owners with regards to the use and enjoyment of the property).

Likewise, condominium management in Taiwan is the responsibility of the “management committee” of the respective condominium development. Governed by the Condominium Management Ordinance and related by-laws, the management committee is appointed by, and accountable to, the general meetings of the respective condominium owners. Yet, condominium projects (i.e. cluster of condominium blocks) that have formed their management committees are not the majority in both cities.

Data in this paper were collected from postal questionnaire surveys conducted based on a common questionnaire design (with only necessary local adaptation) and on the same sampling parameters in October 2001 and April 2002 in Taiwan and Hong Kong respectively. Questionnaires were sent to all chairpersons of registered condominium owners’ associations. A total of 6,640 owners’ corporations in Hong Kong and 1937 condominium management committees in Taipei were covered. Respectively, 676 and 267 completed questionnaires were returned with corresponding response rates of 10 per cent and 13 per cent. Discounting returns which are from non residential projects[1], there were respectively 592 and 251 valid returns from Hong Kong and Taipei for further analysis.

While two thirds of the returned questionnaires were from condominiums of six- to 12-storeys high in Taipei (64 per cent), close to half of the respondents in Hong Kong (43 per cent) were from high-rise residential projects of more than 13-storeys. Age of buildings in which the respondents dwelt was also much younger in Taipei than those in Hong Kong. Respondents in Hong Kong were from condominium towards the lower end of the house price-range, whereas, respondents in Taipei were owner-occupiers of up-market properties. Only a low proportion of condominium owners in Hong Kong (17 per cent) and Taipei (10 per cent) chose to take care of their buildings with their own effort. For condominium owners in Taipei who did not choose the “owner managed” mode, they were nearly equally divided between opting for direct labour and third party management modes. On the contrary, most of the counterparts in Hong Kong chose to hire a third party management agent (Table II).

Respondents to the surveys in the two cities offer a comprehensive source of empirical data to examine the hypotheses in this paper. On one hand, the two cities operate on similar systems of condo-governance as well as the structure of market economy and cultural background. This generates an agreeing environment of condo-governance which allows further comparison with practices in the West. On the

	Taipei (%)	Hong Kong (%)
<i>Types of condominium development</i>		
Below 5-storey	5	10
6- to 12-storey	64	29
13-storey or more	20	43
Project with cluster of condominium buildings	8	16
Others	3	2
<i>Age of condominium</i>		
Under 6 years old	50	4
6 to 12 years old	22	12
12 + to 20 years old	18	22
Over 20 years old	11	62
Average density of condominium development (number of households per building-block)	63	260
Average management fee (US\$ per meter)	0.5	1.5
Owner managed mode	10	16
Direct labour mode	44	55
Third party agent	46	29
Total <i>n</i>	251	592

Table II.
General profile of
respondents to postal
surveys in Taipei and
Hong Kong

Sources: Condominium surveys in Hong Kong and Taipei

other hand, the two cities also play complementary roles in terms of our investigation on the more refined variables in condo-governance. Newer buildings in the Taipei sample complement with much older housing stock in Hong Kong to provide a wider spectrum of sample data on the “Age” variable in the study, which is conjectured as an important independent variable in the determination of the choice of management mode. Hong Kong also has a high proportion of third party-managed condominiums, whereas, the Taipei scenario enriches our research data with a higher proportion of condominium owners employing the direct labour mode.

Choice of management mode: descriptive statistics

Condominiums with difference modes of management show shape difference in many aspects. For instance, owner management was favoured by owners in smaller condominium developments with 24 households per building block in Taipei and 62 in Hong Kong. Whereas, the third party management mode was favoured by owners of buildings with average density from 77 and 415 households in Taipei and Hong Kong respectively. It is thus not surprising to find that low-rise condominium are more likely to be associated with owner/resident managed mode. Condominium below five-storeys were more than twice more likely to be owner managed both in Hong Kong and Taipei. Conversely, condominium projects which were formed by cluster of buildings were very unlikely owner managed, none in Taipei and merely 2 per cent in Hong Kong. Instead, these owners would more likely choose third party management mode (75 per cent in Taipei and 81 per cent in Hong Kong) (Table III). Newer condominium developments were also more likely to be third party managed. Condominium buildings built within the last six years are more likely to be managed by third part

	Condominium management mode (%)					
	Owner managed		Direct labour		Third party	
	Taipei	Hong Kong	Taipei	Hong Kong	Taipei	Hong Kong
<i>Density of condominium development</i>						
Below 5-storeys	25	33	58	34	17	33
6- to 12-storeys	14	27	52	36	34	38
13-storey or more	0	13	27	29	74	59
<i>Project with cluster of condominium buildings</i>						
Others	0	2	25	16	75	81
<i>Age of condominium</i>						
Under 6 years old	10	0	34	8	57	92
6 to 12 years old	11	6	43	6	45	89
12 + to 20 years old	12	11	65	18	23	70
Over 20 years old	7	23	59	39	33	38
<i>Ratio of communal floor area of the condominium property</i>						
Below 20 per cent	12	17	53	31	36	52
20 + to 30 per cent	10	8	31	25	59	67
Over 30 per cent	0	24	47	32	53	44

Table III.
Choice of management mode by condominium density, age and ratio of communal area

Note: Percentages sum to 100 per cent in each row

Sources: Postal questionnaire surveys in Hong Kong and Taipei

agents, above half in Taipei (57 per cent) and over three quarters in Hong Kong (76 per cent). The oldest group of condominium buildings (aged above 20 years) in Hong Kong are variably owner/resident managed or by the direct labour mode (Table III).

In Taipei, condominium units at the lower end of the market tend to be owner-managed or by the direct labour mode. Among condominium units of value less than US\$1,730 per sq.m (NT\$200,000 per ping)[2] there were 13 per cent and 60 per cent of owners who opted for owner managed and direct labour mode respectively. Whereas, condominium unit owners at the upper market tend to employ a third party management agent and none of the condominium unit owners at the uppermost price range valuing over US\$3550 per sq.m (NT\$400,000 per ping) chooses the owner managed mode (Table IV).

Although similar pattern is observed in Hong Kong, the difference in the choice of management mode by characteristics of property is less pronounced than that in Taipei. There is minor variation in the choice of management mode among condominium owners in the lowest house price range. Over half (53 per cent) of the owners of condominium unit valuing below US\$2,760 per sq.m chose third party management mode and nearly two thirds (60 per cent) of the most expensive condominium units (above US\$2,760 per sq.m arrived at the same choice (Table IV).

Hong Kong property commands a much higher average level of management charges, S\$1.4 per sq.m per month, which was double the level in Taipei (US\$0.7 per sq.m). Owner-managed condominiums command the lowest agency cost and also the lowest level of management charges, US\$0.35 per sq.m in Taipei and US\$1.2 in Hong Kong. The direct labour mode, pertinent to a higher agency cost, not surprisingly

	Condominium management mode					
	Owner managed		Direct labour		Third party	
	Taipei	Hong Kong	Taipei	Hong Kong	Taipei	Hong Kong
<i>Management fee (US\$ per sq.m)</i>						
Mean (per month)	0.35	1.17	0.61	1.32	0.83	1.72
<i>Density of condominium development</i>						
Households per block	24	62	57	96	77	415
<i>House price in US\$ per sq.m (%)</i>						
Less than 1,730	13	na	60	na	27	na
1,817-2,596	11	na	46	na	43	na
2,682-3,462	9	na	28	na	63	na
3,548 or above	0	na	42	na	58	na
<i>House price in US\$ per sq.m (%)</i>						
Less than 2,764	na	16	na	31	na	53
2,765-4,146	na	15	na	28	na	58
4,148-5,528	na	11	na	28	na	61
5,530-6,910	na	14	na	25	na	61
6,911 or above	na	10	na	30	na	60

Table IV.
Choice of management
mode by condominium
density, house price and
management fee

Notes: "na" (not available), percentages sum to 100 per cent in each row

Sources: Postal questionnaire surveys in Hong Kong and Taipei

commands a higher level of management charges, at US\$0.6 and US\$1.3 in Taipei and Hong Kong respectively. The third party management mode which incurs the highest agency cost commands the highest level of arrangement charges, at US\$0.8 and US\$1.7 again in Taipei and Hong Kong respectively. However, ratios between management charges by mode were less apart in Hong Kong (1:1.1:1.5) than in Taipei (1:1.7:2.4). The lower cost for third party management in Hong Kong may attribute to economy of scale of management companies in Hong Kong which were, on average, 5.4 times bigger in operation than their counterparts in Taipei (Table IV)

To sum up, owner-managed condominium properties were older and less densely developed low-rise building blocks or projects that command the lowest management charges. On the other hand, third party-managed condominium properties were newer and bigger developments or projects and charge the highest management fee. Condominium developments or projects of direct labour management mode are those in-between in property characteristics. In Taipei, there is also a strong relationship between the choice of management mode and house price. Yet this is absent in Hong Kong.

Choice of management mode: logistic regression modelling

To explore the combined effect of various factors on the choice of management mode, a multivariate approach to logistic regression modelling is employed. It expresses the probability of occurrence of one state versus the other state (the reference state) of the dependent variable as a linear function of the independent variables[3]. The dependent variable, condominium management modes (owner managed, direct labour and third party agent) are assumed to be ordinal. This is confirmed by relevant statistical test[4]. The multinomial logistic regression was computed by the PROC LOGISTIC module in SAS.

Inspired by literature on the choice of management mode and agency cost (Rosenberg and Corgel, 1990; Chinloy and Maribojoc, 1998; Sirmans *et al.*, 1999), the following set of independent variables was included:

- house price per sq.m of the condominium unit;
- characteristics of the condominium (low-rise below five-storeys, medium-rise between six- to 12-storeys and high-rise including cluster of buildings over 13-storeys or above);
- percentage of communal floor areas of the residential property/project;
- age of the condominium building/project;
- density of condominium development (number of households per building block/project); and
- sense of community cohesion (self-score from 1 (low) to 5 (high) assessed by the respondents).

Results of the logistic regression modelling are reported in Table V. Predictability of the outcomes is believed to be considerably accurate. Respectively 77 per cent and 75 per cent of the results from the linear regression model match the actual survey results on choice of management mode in Hong Kong and Taipei. The variable “house price” in both cities is positively and significantly relevant. As prices increase, owners would more likely opt for direct labour than third party mode of management. In a way, house price can be seen as a proxy for the demand for more sophisticated management service. More expensive flats require better service hence decision management agents with specialised skills. Owners would find it too costly to acquire those skills themselves and would therefore hire and delegate other people who already possessed the skills to take up the jobs. Yet, they can retain and manage the less skill-intensive, yet more important, task of decision control to the point that even such task might require specialised knowledge beyond their grasp. Then, the decision control functions are shifted to third party agents who are more entitled to perform those functions. The arrangement would, in turn, become the only viable option. On the other hand, house price is also a proxy for the time cost of the owners (they would likely on higher income and their time more expensive). Thus, given the same choice of management service mode, owners of more expensive flats would be more likely to surrender the decision management and decision control functions correspondingly.

Types of housing development have significant effect on the linear modelling of data in Taipei only with medium-rise, higher-rise and cluster of buildings displaying higher probability in the choice of direct labour and third party managed modes. This has to do with comparative advantage from the readily available skills and expertise of management service personnel as described in the previous section. On the contrary, building type in Hong Kong is not statistically significant in this exercise. Further analysis of the Hong Kong data reveals that majority of the low-rise buildings were also the most expensive buildings in the sample. Not maximising the use of land in relations to a lower allowable plot ratio, low-rise buildings are expensive and those who can afford are able to pay for more costly management modes. This has surely made the effect of building types insignificant.

Age of the building is significant and has negative influences on choice in both cities. It shows that owners of older buildings are more likely to be choosing direct

Variables	Taipei		Hong Kong	
	<i>b</i>	Odd	<i>b</i>	Odd
<i>Dependent variable – mode of management</i>				
Intercept1	-2.84 (-0.01)	.	4.24 (0.00)	.
Intercept2	-0.04 (-0.97)	.	6.10 (0.00)	.
<i>Condominium type</i>				
Lower than 5 floors	Reference group			
6-12 floors	0.92 (-0.13)	2.52	0.59 (0.21)	1.80
13 floors or above	2.12 (0.00)**	8.28	0.65 (0.17)	1.91
Cluster of buildings	1.9 (0.03)**	6.70	0.93 (0.16)	2.53
Others	2.74 (0.01)**	15.54	-0.01 (0.99)	0.99
<i>House price</i>	0.50 (0.01)**	1.64	0.23 (0.09)*	1.26
<i>Age of condominium</i>	-0.22 (0.06)*	0.80	-0.96 (0.00)**	0.38
<i>Ratio of communal area</i>	0.03 (0.81)	1.03	-0.19 (0.25)	0.83
<i>Size of condominium</i>	0.01 (0.02)**	1.01	0.004 (0.00)**	1.00
<i>Community cohesion</i>	-0.06 (0.701)	0.94	-0.23 (0.17)*	0.80
-2LogL	62.03 ($p < 0.01$)		76.77 ($p < 0.01$)	
Correct prediction (%)	75.4		76.9	
Gamma	0.51		0.54	
<i>n</i>	241		315	

Table V.
Logistic regression:
management mode and
characteristics of
condominium

Notes: Dependent variable: modes of management (0 = owner managed, 1 = direct labour, 2 = third party agent); * $p < 0.05$; ** $p < 0.01$; standard errors of *b* in parentheses

Sources: Postal questionnaire surveys in Hong Kong and Taipei

labour or third party agents. This may be because of inertia of owners of more recent developments to change from the third party managed mode instated by the developers who see it as part of their marketing strategy. The owners inherited the mode through purchase of the unit. Such chain of effect is more common in Hong Kong as “big” real estate developers have dominating market presence and all of them have diversified business undertakings or subsidiaries to manage their developments.

Density of development is also positively and significantly related to the choice of management mode in both cities. Higher density tends to be associated with the choices of direct labour and third party managed modes, not only because more sophisticated service is required, but because interaction between owners in these projects are perceived to be “too far apart” physically for the creation of any environment conducive for owners’ management. For clusters under direct labour mode, increases in the project size also means increasing distance between the lay members of the home owner organisation and their leaders who are the decision control

agents as more complicated management issues are involved leading to escalating agency cost, as well. Changing to third party managed mode and by shifting most of the decision control functions to the third party agent, would help reduce the agency cost incurred by lay members in the home owner organisation.

Community cohesion can be viewed as an indirect counteracting force for agency cost within the home owner organisation as greater cohesion leads to more frequent interaction and creates trust among owners. Hence, a higher level of community cohesion would favour owner-managed mode. Such pattern is confirmed in Hong Kong with negative and statistically significant parameter. However, the insignificance of factor in Taipei requires some further examination. It may be because of the over-shadowing effect of other factors (like project size) or the index may not have been constructed in a manner precise enough to tape the difference.

Last by not least, proportion of communal floor areas, as a measurement for the complexity of the management duties, does not reflect any significant impact upon choice of mode in either cities. This is probably because the proportion alone cannot capture the variety and the impact of “Shared facilities” and “Amenities” in condominium living. More refined indicators needed in future studies.

Summary and discussion: explaining the choice of management mode

Inspired by principal-agent theory, this paper has attempted to construct a typology of the choice of condominium management mode along the magnitude of involvement of condominium owners/resident occupants and their agent if delegation is present of the decision management (i.e. performance of management tasks) and/or decision control (monitoring of the agent performing management tasks). An owners'-managed condominium involves no third party agent, not in decision management nor in decision control. All the condominium management tasks are performed by the owners and/or residents. The direct labour mode in practice are those in which condominium owners/resident occupants hire direct labour to be management decision agents whereas they remain to be the decision control agents. The third party management mode is when the decision control function is further delegated to a third party management agent. The owners/resident occupants would not interfere with the daily operations of condominium management but retain the power of choosing and replacing the third party management company.

Our investigation provides insights into how empirically a management mode relates to characteristics of condominium developments. It shows that house price, age of buildings and household density are significant determinants in both cities whereas, types of condominium is only a significant factor in the Taipei data and community cohesion only in Hong Kong. Proportion of communal floor areas is not, at all, a significant factor in either cities.

A number of observations can be summarised on the principal-agent theoretical perspective based on findings from the logistic regression modelling on condominium owners' choice of management mode. First, the choice of condominium management mode reflects opportunity cost for aspects of decision the owners are willing to surrender for the disposition of certain complex management tasks. That is, the more complex the management tasks became (high-rise and higher household density, etc.), the higher chance of the owners choosing the direct labour and third party management mode. Similarly, the more costly are such tasks on the time of the owners,

the less likely they will opt for the owner-managed mode, but third party mode. Second, agency cost also constitutes another significant factor in the determination of mode. Bigger developments or projects demand higher agency cost from members of the home owners' organisation and it is thus less viable to operate efficiently in the owner managed mode. More complex management tasks required higher skills and this would increase the demand on the skills for the decision management agents and at the same time increases the agency cost of monitoring such agents. If owners still retain the role as the decision control agent, up to some point, the agency cost would become prohibitively high it would be better to commission even the decision control role to third party agents.

However, further enhancement in the specification of the determining variable has to be made and empirical measurement of both the opportunity cost and agency cost are yet to be developed. For instance, measurement of certain variables cannot be uniquely isolated and attributable to one underlying cause (e.g. house price is a "spurious" factor) and precise measurements are not taken on others (e.g. community cohesion and type of building). Other instituted factors not directly related to agency cost may also have a significant impact on choice of mode. For instance, we observed that more recent developments are third party managed because of inertia on the part of the owners to switch to mode other the one decided by the developer. Cost for changing may be another factor we have to pay attention to.

How condominiums can be better managed is becoming an important issue in urban governance. Not only is it crucial to the wellbeing of urban development at the micro level, but it also helps home owners preserve the value of their asset. It is particularly relevant in East Asia where condominium is the dominant form of home ownership. This paper has pioneered academically a field of interests in which a conceptually sound framework on which those significant factors can be systematically connected. Nonetheless, further conceptual and methodological enhancements in terms of definition and measurements are still necessary. For instances, how along the continuum, the decision management and decision control function interacts to shape decision on the mode of condominium management and how can such interaction be elicited more fully in a mathematically. More precise indicators in measuring agency cost have yet to be developed.

Notes

1. In Hong Kong, individual condominium blocks with less than 50 per cent residential component were excluded from further analysis
2. One ping equals 3.3sq.m.
3. $\text{Log} [(p(y \leq j | X)) / (1 - p(y \leq j | X))] = \alpha_j + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k$ where $j = 1, 2$ and 3 corresponding to the three condominium management modes respectively. α_j is the intercept [statistical instead of mathematical terms may be better] of the j th management mode and X_1 to X_k , the independent variables.
4. To test whether the two equations have the same set of coefficient, the Score test in SAS method is used. It is shown that Q_{RS} for the Taipei model is 14.4 with p at 0.11, whereas for the Hong Kong model Q_{RS} and p are respectively 14.7 and 0.1. The null hypothesis that the slopes of the equation are different is rejected at 1 per cent confident level.

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