

**URBAN INFRASTRUCTURE MANAGEMENT : A COMPARATIVE ANALYSIS  
OF PARKING MANAGEMENT IN TWO MUNICIPALITIES IN THE  
KLANG VALLEY, MALAYSIA**

Jamilah MOHAMAD  
Associate Professor  
Department of Geography  
University of Malaya  
50603 Kuala Lumpur  
Malaysia  
Fax:603-79675457  
E-mail:jamilahmd@um.edu.my

Abdul Razak SHAHBUDDIN  
Lecturer  
Urban Studies and Planning Programme  
University of Malaya  
50603 Kuala Lumpur  
Malaysia  
Fax:603-79675457  
E-mail:razaks@um.edu.my

**Abstract:** Increased levels of motorization have resulted in an increase of parking demand within urban areas in the Klang Valley, Malaysia. Local authorities need to respond with better parking management methods in order to effect better parking control. This paper illustrates two different parking management systems as operated by two neighbouring local authorities. Users were requested, through a survey, to provide various parking usage characteristics and their perception of the quality of parking service offered. The results showed that the Pay and Display system was more satisfactory than the traditional parking coupon system. Application of better parking management systems, through the use of technology, has not only proved beneficial in terms of increased revenue for the local authorities concerned but has also brought benefits to the users and private parking operators.

**Key Words:** parking, management, urban, infrastructure

## 1. INTRODUCTION

The scope of urban management incorporates the 'whole complex of interventions of government agencies and private commercial and non-commercial institutions by which human and financial resources are mobilized to change the urban physical and socio-economic environments according to felt needs' (van Naerssen T. et al. 1996). The concept of urban management as such covers aspects of organizational structure, relationships between agencies within and external to the organization, and processes of decision-making, planning and implementation of urban programmes.

Urban infrastructure management is one of the major components of the wider urban management functions of local government. Infrastructure management within urban areas will involve responsibilities over one or more of the sectors of drainage, solid waste management, water supply, electricity supply, gas supply, telecommunications, and urban transport (Mohamad J. *et al.* 2001). Notwithstanding the increasing emphasis on public transport, present usage levels of private motorized vehicles has meant that there is a great need to manage the parking space and demand within the urban areas. Better control over parking provision would also signal the likely use of parking as an instrument of travel demand management in the future.

The existing transport system in Malaysia is dominated by the road transport sector and *ceteris paribus*, the trend is likely to continue into the future with the continued large

investment in road infrastructure and the robust national car production industry. The concentration of road infrastructure provision coincides with the pattern of urban development which is heavily concentrated in the Klang Valley especially along the Kuala Lumpur-Klang development corridor.

The Klang Valley is the most important economic region in Malaysia. The Klang Valley covers a total area of 2843 sq. km. and has an estimated population of 3.7 million in the year 2000. In the context of the Klang Valley, urban management tasks are the responsibility of the various Local Authorities which form the third tier of government after the Federal and State Governments. Administratively, the Klang Valley has been divided out to eight Local Authorities, one being the Federal-controlled City Hall of Kuala Lumpur and the other seven Municipal authorities within the State of Selangor. City Hall of Kuala Lumpur administers the area gazetted as the Federal Territory of Kuala Lumpur. The state capital of Selangor is Shah Alam and is administered by the Shah Alam City Council. The other six local authorities are all Municipal councils i.e. Petaling Jaya Municipal Council, Subang Jaya Municipal Council, Klang Municipal Council, Selayang Municipal Council, Ampang Jaya Municipal Council and Kajang Municipal Council.

The administrative framework and functions of the Local Authorities are based on the provisions of the Local Government Act of 1976 (Act 171). Although the set up of City Hall of Kuala Lumpur and City Council of Shah Alam are more elaborate due to their roles as Federal and State capitals respectively, the Municipal Councils generally have between 10 – 12 departments managing the urban infrastructure within their respective areas. However, since the implementation of the Privatization Policy by the Malaysian Government in 1983, increasingly more and more functions related to infrastructure provision and maintenance have been given over to the private sector.

At the inception of the Privatization Policy, the Economic Planning Unit (1991) had identified five objectives of privatisation aimed at; (a) relieving the financial and administrative burden of the Government (b) improving efficiency and productivity of economic activities (c) achieving higher economic growth rates (d) reducing the size and presence of the public sector in the economy, and (e) helping towards meeting the National Economic Policy targets especially in relation to achieving satisfactory bumiputera (indigenous) participation in the economy. As it is today within the urban infrastructure sector, privatized concerns have included Indah Water Konsortium (sanitation), Alam Flora Sdn. Bhd. (solid waste management), SwastaPark Sdn. Bhd. and SwastaEfektif Sdn. Bhd. (parking), Park May and Konsortium Intrakota (bus public transport), Tenaga Nasional Berhad (electricity), Puncak Niaga (water supply) and Telekom Malaysia, Time Telekom and Maxis (telecommunications).

## **2.CONTEXT OF STUDY**

This paper will report on a comparative study undertaken between the parking management systems of two local authorities i.e. Municipal Council of Petaling Jaya (MPPJ) and Municipal Council of Subang Jaya (MPSJ). Both local authorities have been at the forefront of using ICT technologies in trying to improve service delivery to their communities. This study wishes to compare different parking management systems between two local authorities whose residential population structure do not differ very much from each other.

In attempting to gauge user response to the different parking management structures, it is hoped that the user socio-economic and usage profiles would not be too different.

The two municipal authorities are located within the Petaling District which lies in the central part of the Klang Valley Region. The Petaling District is one of the five administrative units that make up the Klang Valley region, the other four being Kuala Lumpur Federal Territory, Klang District, Hulu Langat District and Gombak District. The Petaling District, covering an area of 484.33 sq.km., plays an important role in the economic development of the Selangor state and Klang Valley region. Petaling District has a total population of 197000 in 1970 which then increased to 367478 in 1980 and an estimated 1.2 million in the year 2000. The biggest contributor to the growth in work force is in the sectors of manufacturing, commercial and private services. The growth in employment opportunities in the district is 9.4% and 5.7% for the periods between 1980-1990 and 1990-2000 respectively. Strategic growth in the Petaling District is being guided by the statutory document Structure Plan for Petaling District 1988-2010.

### **2.1 Petaling Jaya Municipal Council (MPPJ)**

The Petaling Jaya township was developed in 1954 on an area of 256 hectares of plantation land as a satellite town to accommodate the relocation of squatters from Kuala Lumpur (McGee and McTaggart 1967). The Petaling Jaya Municipal Council (MPPJ) today manages an area of 97.2 sq.km. with a sizeable urban population of about 438084 in year 2000. Despite its humble beginnings, the township has increasingly catered for a more middle-class and upper-middle class residential population.

Under the Klang Valley Perspective Plan Review (1988) spatial strategy, Petaling Jaya was identified as a district centre. In terms of the employment structure, the manufacturing sector is the most important sector in terms of providing employment opportunities to the workforce in Petaling Jaya after the services sector. Commercial development within the township has picked up since the spread of residential areas within the township. The increase in demand for commercial space has resulted in the growth of a number of major commercial centres in Petaling Jaya. Examples of the most important centres in the MPPJ area are Petaling Jaya New Town, Damansara Utama/Damansara Jaya, Kelana Jaya, Bandar Utama and Bandar Sri Damansara. The accessibility of the township due to the presence of the Federal Highway and several other major highways is a plus factor towards increasing the dynamism and growth potential vis-à-vis the other urban centres in the Klang Valley.

With a status as a Municipal Council, MPPJ is led by its Council President (Yang Dipertua). The President is fully responsible over the entire organisation and he is aided in his task by 24 other appointees who serve as MPPJ councillors. A Municipal Secretary is appointed to oversee daily operations. In terms of administrative structure, there are eight main departments in MPPJ to undertake local government management functions. The main functional departments are Management Services, Treasury, Development & Maintenance, Planning & Development, Environment, Valuation/Property Management, Mechanical and Electrical Services and Social Development. The Treasury Department oversees parking operations and has its own enforcement team to enforce the car parking operations as agreed between MPPJ and the private operator.

### **2.2 Subang Jaya Municipal Council (MPSJ)**

Subang Jaya Municipality was created by merging some areas formerly under the jurisdiction of MPPJ (i.e. the Subang Jaya township comprising of Sections 15 - 19) and areas formerly under the Petaling District Council. Subang Jaya Municipal Council (MPSJ) was gazetted by the Selangor State Government on 2 January 1997 and officially launched on 25 April 1998. The MPSJ Municipality has a population of 423338 people living in an area of about 161.8 sq. km. The Subang Jaya Municipality is divided into three major planning zones, i.e. Damansara Zone (comprising Subang Jaya and Bukit Lanchong), Puchong Zone and Seri Kembangan Zone (comprising Serdang, Seri Kembangan, University Putra Malaysia campus and part of Ayer Hitam Forest Reserve).

Eighty percent of the area under the Subang Jaya Municipal Council is within the Multi Media Super Corridor. The proximity of the Municipality to the New Federal Administrative Capital of Putrajaya and the Kuala Lumpur International Airport (KLIA) is expected to bring intense development to the area. Accessibility is also very high as a number of urban highways criss-crossed the area such as the North-South Highway, Shah Alam Expressway, Damansara-Puchong highway and the Elite Highway. In terms of the hierarchy of the urban centres in MPSJ, Subang Jaya has been designated as the sub-regional centre and USJ 10 as the district centre. Pusat Bandar Puchong, The Mines and Bandar Sunway are all major service centres.

MPSJ is headed by its Council President as in the case of MPPJ. 24 Municipal councillors have been appointed to assist the President in making policy decisions and other related matters. The Municipal Council Secretary looks after the daily administration matters. In carrying out its local government management function, MPSJ is organised around ten departments. The ten departments are Administration, Legal, Treasury, Town Planning, Engineering, Urban Services, Building, Valuation & Property Management, Landscape and Health & Licensing. Similarly, as in the case of MPPJ, the Treasury department oversees car parking operations as they are revenue-earning. However, car parking operations are enforced by the Car Parking Enforcement Unit placed under the Legal Department.

### **2.3 Parking operations in MPPJ and MPSJ**

The Selangor State Government took a decision to privatize all parking operations and management within the entire State in 1999. This decision was in line with the Privatization Policy introduced by the Federal Government. The privatization arrangements are monitored by the Privatization Unit in the state government machinery. SwastaPark Sdn Bhd was awarded the car parking privatization concession. However, at the time of the study, the privatization policy has not been fully implemented yet. Hence, both the local authorities were then still involved in aspects of operational decision-making and monitoring.

There is a total of about 13400 car parking lots within the entire area under the MPPJ jurisdiction. In terms of parking management system, MPPJ has chosen to implement the Pay & Display technology system since 3<sup>rd</sup> January 2000. In the early stage of its implementation, there are about 650 Pay & Display machines in use. The estimated cost of each machine is about Malaysian Ringgit (RM) 14000 – 15000. Between 20-40 parking lots could share the use of one Pay & Display meter; the actual ratio varying between 1:20 – 25 lots in the more-developed areas and between 1:25 – 40 lots in the less-densely developed area.

In comparison, MPSJ obtained permission from the State Government to continue with the use of its existing coupon system until the end of March 2002. MPSJ eventually implemented the Pay & Display system beginning 1<sup>st</sup>. April 2002 after the survey for this study had been completed. MPSJ has a total of 17000 car parking lots. Again, SwastaPark Sdn. Bhd. was the sole company that obtained the concession to manage the system for MPSJ. Hence, the basis of comparison here was based on the Pay and Display system used in MPPJ and the coupon system which MPSJ was still using at the time of study (Shahbuddin A.R. unpublished). In essence, the study is a comparison of the users' responses and perceptions to the parking systems as operated in their municipalities.

The Pay & Display system is based on a rather user-friendly technology and is easy to use. Motorists need only to drop the required amount of coins into the selected machine, after which they will key in their car plate number before getting their printed ticket. The ticket must then be displayed on the car dashboard. Some of the important information found on the ticket is the time of payment, parking expiry time, car plate number, date and payment amount. Motorists could then park their vehicles in any of the vacant parking lots found within the local authority area as long as their ticket remains valid. In the MPPJ area, the charge for every hour or part thereof is Malaysian Ringgit RM 0.60. A flat rate of RM5.00 is fixed for long-term parkers who park their car during office hours (8am – 6.30pm). The parking charges in MPSJ is lower than those of MPPJ. MPSJ charges RM0.50 for every hour or part thereof and RM4.00 for the long-term parkers.

The Pay & Display machine is also more nature-friendly as it runs on solar power. Thus, it saves a substantial amount on electricity and battery usage. Nevertheless, it could also operate on electricity, battery and generator. As the Pay & Display machine is dispensed in the ratio of 1:20-45 parking lots per unit, it is therefore easier to supervise the usage of the machine. Any vandalism involving a particular machine can easily be detected.

Both local authorities have resorted to the use of handheld computers as an aid to enforcement matters. The handheld computers have helped towards enforcing the parking regulations more efficiently and expediently. The handheld computers could capture the offenders' particulars on the spot. The enforcer needs to record the vehicle plate number, road tax information, vehicle type and colour. Later, they will have to input the date, time and place of offence as well as the offence code. Generally, offences need to be coded in order to ensure a smooth workflow when the enforcer inputs the data into the system. When all the information has been compiled, compound tickets will be issued and printed on the spot and then displayed on the vehicle. A duplicate copy of the compound issued will be kept in the memory of the handheld computer. MPPJ started off using twenty units of handheld computers in May 2000. The number of units has increased to fifty units in March 2001. MPSJ on the other hand started using 25 units of the handheld computers since March 2000 and up till the end of 2001, the number has risen to 45 units.

### **3. SURVEY OF USER RESPONSE TO PARKING MANAGEMENT SYSTEM**

A user interview survey, based on a carefully-designed questionnaire, was undertaken to ascertain basic socio-economic, parking usage and perception of service characteristics amongst the users, generally residents, within the area. The paper will compare between the survey findings gathered from the two Municipalities in order to gauge whether there exists differences in the various socio-economic, usage and perception characteristics.

The user interview survey questionnaire was divided into five sections consisting of a total of 39 questions. The questions were mostly close-ended in nature. The Likert scale technique was employed to denote the level of satisfaction of the users as regards to the quality of parking provision. The first section gathers information regarding the socio-economic characteristics of the household including information on gender type, employment type, income and educational attainment levels. The second section addresses information on usage and level of provision characteristics.

In Section 3, users were requested to evaluate the parking management systems within their Municipality, the Pay & Display system in the MPPJ area and the coupon system in the MPSJ area. In Section 4, the users were requested to evaluate the degree of parking enforcement displayed by the local authorities, and finally, the last section requested users to indicate on a Yes/No format their views on the parking management system as a whole. During the administration of the questionnaires, users were required to indicate their responses within the classification or categories given in the questionnaire. For example, under employment type, six categories of employment types were used ranging from government sector / private sector / own or family business / housewife / student / unemployed.

A sample of 300 users were selected randomly within the ten designated zones, five zones each in the two respective Municipalities. Therefore, 150 users were interviewed in each Municipality. The zones selected in the Petaling Jaya Municipality were Petaling Jaya New Town, Petaling Jaya Old Town, Section 14, Kelana Jaya and SS2. While the zones selected in the Subang Jaya Municipality were SS15, Taipan USJ, Bandar Baru Puchong, Bandar Sunway and Puchong IOI/Kinrara. The selection ensured that the survey would cover a representative sample of users within the two Municipalities.

The results were analysed using the SPSS statistics package. Taking the overall sample of 300 users, it was found that 73.3 percent of users interviewed were men. 45.6 percent were employed by the private sector, 34.9 per cent were self-employed while 10.1 per cent were government employees. Almost half of the respondents were earning in the range of RM 2000 – 3999 monthly. In terms of educational attainment, 53.7 per cent have a tertiary qualification followed by 46.3 per cent with only secondary-level education. In terms of parking usage, 26.4 per cent were parking for an hour or less, 23.3 per cent were parking between 2-5 hours while the other 50.3 per cent were parking for a duration of more than 5 hours.

In the following section, the results of the ONEWAY analysis of variance will be described further. The observed significance level is the probability of obtaining an F statistic at least as large as the one calculated when all population means are equal. If the probability is small enough, the hypothesis that all population means are equal is rejected.

Table 1 suggests that there are no significant differences between the user profiles of the MPPJ and MPSJ groups in terms of gender (variable GENDER), employment type (variable EMPLOY), level of educational attainment (EDUCATE), trip purpose associated with parking demand (PURPOSE) and parking duration (DURATION). The results however suggest there is a difference for the variable of income level (INCOME) although responses regarding income levels have often been problematic and difficult to gauge as regards its reliability. Variability in terms of user responses as regards to the effectiveness, efficiency

and reliability of parking management systems would then be less attributed to differences in user socio-economic profiles.

Table 1. User socio-economic and usage characteristics

ANOVA						
		Sum of Squares	df*	Mean Square	F	Sig.
GENDER	Between Groups	1.333E-02	1	1.333E-02	.068	.795
	Within Groups	58.653	298	.197		
	Total	58.667	299			
EMPLOY	Between Groups	.000	1	.000	.000	1.000
	Within Groups	246.416	296	.832		
	Total	246.416	297			
INCOME	Between Groups	13.939	1	13.939	6.247	.013
	Within Groups	651.548	292	2.231		
	Total	665.486	293			
EDUCATE	Between Groups	.748	1	.748	.531	.467
	Within Groups	413.978	294	1.408		
	Total	414.726	295			
PURPOSE	Between Groups	3.413	1	3.413	1.638	.202
	Within Groups	620.907	298	2.084		
	Total	624.320	299			
DURATION	Between Groups	1.333E-02	1	1.333E-02	.006	.940
	Within Groups	698.987	298	2.346		
	Total	699.000	299			

\*df denotes degrees of freedom

Table 2 shows that there exists differences between the groups in terms of the following variables:

- Variable PROVLOT denoting adequacy of parking lots provision
- Variable PARKLINE denoting clear delineation of parking lines
- Variable PARKTYPE denoting suitability of parking lot design
- Variable OBSTRUCT denoting existence of obstructions to parking exits/entrances
- Variable OBSTYPE denoting types of obstructions

The study found that 69.1 per cent of users in MPSJ viewed that the number of available parking lots was inadequate compared to 93.9 per cent in MPPJ who commented on the inadequate provision of parking lots. Being a newly-incorporated local authority, MPSJ parking lots were new and generally has a better finish than the older parking lots in MPPJ.

Table 2. Level of Parking Provision

ANOVA						
		Sum of Squares	df*	Mean Square	F	Sig.
PROVLOT	Between Groups	5.136	1	5.136	10.458	.001
	Within Groups	144.891	295	.491		
	Total	150.027	296			
LOTSIZE	Between Groups	.000	1	.000	.000	1.000
	Within Groups	27.520	298	9.235E-02		
	Total	27.520	299			
PARKLINE	Between Groups	1.026	1	1.026	4.031	.046
	Within Groups	75.622	297	.255		
	Total	76.649	298			
PARKTYPE	Between Groups	.473	1	.473	5.000	.026
	Within Groups	28.102	297	9.462E-02		
	Total	28.575	298			
OBSTRUCT	Between Groups	2.373	1	2.373	7.753	.006
	Within Groups	90.891	297	.306		
	Total	93.264	298			
OBSTYPE	Between Groups	3.419	1	3.419	14.309	.000
	Within Groups	68.581	287	.239		
	Total	72.000	288			
COVER	Between Groups	1.329E-02	1	1.329E-02	2.000	.158
	Within Groups	1.973	297	6.644E-03		
	Total	1.987	298			
QCOVER	Between Groups	.333	1	.333	.787	.376

	Within Groups	126.187	298	.423		
	Total	126.520	299			
MAINTAIN	Between Groups	1.763	1	1.763	3.234	.073
	Within Groups	162.487	298	.545		
	Total	164.250	299			
	Total	66.555	298			

\*df denotes degrees of freedom

In terms of enforcement of parking regulations, Table 3 shows that there exists differences in the variable COMPOUND (representing the level of readiness of parking enforcers to issue compound fines) and variable PRESENCE (denoting the visibility of parking attendants at parking lots). 79.2 per cent of respondents from MPPJ stated that the parking enforcers were very strict in enforcing regulations compared to 67.6 per cent from MPSJ who commented the same. 73.3 per cent of MPPJ respondents viewed that their parking wardens were highly visible compared with 57.4 per cent from MPSJ.

Table 3. Level of Enforcement

ANOVA						
		Sum of Squares	df*	Mean Square	F	Sig.
QENFORCE	Between Groups	1.062	1	1.062	2.692	.102
	Within Groups	117.186	297	.395		
	Total	118.247	298			
COMNICAT	Between Groups	3.020E-02	1	3.020E-02	.100	.751
	Within Groups	88.966	296	.301		
	Total	88.997	297			
COMPOUND	Between Groups	1.225	1	1.225	4.735	.030
	Within Groups	76.291	295	.259		
	Total	77.515	296			
ATTITUDE	Between Groups	3.606E-02	1	3.606E-02	.080	.777
	Within Groups	132.873	295	.450		
	Total	132.909	296			
PRESENCE	Between Groups	1.737	1	1.737	5.967	.015
	Within Groups	86.169	296	.291		

	Total	87.906	297			
--	-------	--------	-----	--	--	--

\*df denotes degrees of freedom

Table 4 shows that there exists differences in the variables VANDAL (denoting problem of vandalism), COINFULL, NOTICKET and MISPRINT (the latter two denoting problems related to issuance of tickets) between the two parking systems in operation. Respondents from MPPJ reported that there have been very few, if at all, problems of vandalism and due to the nature of the Pay and Display system, no problems associated with full coin boxes, no tickets and wrongly-issued tickets were incurred. The Pay and Display system has done away with many of the problems faced by parkers that were usually incurred due to the low level of maintenance of parking facilities. Vandalism is also low as reported previously due to the high visibility of parking attendants in the MPPJ area.

Table 4. Level of Parking System Failures

ANOVA						
		Sum of Squares	df*	Mean Square	F	Sig.
FAULT	Between Groups	1.605E-03	1	1.605E-03	.004	.952
	Within Groups	128.211	294	.436		
	Total	128.213	295			
VANDAL	Between Groups	3.539	1	3.539	13.172	.000
	Within Groups	78.998	294	.269		
	Total	82.537	295			
COINFULL	Between Groups	1.519	1	1.519	5.431	.020
	Within Groups	82.508	295	.280		
	Total	84.027	296			
NOTICKET	Between Groups	3.073	1	3.073	11.500	.001
	Within Groups	79.375	297	.267		
	Total	82.448	298			
MISPRINT	Between Groups	2.803	1	2.803	17.005	.000
	Within Groups	49.127	298	.165		
	Total	51.930	299			

#### 4. PERFORMANCE EVALUATION

In terms of comparison of the general performance of both parking management systems in Table 5, it was found that there are differences for the three variables of:

- Variable CHARGE denoting the level of parking charges paid
- Variable LOCATE denoting the location of parking meters/ticket agents
- Variable METERNO denoting the adequacy of parking meter provisions

It was found that MPSJ respondents rated the coupon system as unsatisfactory as regards the three variables listed. 59.4 per cent of MPPJ users agreed with the level of parking charges while 58.7 per cent of MPPJ users disagreed with the parking fees charged.

Table 5. Level of Satisfaction on Technology Application

ANOVA						
		Sum of Squares	df*	Mean Square	F	Sig.
CHARGE	Between Groups	5.333	1	5.333	8.275	.004
	Within Groups	192.053	298	.644		
	Total	197.387	299			
LOCATE	Between Groups	6.453	1	6.453	23.951	.000
	Within Groups	80.293	298	.269		
	Total	86.747	299			
METERNO	Between Groups	8.003	1	8.003	23.791	.000
	Within Groups	100.247	298	.336		
	Total	108.250	299			
DISPLAY	Between Groups	.163	1	.163	.446	.505
	Within Groups	109.073	298	.366		
	Total	109.237	299			

\*df denotes degrees of freedom

Finally, with regards to acceptability of parking systems, Table 6 shows a difference in the perception of users as to the success of their respective local authorities in managing parking. MPPJ users voted in favour of their local authority in what they see as a form of successful management of parking provision. The two groups of users were generally aware of the privatization exercise (variable PRIVATE), were generally agreeable on the need to privatize parking operations (variable AGREE) and found the general efficiency of parking operations acceptable (variable EFFICIEN).

Table 6. Level of Acceptability

ANOVA						
		Sum of Squares	df*	Mean Square	F	Sig.
PRIVATE	Between Groups	9.278E-03	1	9.278E-03	.041	.839
	Within Groups	66.546	297	.224		
	Total	66.555	298			
AGREE	Between Groups	4.609E-02	1	4.609E-02	.224	.637
	Within Groups	61.218	297	.206		
	Total	61.264	298			
EFFICIEN	Between Groups	.000	1	.000	.000	1.000
	Within Groups	70.389	296	.238		
	Total	70.389	297			
SUCCESS	Between Groups	.859	1	.859	5.699	.018
	Within Groups	44.617	296	.151		
	Total	45.477	297			

\*df denotes degrees of freedom

Besides increasing the efficiency of parking operations, the application of Pay and Display system has made a sizeable contribution to revenues obtained by MPPJ. MPPJ received about RM 6.8 million a year from SwastaPark as payment for operating the car parking operations. The income received is based on the total number of car parking lots rented out to SwastaPark. MPPJ charges SwastaPark at a rate of RM 41.69 per unit of parking space per month. All the operating charges are fully borne out by SwastaPark Sdn Bhd.

## 6. CONCLUSION

The study undertaken above shows that the majority of users of the Pay & Display system perceived that the system was either 'easy' or 'very easy' to use. The percentage of users expressing 'easy' or 'very easy' with regards to the required actions of locating a Pay & Display machine, dropping coins into the machine, entering car plate number, obtaining ticket, walking back to vehicle and displaying ticket is usually above 70% with the exception of 'walking back to vehicle' variable. It seems that the levels of technology efficiency could be further increased if more Pay & Display machines were dispatched. Furthermore, the users of Pay & Display are generally satisfied with aspects relating to rate of charges, location of meters and the number of meters installed. Sixty percent or more of the users are satisfied with all the aspects stated.

This study has shown that the Pay and Display parking management system operated in the MPPJ area has received a more favourable response from its users compared to the coupon

system then still in existence in the MPSJ area. In fact, MPSJ has recently abandoned the coupon system and opted for the Pay and Display parking system similar to the MPPJ operations.

This study has illustrated the point that one of the keys to reformed infrastructure policy is delivering infrastructure services to meet users' demands. This means that every process in the delivery institutions must be responsive to the consumer.

## REFERENCES

Economic Planning Unit (1991) **Privatization Masterplan**. National Printing Department, Kuala Lumpur.

Klang Valley Planning Secretariat (1988) **Klang Valley Perspective Plan Review**. Prime Minister's Department, Kuala Lumpur.

McGee, T.G. and McTaggart, W.D. (1967) A Socio-Economic Survey of a New Town in Selangor, Malaysia, **Pacific Viewpoint Monograph No. 2**, Victoria University of Wellington, New Zealand.

Mohamad, J. and Shahbuddin, A.R. (2001) Pengurusan Infrastruktur Bandar di Wilayah Lembah Klang: Isu-isu dan Cabaran. **Proceedings Indonesia-Malaysia Urban Management Seminar WEKIM 1**, Petaling Jaya, 23-25, March 2001. (in Malay).

Shahbuddin, A.R. (unpublished) **Pengurusan Infrastruktur Bandar: Satu Kajian Perbandingan Mengenai Pengurusan Sistem Letak Kereta Di Kawasan MPPJ dan MPSJ**. Unpublished dissertation for the degree of Masters of Arts, University of Malaya, Kuala Lumpur. (in Malay)

van Naerssen, T., Ligthart, M. and Zapanta F.N. (1996) Managing Metropolitan Manila. In J. Ruland (ed.), **The Dynamics of Metropolitan Management in Southeast Asia**. ISEAS, Singapore.