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INSTITUTIONAL ARRANGEMENTS FOR PROVISION AND PRODUCTION OF PARKING SERVICES IN PUSAN CITY

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Introduction

Parking services are a set of activities of provision and production for parking facilities in which they stop and preserve automobiles as a part of commuting. Good parking service means the that commuter can use the facilities conveniently, easily, and cheaply. The rapid increase of numbers of automobiles due to high levels of incomes brings about the explosive need of parking, but insufficient parking spaces and difficulties of securing available resources for parking facilities make parking problems very severe in most large cities.

Parking is an integral part of the transport system. The sufficient supply of parking spaces and facilities makes the use of automobiles more convenient than any other travel mode. Therefore, it brings about the excess use of automobiles, and results in severe traffic congestion even though if parking problems are solved. A deficient supply of parking spaces and facilities raises another problem; illegal parking. Illegal parking, especially in public streets and on pavements, is not only impeding and dangerous for other street users, it also results in reduced accessibility to inner cities (Topp, 1991: 5). Therefore, parking is a very important part of the transportation system, and it is very difficult to solve parking problems. Over recent years, parking policy, therefore, has been a key element of the transport policy in many countries. Parking policy measures can affect many different dimensions of travel behavior but are likely to be most significant in terms of traveller's choice of parking type and location. Of course, transport policy measures, such as development of mass transits also influence the traveller's choice of parking type and location.

This article deals with parking problems of highly motorized Pusan City which is the second largest in Korea, and has 4,000,000 inhabitants. Parking services are partly provided by city government and partly by "Gu" government which is a basic local governmental unit. This is because of dual local autonomy system in large city in Korea. At any rate, Pusan city is troubled with many transportation problems, such as severe traffic congestion, inconvenience of using mass transit, high rate of traffic accidents, noise and air pollution, and parking difficulty. In fact, as those problems are interconnected with each other, we could not find any relevant resolution without considering those problems systematically. There is some difference in degree of severity and importance of those problems by the means and facilities of transport. This paper deals with parking problems in the context of finding solutions to the transportation transport problems of Pusan City.

To describe the factors influencing parking services, we need a framework that guides us in deciding what to study. There are many analytic frameworks in the social sciences, each of which has its advantage and disadvantage for a study. For policy makers and scholars interested in issues related to how different institutional arrangements enable individuals to solve problems democratically and efficiently, the institutional analysis helps to organize a diagnostic or prescriptive inquiry. This is particularly relevant now that so much attention is being paid to the enhancement of various kinds of institutions (E. Ostrom, 1990: 1-3). In recent years, institutional analysis has gained increasing notice in the social sciences. Disciplines such as economics, political science, and public administration have directed attention to how institutional arrangements affect human decisions and interactions (Eggertsson, 1990; Ostrom, Feeny and Picht, [1988] 1993).

In fact, we need a framework in order to perceive, define policy problems and establish policy measures. Parking problems have been studied by many scholars of transport engineering, urban planning. But, they should not be dealt with as only physical and material problems but also as consequences of a set of social interactions. Those consequences result from patterns of interaction by actors in action situations which are influenced by attributes of a community, nature of service, physical conditions of a city, and rules-in-used. The rules are multi levels of policies related to service provision and production. That is, parking problems may be more well defined as a social phenomena which is greatly influenced by a set of rules of how to provide, produce, and use parking. The change of rules, such as laws, acts, and policies of parking can bring about changes of parking behaviors which are deeply interrelated with solutions of transport problems, and which government can more easily control. Therefore, the institutional framework can help us to solve parking and transport problems.

Finally, I carried out a survey of responses of policy scenarios, which I made as alternative policy measures for solving parking problems, on 220 car drivers and 220 mass transit users in Pusan. The data of response can support my assertions of establishing new rules to solve parking problems.

Basic Framework for Institutional Arrangements of Provision and Production of Services

To learn from empirical studies of the performance of various institutional arrangements in urban service delivery, one must draw and extend a theoretical framework that identifies the key attributes shared by action situations in a wide diversity of urban service delivery systems (Tang, 1992: 13). The basic framework guiding institutional analysis usually consists of six sets of attributes that characterize any institutionally structured situation: the physical conditions, attributes of the community, rules-in-use, action arena, patterns of interaction, and outcomes (E. Ostrom, 1990; Gellar, Oakerson, and Wynne, 1990: 10-15). In institutional analysis, they have much concern with the rules-in-use of which they analyze action situations with the same aspects. Patterns of interactions only designate the activities themselves and are used as a linkage mechanism between action arena and outcomes. Therefore, they deal with patterns of interaction as a black box. Finally, outcomes which are observed consequences of service activities should have to be evaluated by several criteria. The important criteria include efficiency, effectiveness, and equity (Jones and Grasso, 1985; Kim, 1992).

The focal point of institutional analysis is the action situation in which individuals adopt actions or strategies. Three sets of contextual attributes structure the action situation; (1) attributes of a community; (2) physical/material conditions; and (3) rules-in use, that is, institutional arrangements used. From a policy perspective, institutional arrangements are most important the among three contextual attributes (Tang, 1991: 42-43). Therefore, this paper try to focus on the contextual variables in the model, such as, attributes of community, physical/material conditions, and rules-in-use. That is, my paper seeks to find what are the policy problems of parking services in Pusan City, how rules-in-use, as policy alternatives, can influence the action situations or outcomes with physical conditions and attributes of a community.

The attributes of a community include generally accepted norms of behavior, the level of common understanding about action arenas, the extent to which the preferences are homogeneous, and distribution of resources among members. The term culture is frequently applied to this bundle of attributes (E. Ostrom, Gardner, Walker, 1994: 45). They mean the characteristics of social economic environment encompassing the service delivery system. They include resident's income, industrial structure, values, and etc. Income, as an important indicator of a community's economic status, affects tax bearing capacity of residents. This factor, in turn, determines the size of the total revenue available to support

public services. In policy studies, many scholars have found a close relationship between income and service expenditure (Hofferbert, 1974: 145), which may affect the patterns of interaction and service outcomes. Especially, in transport, levels of residents' incomes may influence the travel mode and parking behavior. Industrial structure is also an important factor of community attributes. It may affect the traffic volumes and commuting styles and purposes. The values of residents of a community also influence the action situations and patterns of interactions. In transport, they influence the sense of traffic order and preferences of parking behavior. The ratio of car-holders to total residents is also an attribute of a community, when we study on the problems of the transport in a city. At any rate, we can enumerate many kinds of attributes of a community. Important is that we find the attributes of a community and use them in explaining and predicting the patterns of interactions and outcomes. Physical/material conditions, attributes of a community, and rules in use all independently and jointly affect patterns of interaction, which in turn generate outcomes that occur in the physical/material conditions and attributes of a community.

Physical/material conditions mean hard constraints of service delivery which include physical environments of the community, on the one hand, such as population density, housing pattern, total volumes of streets, total parking spaces and other geographical characteristics of an area, and, the other hand, physical/material attributes of services, that is, feasibility of exclusion and subtractibility. The latter are more important factors when we consider the provision and production of services. Exclusion occurs when potential users can be denied goods unless they meet certain criteria. A good is subtractive when one person's use of it prevents its use by others. If these two attributes are arrayed in a simple matrix, four types of goods can be identified: common-pool resources, public goods, private goods, and toll goods (Gardner, Ostrom, and Walker, 1990; Tang, 1992: 3-7; Kim, 1993: 9-13). These variations may have significant implications for the development of user charges as substitutes for taxes and other market-like mechanisms in the operation of governmental service activities (V. Ostrom and E. Ostrom, 1977: 10-13). Government action is appropriate as a response to citizen demand primarily in the case of collective goods, where consumption is joint and exclusion is feasible. Market arrangements can be used to deliver either private goods or toll goods, that is, where exclusion is feasible. At any rate, it is evident that the nature of the problem facing government, that is, the nature of service influences the performance of service delivery.

Institutional arrangements are rules that "are potentially linguistic entities that refer to prescriptions commonly known and used by a set of participants to order repetitive, interdependent relationships" (E. Ostrom, 1986: 22). Those rules influence the action situation of actor, and in turn, the patterns of interactions and outcomes of service delivery.

In order to understand the meanings of institutional arrangements for provision and production of services, we have to investigate the concept of local public economy. A multiplicity of differentiated governments, coexisting in a given region, interactively linked through a variety of arrangements can constitute a coherent local public economy. Therefore, the basic units of organization in a local public economy are local governments. Distinguishing provision from production and delivery of local goods and services has far-reaching implications for the organization and governance of a local public economy, including a great reliance on private and intergovernmental contracting to produce services, and a greater number and variety of local government jurisdictions to make provision for local services (Oakerson, 1987: 20; ACIR, 1987: 5).

Generally, provision refers to collective choices that determine what goods and services to provide; what private activities to regulate, and the type and degree of regulation to use; the amount of revenue to raise, and how to raise it; the quantities and quality standards of goods and services to be provided; and how to arrange for the production of goods and services. Production, as distinguished from provision, refers to the more technical process of transforming inputs into outputs-making a product or, in many

cases, rendering a service. The point is that provision and production are separable activities that can be linked in a variety of ways (ACIR, 1987: 1-7).

Local governments can arrange for the production of public services in several ways. Local governments can establish and manage their own producing bureaucracies. The largest proportion of local government services are produced by the unit of government that makes the basic tax and expenditure decisions. Local officials can consider several alternative arrangements when selecting service delivery approaches. There are service contracting, franchise agreements, subsidy arrangements, vouchers, volunteer, self-help, and regulatory and tax incentives (ICMA, 1989: vi). Markets can be also considered as alternative arrangements for service delivery, if local government decides to discontinue the provision of a service, and make residents get the service from the market. Especially important are subsidy arrangements, regulatory and tax incentives in parking service delivery in Korea. Because parking lots and garages are insufficient, and illegal parking is prevalent in all areas of cities, local governments use those arrangements to provide parking service. Subsidies are financial or in-kind contributions that enable private firms or individuals to deliver services. Toll goods and private goods when consumption is to be encouraged can be subsidized and provided through grants and vouchers. Regulatory and tax incentives are used to encourage private sector service provision or to reduce service demand. Incentives alter the cost of providing a service, thus affecting the decisions of organizations or individuals to enter the market or to continue to provide a service (ICMA, 1989: xviii).

In this context, it is useful that we use the term of institutional arrangements for provision and production of services as laws, policies, and rules for them. My paper deals on policy problems of provision and production for parking services.

Attributes of Pusan City

Parking problems take place in social economic conditions and cultural contexts of a community which influence commuting behaviors and choice of travel modes. Therefore, we have to consider various attributes of a community to find relevant solutions for parking.

The population of Pusan has continuously increased from 3,160,000 in 1980, to 3,797,000 in 1990. The population of adjacent cities and municipalities which share the same border of jurisdiction also rapidly increased. The increase of population is caused from the moves of industrial firms from Pusan into those areas on the one hand, and from the moves of residents to secure housing into those areas who commute to work in Pusan on the other hand. Those facts bring about a lot of traffic volume.

The number of employees greatly increased from 432,000 in 1980 to 590,000 in 1986, but since 1988 the number decrease to 543,000 in 1990. This is not only due to the economic impasse, but to the movement of industrial firms into outskirts of Pusan. As the movements causes employees to commute to work, the number of commuters greatly increased. In the numbers of employees by industry, the number of employees of the manufacturing industry is 68.9 percent of total employees. The number of total students is 1,047,000, 27 percent of total population. The fact that there are too many students and employees in the manufacturing industry in a city causes severe transport problems when they attend school.

The number of registered automobiles in Pusan has increased from 62,419 in 1980 to 106,357 in 1985, and to 234,936 in 1989 and to 469,622 in 1993. The number has doubled in 4 years. Especially, the number of cars has increased by approximately two and a half times for the same periods. The rapid increases of automobiles and population in the Pusan metropolitan areas bring about various kinds of transport needs and great traffic volumes.

By result of a survey of person trips, the number of transport populations of Pusan in 1991 is 3,502,000 which is 92.2 percent of 3,798 thousands of the total populations. The number of commuting persons is 2,959,000, 77.9 percent of the total populations. In the case of employees' commuting trips, the percent of bus users has occupied 33.8, and on-foot 20.3%, cars 19.1%, company car or bus 10.7%. In the case of business trips, the number of car users is 41.7 percent which has continuously increased. Therefore, without a change of citizens' attitudes, they will use cars excessively in the future, which, in turn will, cause more severe transport and parking problems.

Pusan City Government has made several policy efforts to solve the transportation problems. It has expanded infra-structures of transport, such as roads, subways, parking spaces on the one hand, and has introduced new transport management techniques, such as new traffic signal systems and bus zones, etc., on the other hand. Despite those efforts, there remain various kinds of transport problems, such as severe traffic congestions, parking problem in inner city and residential areas, high rates of traffic accidents, severe air pollution, and excessive consumption of energy.

Citizens' Perceptions of Transport Problems

It is necessary that we review the perceptions of citizens on the transport and parking problems to understand the attribute of a community better. To find how the citizens of Pusan perceive the transport problems, we asked 400 persons what is the worst transport problem. The greatest per cent of respondents (78.3%) indicate traffic congestion as severest. Sixty respondents (15%) consider parking problems as moderately severe.

In the question of illegal parking, two hundred and nine respondents (52.3%) consider the problem "very severe," one hundred and fifty three respondents consider it "severe." These results indicate that most citizens consider parking problems either "very severe" or "severe." In addition, seventy percent of mass transit users have plan to buy a car in five years. Therefore, without a drastic change of transport and parking policies, traffic congestion and parking difficulties will be more severe in the near future.

Physical/Material Conditions

General Traffic Conditions

As the second largest city in Korea, Pusan has housing difficulties and deficient land to use due to geographical characteristics, such as a marine city walled by mountains. The rate of road is 12.5% [Seoul (18.4%), Tokyo (24.4%), New York (24.6%), Paris (25.1%), London (23.3%), Washington D.C. (43%)] and is the lowest among six large cities in Korea. The rate of increase of roads between 1980 and 1989 was only 1.3%, but the rate of increase of automobiles for the same periods was 15.0%. The reason why they could not raise the rate of roads is due to high costs of compensation for land and deficient available land. In 1993, even though Pusan City Government invested more than eighty per cent of total transport expenditures to construct roads, it was too insufficient to satisfy the new needs of roads and parking spaces due to the increase of new automobiles. In addition, as there are many large container yards in several places in the inner city, it is inevitable that container trucks run through the arterial roads in the city. The volume of container cargo of Pusan is 95.1% of total cargo in Korea. This running of container trucks is a major cause of traffic congestion (Oh, 1991). Moreover, the subway has only 7.9% of shares of transport [Seoul: 21.2%, Tokyo: 71.4%, New York: 75.0% (1989), Paris: 53.0% (1989), London: 75.2%], and bus (43.2%), taxi (22.3%), car (16.4%), others (10.2%) are in the order.

There has been rapid increase of parking spaces according as the automobiles increase in Pusan. The parking volumes were 46,423 spaces in 1989, 67,355 spaces in 1991, and 194,110 spaces in 1994. The parking spaces increased nearly three times for the past three years. If we classify the parking spaces by types, on-street parking spaces are 38,757 (20.0%), public off-street parking spaces are 3,196 (1.6%), private off-street parking spaces are 23,153 (11.9%), public attached parking spaces are 10,175 (5.2%), private attached parking spaces are 118,829 (61.2%). When we classify the parking spaces by charge types, the public toll parking spaces are 12,710 (6.5%), and public free parking spaces is 39,418 (20.3%), private toll parking spaces are 30,715 (15.8%), private free parking spaces are 111,267 (57.3%). Private parking spaces account for 73.2% of total parking spaces.

Types and Natures of Parking

Generally, parking concepts pursue several objectives which are interconnected; (1) to cover the parking demands of residents and commercial traffic and to provide some spaces for customers and visitors at market rates; (2) to distribute scarce spaces according to priorities derived from urban development policies; and (3) to control urban traffic, to maintain an equilibrium between parking and circulating traffic and to affect modal choice, especially of the employees in favor of public transport (Topp, 1991: 5). Therefore, we have to establish parking policy measures with considering those several objectives.

Parking spaces are demanded by residents, employees, customers and visitors, and by delivery and service traffic. Parking facilities means places to stop and preserve the automobiles as a part of commuting. Parking laws classify those facilities into on-street parking lots, which are established on the surfaces of street and traffic square, and are provided to every persons, off-street parking lots, which are established at other places except surfaces of streets and traffic squares.

In general, on-street parking can be considered as a public or collective good, although where there are parking meter it has been made into a toll good that is impure insofar as the street has limited capacity (Savas, 1987: 43). Strictly speaking, on-street parking is neither collective goods nor toll goods. It may not be used or consumed jointly and simultaneously by many customers without being diminished in quality or quantity. If there is no empty parking space, then the quantity of the available goods is completely diminished. Therefore, it is rather consumed individually than collectively. On-street parking has other characteristics of exclusion. Even if a car-driver, the potential user of the goods can be denied the goods or excluded from their use unless he meets the conditions set by the potential supplier, that is, government, it is difficult to exclude the use of street parking due to the high cost. Exclusion is a matter of cost. Exclusion is feasible or infeasible to the extent that the cost of enforcing exclusion is relatively low or high (Savas, 1987: 36). In fact, whether on-street parking of an area can be operated with or without charges depends on the size of scale of economy and amounts of charges. If we consider all the on-street parking lots, then it is difficult to exclude potential users due to the high cost. In this perspective, on-street parking can be defined as common-pool resources which share two characteristics; first, the resource is so large that it is costly to exclude potential beneficiaries from obtaining its use; second, the supply is limited, that is, consumption by one user reduces its availability to others (E. Ostrom, 1990). Usually, on-street parking lots can be operated with imposing charges by parking meter or employees. In this case, on-street parking with charges may be defined as a kind of toll good. When we consider the illegal parking in the street, the typical problems of common-pool resource due to the characteristics of street bring about.

Streets can be understood as a local public good and common pool facility. As a public good, streets are made available to all if made avail to one. Due to the high cost of excluding individual users, streets are nearly nonexcludable, even though a very weak form of exclusion can be maintained by

means of vehicle licensing (ACIR, 1988: 81; Savas, 1987: 43). But, Streets are, however, a "congestible" public good, that is, there is some maximum number of users after which each user begins to subtract from the use of others. Once supplied, streets can also be considered common pool facilities, and as such, present a number of problems affecting the ability of individuals to use street facilities jointly. Users can subtract from one another's welfare in a variety of ways (ACIR, 1988: 81-2).

Off-street parking is easily excludable and may be used individually. But, it has not the same characteristics as a personal parking garage has. It may be used or consumed jointly to the capacity of parking lots. Therefore, it can be considered as a toll good. Of course, it is also not a pure toll good like satellite TV. Off-street parking falls along a continuum between pure individual and pure joint consumption.

Attached parking has similar aspects of the off-street parking in exclusion and consumption. But, it is primarily supplied to customers of buildings. Park-and-ride parking also has the same characteristics of exclusion and consumption as off-street parking. But, it has a special purpose of controlling traffic congestion in inner city areas. Those natures of parking facilities may influence the institutional arrangements for provision and production of parking services.

Institutional Arrangements for Parking Service Provision and Production In Pusan City

Policy Measures for Controlling Parking Needs

When we consider the attributes of community and physical conditions of Pusan, we can expect that the increase of automobiles will continue, and traffic congestion and parking difficulties will be more severe than ever before without drastic changes of transport policies.

> If there are great developments in the mass transit system, such as enforcing bus exclusive lane systems, operating limousine buses, expanding the subway line, developing the park-and-ride system, will you put off buying a car?

By the result of this survey, one hundred and thirty eight respondents (70.1%) answer that they will buy a car in five years, and among them, fifty seven respondents (41.7%) answer that they will put off buying a car if the mass transport system is developed. As the development of mass transport system brings about the effects to reduce demands of cars and controlling parking demands, it is necessary that we develop a mass transport system to solve transport and parking problems.

Provision and Production of On-Street Parking

Mayor or county commissioner, who takes charge of the urban planning areas where parking lot is located, establishes parking lots according to the plan of establishing on-street parking lot by listening to the opinion of the police station in the jurisdiction. He or she has to abolish it immediately when it is no longer necessary. On street parking lot can be either directly operated by mayor or county commissioner, or operated by trustees on whom he or she can levy fees on user of streets. The manager of on-street parking lots can collect user fees from the persons who park their cars at parking lots. The

rates of fees, the method of collecting fees, and how to manage the on-street parking lots are fixed by municipal ordinances. Most on-street parking lots are managed by the association of reservists or association of ex-policemen, but that has brought up several problems, such as unreasonable administration, and doubt of special favor. Therefore, the on-street parking should be managed by a firm which is selected through competitive contracting out. Municipal government can secure more managerial benefits, and use them for expanding the parking facilities.

On-street parking has several advantages, such as cheap cost to establish parking lots, and convenience of parking. But, it has several disadvantages, such as reducement of street capacity, and commuting frictions with passengers, on the other hand. Therefore, two contradictory opinions of on-street parking have raised. One is that on-street parking lots should be established and used to the extent not to obtrude the commuting traffic, because they are easy to establish and abolish, and convenient to users. The other is that on-street parking should be abolished, because the permission of on-street parking can only temporary alleviate parking difficulties, and the permission also brings about new parking demands, and the rapid increase of automobiles raises traffic congestion and parking problems immediately. The relevance of those assertions should be judged by reviewing the attributes of a community and a physical conditions. In the case of Pusan, the immediate abolishment may bring about the inconvenience of parking due to underdevelopment of a mass transit system and insufficient off-street parking. Therefore, citizens and businessmen may oppose the abolishment of on-street parking. In this context, on-street parking should be provided without impediment of traffic commuting in the short term, but it should be gradually reduced on streets to be in accord with their primary functions, eventually, all the on-street parking should be abolished except for impossible places to provide parking facilities.

The parking charges are fixed by municipal ordinances. In Pusan, there are only two grades of parking charge. It is necessary that the grades of parking charge be classified by more than two, because the prices of land differ by place, and demand and supply of parking at any place are different. In addition, because it is more convenient in several aspects, such as easiness to access and to find parking lots, and short distance to destination, than off-street parking. Therefore, the parking charge should be increased to the extent of the same price of private parking lots. The price of on-street parking is lower than private parking. It means that the municipal government subsidizes the car driver, and it increases the parking demand, makes car drivers prefer public parking to private parking. All the things obstrude the business of private parking lots. Therefore, the price of public parking should be the same as the price of private parking so that car drivers may pay all the parking costs. The municipal government has to use the increased incomes to expand off-street parking lots for special purposes, such as park-and-ride facilities.

In fact, parking cost and components of parking activities, such as general in-vehicle time, parking search time, and egress time strongly influence the choice of parking types and locations (Axhausen and Polak, 1991: 59-60). Many past studies of travel behavior have investigated the effect of different components of parking costs and times on the choice of travel mode. There has been much less study on what effects parking costs and times have on the choices between different types of parking or different parking locations. In addition, a number of previous studies may have incorrectly concluded that travel demand is relatively insensitive to parking policy measures (Bradley and Lazell, 1986). In any rate, it is evident that parking costs and times strongly influence parking and travel behaviors, parking policy is a widely used and important tool of contemporary transport planning (Young, 1990). But, in order to use parking policy measures for such purpose, we have to fully understand the effects of parking policy variables on various aspects of parking and travel behavior. Without a clear understanding of them, policies might not obtain the intended benefits. For example, a policy restraining on-street parking might not lead to an increase in off-street parking or a decrease of solo drivers, but to an increase in both illegal parking and parking fringe areas around the restraint area (Axhausen and Polak, 1991: 77).

There are several methods of collecting parking fees, such as using parking meters, attaching parking cards to cars, or giving parking tickets. Even though the method of using a parking meter has several advantages, such as saving manpower, preventing illegal operating, raising turn-over rate, it has also a great disadvantage of high costs of establishing the facilities. In Pusan, most on-street parking lots are operated by the method of "attaching a parking card to the car." Research shows that parking management by parking meter method is much more efficient than that of any other method. Therefore, management style of on-street parking should be changed to the parking meter method. If there is a problem of establishing costs, municipal government has to adapt the measure for private firms to establish parking meters and to get the rights to manage the parking lots (Ministry of Construction, 1990: 145).

Provision and Production of Public Inner Off-Street Parking

Generally, public inner off-street parking lots should be established at places where there are insufficient attached parking lots. Location and size of inner off-street parking lots should be decided with considering an urban master plan including transport facility plans and land use plans. It requires too much money to establish off-street parking facilities. It also requires too much time due to not only construction schedules but agreements among related institutions. Therefore, it is desirable to establish public off-street parking lots at places only where the supplies of on-street parking lots and attached parking lots are absolutely insufficient, and where private parking lots will not be established.

The proper provision unit of off-street parking is "Gu," basic local government, because it has more information of parking conditions and usable public land on the one hand, and it also provides on-street parking lots, and takes charge of Special Accounts of Parking on the other hand. The most important reason why basic local government has to provide the service is that parking service has area specific effects. It does not affect any other area in terms of traffic problems.

When basic municipal governments have to provide the parking lots, they should manage parking lots at market rates. That is, there is no reason why the price of public off-street parking ought to be lower than that of private parking lots. Off-street parking lots have characteristics of tool goods. They are not special programs for lower income persons, and there is no special purpose of reducing road congestion except controlling illegal parking. At present, the price is very low for the purpose of controlling illegal parking. But, we have to solve the illegal parking problem by strict regulations. The low price causes not only small gains but also creates more demands of car drivers and brings about social costs of traffic congestion. From this point of view, inner off-street parking lots are produced by private firms, and municipal government need not try to produce the parking lots. If there are no incentives for private firms to construct and manage those parking lots, then municipal government must use several incentives, such as tax incentives, financial aids, and cheap rent for vacant public land. In fact, several problems may result, especially, doubt of giving favor to special firm, in the case of privatization of producing inner off-street parking lots. It can be solved by competitive contracting out.

This suggestion may be supported with many empirical studies which have compared the relative costs of public and private productions of governmental services. Most of the results indicate that private production is indeed more cost-efficient than public production (Bennett and Johnson, 1980). The traditional institutional setting of the public sector poses big problems in terms of incentive structure in the sense that incentives for efficiency and incentives for cost-consciousness are more or less absent. The introduction of an element of market forces will change the management of parking lots in some important respects (Kristensen, 1983: 1-9).

Parking Management Corporation of Pusan City, which Pusan City Government initially invested all of its capital, takes charge of management and construction of all public parking lots. In nature, public organizations need not compete with any other firm or organization to create more profits. Competition makes firms to produce goods with minimum cost or to create maximum profits, because the firms which are not managed in an efficient way may be expelled by market mechanisms. But, governmental agencies or public agencies can survive due to no competition even though it is managed by an inefficient way (Weimer and Vining, 1992: 134-5). Restricted competition or non-competition in service production is a major element of government failures. Therefore, we have to review the organization structure and management style of Parking Management Corporation of Pusan City.

Provision and Production of Park-and-Ride Facilities

Park-and-Ride facilities have the purpose of reducing solo-drivers and traffic congestion by linking cars with means of mass transportation, such as subways and buses. Of course, park and ride schemes may not generally result in lasting reductions in traffic congestion, due to rising car ownership and use and the phenomenon of generated traffic (Dickins, 1991: 18). But, if there were not the schemes, the traffic congestion would be more severe.

For this purpose of park-and-ride, government need make efforts for citizens to use park-and-ride parking more positively. The parking fee should be free or very low, and mass transportation also should be developed so that car drivers may use park-and-ride facilities. Park-and-ride facilities have characteristics of toll goods. But, as the primary function is to reduce using cars or to encourage using means of mass transport, we should not put the responsibility of provision and production of park-and-ride parking on markets, but put the responsibility on government. If drivers park cars at park-and-ride facilities, and use means of mass transport, it brings about several positive effects, such as reducing congestion, consumption of energy, and pollution, throughout the city. Therefore, it is desirable that city government take responsibility of provision of park-and-ride parking.

There are two kinds of park-and-ride facilities. One is attached to subway stations, and the other are remote park-and-ride facilities which are established at boundary areas of a city and linked to buses. All of those facilities should be provided by city government, but the production of the services, such as collecting parking fees and operating parking lots may be charged to private firms by contracting out.

Provision and Production of Private Parking

Private parking lots are established by individuals and firms to earn profits. On considering deficient parking lots in Pusan City, it is desirable to encourage the business of private parking. As the inner off-street parking lots and in-house parking lots are toll goods, the private sector should take responsibility to provide and produce parking lots. Recently, The Korean Government tried to relax many kinds of administrative regulations of parking, and make private firms to determine parking charges at market rates. In addition, government recommends private firms to banks to get loans within seventy per cent of total costs of parking construction.

Despite those policies, are there several reasons why private parking lots are not constructed actively. The most important reason is that most car drivers illegally park, and there is no strict regulation of illegal parking. The second important reason is that the price of public parking is much lower than that of private parking. That government supplies cheap parking spaces is good for car drivers, but it results in the effects of subsidizing to car drivers, and encouraging car driving.

Moreover, it raises equity problems because the users of parking lots are above a certain class. Those two factors cause to reduce the demands of private parking lots. Therefore, it is necessary that strict regulation of illegal parking and adjustment of parking charges should be enforced. Furthermore, It is desirable to deregulate many kinds of conditions of parking construction. Since parking problems may be different by area in the city, the basic local government should provide incentives and regulations for private parking lots.

Provision and Production of Attached Parking

Attached parking lots, which are attached to facilities requiring parking, are supplied to customers of the building or facilities and general public. The parking-space obligation comes into power when a building is newly erected, when it is rebuilt or extended or even when the uses of the building are changed. Basically, there are two ways of fulfilling the parking-space obligation: first, to build the spaces on one's own premises and, second, to pay a certain amount of money per space to the community or to build the spaces around the building with others. The second way to discharge the obligation is limited to cases where the number of parking spaces which the owner has to build is below eight. If there is no public parking space or no plan to build it, the discharge of obligation may not be permitted.

The present standards of attached parking lots have been stricter than before by the city ordinances of construction and management of parking lots. Raising the standards of attached parking lots is the most effective policy measure in that it makes the owners of the facilities causing parking needs to establish more parking spaces and to absorb the parking needs. But, requiring excessive attached parking lots may be a burden to the owners of those facilities, and it may bring about excessive parking demands. Therefore, many city governments of America lower the standards of least parking lots, or abolish the standards, or establish the standards of maximum parking lots. In short, there are two policy measures; one is to raise the standards, and the other is to lower or abolish the standards. Which is more relevant should be judged by considering physical conditions, such as development of mass transport, the conditions of on-street parking and off-street parking, and attributes of a community, such as citizens' parking and travel behaviors and other cultural factors

In the case of Pusan City, it is undesirable to lower or abolish the standards in the short run throughout the city, because the mass transport system has not developed yet, and public or private parking lots are not sufficient. It is necessary to make double standards. One is to apply lowered standards to central places where the mass transport system is being developed, and where traffic congestion is severe, the other is to apply strict standards to outskirt areas where there is small traffic volume. In this point of view, the authority to establish the standards of attached parking lots should be greatly delegated to city government and basic local government.

Residential Parking Permit Program

Residential parking means to preserve cars in house garages for a long time unlike using parking lots. In Korea, even though government made a rule of residential parking lots recently, the rates of established garages or parking lots are 19.1% in Pusan, and 36.7% in Seoul due to old style houses. A survey by Pusan City showed that 58.5% of total parking was illegal on-street parking in 1992 (Pusan City Government, 1993: 193). Therefore, more than a half of car drivers park their cars on streets and it brings about severe congestion in Pusan. Originally, parking vehicles on the public street did not belong to the common uses of a street; vehicles had to be parked on private premises (Topp, 1991: 13).

Streets are a congestible public good, that is, there is some maximum number of users after which each user begins to subtract from the use of others. Once supplied, streets can also be considered common pool facilities, and as such, present a number of problems affecting the ability of individuals to use street facilities jointly. Users can subtract from one another's welfare in a variety of ways (ACIR, 1988: 81-2). If there are too many cars parked legally or illegally in the streets, it impedes passages of pedestrians or cars, and results in reducing welfare of roads. Especially, streets in many residential areas of Pusan city are always occupied with cars which residents, employees, customers, and visitors have parked disorderly. That brings about many kinds of social costs, such as severe road congestion, traffic accidents, inaccessibility of emergency automobiles, noise, and air pollution. Therefore, we need a rule to regulate illegal parking in streets which are common-pool resources.

Parking spaces are demanded by residents, employees, customers and visitors, and by delivery and service traffic. The latter is often summed up as commercial traffic and considered to represent the necessary or unavoidable part of motor traffic in a city. Parking provisions for residents have a priority, even within streets of existing city districts. Where residential functions are to be encouraged, parking for residents must be obtainable within a reasonable distance and, at the same time, non-residential car traffic should be kept away. Third in the usual hierarchy of parking demands-following commercial and residents- are those of customers and visitors. This user group is very heterogenous and includes shopping, business and private visits. For these mainly short-time parkers, some parking spaces close to the destination should be provided and charged for at the market rate. Finally, for long-parking employees, no on-street parking should be available and off-street parking only at market-rate conditions. Employees who rely on their cars because of handicaps, business needs or lack of reasonable public transport alternatives, can usually be provided with parking spaces by their firms (Topp, 1991: 5-6).

In this context, we can suggest several policy measures in order to solve illegal parking on residential streets. As a policy measure, we have to enforce a Residential Parking Permit System (RPPS). A rule of the system is that they make all the car users, who park their cars in the streets in residential areas, to buy a parking ticket. This rule has several purposes. The first is to make the car owners parked in the streets to burden the social costs causing from illegal parking on the residential streets, and to reduce demands of cars due to the high cost of owning cars.

In order to find the effects of this policy measure, I made a following policy scenario, and surveyed the responses of this scenario.

> If all the residents who park their cars in the residential streets have to buy a Residential Parking Permit Ticket ($40-$60 per month, 2/3 of private parking rate), will you buy a car in 5 years?

Among 138 persons who have a plan to buy a car in 5 years, fifty six persons (40.9%) answer that they will not buy a car if they have to buy the ticket afterwards to park a car on the streets. Therefore, RPPS has a great effect on controlling the demands of cars. But, there is nearly no effect for the car owners to sell their cars because of RPPS. The result of the survey shows that, among fifty-two persons who have parked on residential streets, thirty-two persons (61.5%) will buy the tickets, and ten person (19.2%) will move to condominium apartments, and six persons (11.5%) will install a private garage, and only three persons (5.8%) will sell their cars. The effects of RPPS may be great, but to buy the tickets does not mean to agree with RPPS. Therefore, there may bring about strong resistance against RPPS unless there is no development of a mass transport system.

The second purpose of RPPS is to induce drivers to park their cars on residential streets, and to make them use means of mass transport. RPPS includes strict enforcement of parking regulations. This system differs from Reserved Permit Parking which has the only purpose of solving parking difficulties on residential streets (Hazell, 1992: 80). There is research to support the policy measure, that is, RPPS. A before and after study within the same year in Munich (ADAC, 1982) shows the effects of residential parking permits on the modal choice of employees. The share of car solo-drivers dropped from 44% to 32% and the traffic peaks and search traffic during the day were reduced. The share of public transport increased from 39.7% to 47.3%, and the shares of pedestrian, bicycle, parking-and-ride car passengers increased (ADAC, 1982; Topp, 1991: 4).

RPPS includes a Employee Parking Permit Ticket which enable employees to park in the residential streets during day time. But, the price of the ticket should be at least twice as expensive than that of a Residential Parking Permit Ticket. This RPPS includes also Visitor Parking Permit Tickets.

As residential parking problems happen to break out in most areas of Pusan, it is a city-wide problem, but the degree of severity differs by area. The social cost of residential parking problems may be burdened to residents. Therefore, it may be proper that the provider of residential parking is "Gu," basic local government. But, as Korea has a long history of centralization, and a short history of "Gu" Autonomy System, there may be great difference in perceiving a rule or institution, which either city government or basic local government makes, as important. Therefore, it is desirable to enforce the RPPS throughout the city, and basic local government may be the proper unit to provide RPPS, such as, establishing residential parking permit areas, the size of parking rates, how to sell the tickets. In short, parking permits for residents, limited-period parking and parking charges are the most important instruments to control on-street parking in residential areas (Topp, 1991: 12).

Strict Enforcement of Illegal Parking Regulations

It is a prerequisite in order to solve transport and parking problems to enforce parking regulations strictly. Most large cities in Korea have difficulties with severe illegal parking. It caused from high cost to regulate illegal parkings, and no strong will of government to regulate them. Parking regulations are enforced by police and special officials of basic local government, Gu. There are great differences in amounts of fines, imposing process, how to use the fines by whether police or Gu enforces the regulation of illegal parking.

Recently, Pusan City Government made a recommendation to the Ministry of Internal Affairs to unify the dual rules. Especially, the fines are to be used for different purposes. The fines, which police collect, can be used for constructing buildings of judicial agencies. But, the fines, which Gu collects, can only be used for parking facilities. At any rate, it is desirable to use the fines for parking facilities only except maybe also for regulating activities. In fact, policemen and special officials will not regulate illegal parking thoroughly, because they have to quarrel with the regulated car drivers too often, and there is no incentive to regulate illegal parking thoroughly. Therefore, it is necessary to make incentives for them to do their work more positively. In this point of view, we have to make a rule which makes policemen or special officials, or at least the agency, to enable to get some allowances by their achievements. If this rule is enforced immediately, there will be too many parking violators, and need too many personnel to do this work. But, if we enforce this rule after notice periods, the number of violators will be reduced. At any rate, at early stages of enforcing this rule, many personnel will be required. Accordingly, it is recommendable to use "public personnel" who work for public interests instead of serving in the army.

Enforcement of Employee-Paid Parking

Most employees who drive to work use free attached parking lots of their firms or agencies. Although employer-paid parking may appear to be a generous, enlightened, and popular employment policy, it is also a strong incentive to drive to work alone, and it strongly works at cross purposes with public policies designed to reduce traffic congestion, energy consumption, and air pollution. But, recently, the number of cities to abolish or lower the standards of attached parking lots increases, as parking problems are gradually severe. We have to be concerned with the negative effects of employer-paid parking. It results in reducing the cost of solo driving, and encouraging solo driving. An early study in Canada provides the evidence that reducing parking subsidies reduces solo driving. This study examined the results when the Canadian government stopped providing free parking to its employees in Ottawa in 1974. Ottawa has an all-bus transit system with high levels. Employees were asked to report their travel mode choice before and after the date of the policy change (Transport Canada, 1978).

A comprehensive examination of employer parking subsidies is found in a report, which examined the effect of employer parking subsidies. Using five case studies and six alternative travel models, they show that free parking causes more solo driving. The case studies include three examples in "auto-dependent" Los Angeles-Civic Center employees, Century City employees and UCLA students. All the case studies show that employer-paid parking increases solo driving. The strength of the effect depended on transportation conditions (e.g., parking price, transit service) in the area studied (Shoup and Pickrell, 1980). A recent article reviewed empirical studies of how employer-paid parking affects employees' travel choices. A strong effect was found: Parking subsidies greatly increase solo driving. When employers reduce or remove parking subsidies, a significant number of solo drivers shift to car-pools and/or transit (Willson and Shoup, 1990: 141-57).

In my survey, among 214 car drivers, 187 respondents (86.9%) park their cars at the attached parking lots at their work. I asked them a question of the following policy scenario to find the effects of stopping employer paid parking.

> If you have to pay similar amounts of private parking charges for your parking at your work, and strict regulations are also enforced, what kind of means of transport would you use?

Sixty eight car drivers (36.1%) answered they will continue to use the cars with paying the parking charges, and one hundred and nineteen car drivers (63.9%) answered they would stop car driving. Therefore, stopping employer paid parking may have a great effect on reducing solo driving and reduce parking needs. If this rule is enforced with other policy measures, development of mass transport system, only thirty five car drivers (18.9%) answered they would continue to drive to work. A few days ago, a university in Korea decided to make charges for parking in university parking lots for the first time. On considering the conditions of Pusan where parking and transport problems are gradually increasing, we have to adopt employee-paid parking. When the employer-paid parking is stopped, the resistance of employees may come. Therefore, it is recommendable that employers give commuting allowances to employees with resources of parking charges.

Conclusion

When we consider the attributes of Pusan City and its physical conditions, we can easily expect that traffic congestion of the inner city and parking problems will be worse than ever before without drastic policy measures. As parking is an integral part of the transport system, parking problems should be perceived and defined in the context of reducing traffic congestion which is the most important problem in transport. In this point of view, parking policies should be made in the direction of controlling parking demand and car driving by development of a mass transport system.

In this context, policy measures of institutional arrangements for provision and production of parking service may be summarized as follows.

First, On-street parking should be abolished in the long run, and new on-street parking should not be established any more in the short run. It is desirable that the basic local government, "Gu" take responsibility of providing on-street parking services, and private firms selected by competitive contracting out produce the on-street parking services, such as collecting charges and operating parking lots. The charges of on-street parking lots should be at the same level of market rates.

Second, the inner off-street parking services should be provided and produced by private firms with financial aid and tax incentives. Park-and-ride facilities should be provided by city government because the effects of park-and-ride are felt throughout the city. It requires that the charges of park-and-ride parking be free or very low, and a mass transport system be linked to those areas.

Third, it is undesirable that the standards of attached parking be lowered quickly. The standards should be lowered or the maximum standards of attached parking should be established in inner congested areas in the long run. The responsibility of provision of this service should be placed on basic local government.

Fourth, a Residential Parking Permit System (RPPS), which the car owner has to pay charges for residential on-street parking, should be enforced. The price of residential parking should be lower than that of private parking in short, but they should be the same, or residential on-street parking should not be permitted in the long distant future. RPPS should be provided by basic local government, and this service may well be produced by private contracted firms.

Fifth, it is recommendable to enforce employee-paid parking because of the great effects of controlling solo-driving. The profits caused from enforcing this rule should be distributed to all the employees in order to reduce their resistances.

Sixth, the regulation of illegal parking should be strictly enforced for success of those parking policies. The authority to regulate the illegal parking should be also entrusted to the contracted agency. The fines should be used only for parking services, and a part of those resources should be used for activities of regulating illegal parking as allowances. At the early stage, regulating illegal parking requires too many personnel, but it does not require too many resources if the systems are settled. It is recommendable to use "public personnel."

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