Policies

Unmanned Illegal Parking Enforcement: The Power of Fines and Physical Evidence

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Policy Implementation Period

- 2004: Construction of the Automated Parking Enforcement Service.
- Apr. - Sep. 2004: Execution of pilot project (installation of 32 cameras).
- Mar. 2008: Installation of an additional 156 unattended enforcement cameras (by March 2008)
- May – Nov. 2004: Commissioning of the basic/work design for the illegal parking enforcement service; selection of locations for installation of additional cameras under the expansion project, and finalization of the system specifications.
- Dec. 2004 – Aug. 2005: Installation of an additional 53 cameras as part of the expansion project.
- Aug. – Oct. 2005: Installation of an additional 32 cameras along Cheonggyecheon-ro.
- Aug. 2006 – Feb. 2007: Installation of an additional 51 cameras along Cheonho-daero and other locations.
- Sep. 2007 – Mar. 2008: Installation of an additional 20 cameras along Songpa-daero and other locations.

Background Information

Traffic enforcement refers to the processes involved in enforcing criminal and administrative laws and regulations against violators of traffic laws and regulations, which are carried out to ensure safe and efficient traffic movement and prevent the disruption of road traffic. Enforcement efforts had been undertaken exclusively by human enforcers at the police and local government level until the introduction of the automated enforcement system in 2004.

As public officials are a finite resource, full-time traffic enforcement cannot be achieved with human resources alone; nor can the outsourcing of enforcement services provide a viable or ultimate solution. In sum, human-only enforcement is virtually incapable of guaranteeing uninterrupted, continuous implementation. This situation has led some violators to believe that they simply had "bad luck," and thus to express their dissatisfaction with the punishment imposed. For such reasons, human-only enforcement has been the focus of a multitude of frequent civil complaints regarding the overall fairness of traffic enforcement. The limited scope of a single person's cognitive ability also raises questions about the unfairness of enforcement and other unjustified practices in the course of carrying out such enforcement.

Another issue with human-only traffic enforcement is that it often causes traffic accidents, and can lead to or even exacerbate traffic congestion. However, traffic regulation violations (including illegal parking) disrupt the efficient use of traffic facilities in various ways, resulting in the serious disruption of both traffic and circulation. In this sense, traffic enforcement is as crucial an element as the construction of yet more traffic facilities.

State-of-the-art automated traffic enforcement services were introduced as a way of overcoming the limitations of human-only traffic enforcement and thereby realize the full potential effect of traffic enforcement.

The Importance of the Policies

Seoul undertook wide-ranging reforms of its public transportation system in 2004, having previously drawn up the plan for the construction of the ITS in 2000. The announcement of the ITS plan spread the notion that efficient traffic systems can be achieved with innovative approaches using cutting-edge technology. The sweeping reforms of the public transportation system resulted in the introduction and widespread use of various means and tools that were considered to be capable of radically improving traffic efficiency and the overall quality of road services - including the integration of bus services, the integration of traffic information, and the introduction of bus-only lanes. However, if those traffic facilities and tools could not operate properly or carry out necessary tasks due

to rampant violations of the traffic laws and regulations, any additional investments and facilities would have been viewed as nothing more than a waste. From this perspective, the automation of parking and bus-only lane enforcement could play a critical role in ensuring the effectiveness of the policy means and tools for improving the quality of road services and road traffic efficiency.

Such efforts can be understood in the context of transportation system management (TSM), a system that Western countries have practiced since the late 1980s. In other words, the automation of traffic enforcement is consistent with the principle of balancing traffic demand and supply by ensuring the efficient management of existing facilities so as to improve their capacity, rather than introducing additional facilities.

Relevance with Other Policies

Unattended enforcement services are also applied to the enforcement of bus-only lanes. This represents a policy approach based on the same principles and purpose as those of unattended parking enforcement: Its purpose is to improve the efficiency of bus-only lane management and monitoring. Similar policies aimed at economical management and efficient punishments include the speed enforcement system. The drive-by unattended parking enforcement system has been attracting considerable attention, in addition to the previous fixed parking enforcement system.

Furthermore, unattended enforcement services may be used for multiple purposes including such services as traffic monitoring and traffic data collection, rather than just the remote enforcement of parking regulations. More specifically, they can be used to inform the public of the city's traffic policies through the video link function and integrated monitoring by TOPIS, as well as to analyze the effectiveness of the installation locations.

- TOPIS
- Speed Enforcement Service
- Policies to reduce traffic accidents
- Drive-by Parking Enforcement System

Policy Objectives

The automated traffic enforcement services are provided through automated systems to identify vehicles which violate traffic laws and regulations using various imaging and automated recognition technologies. Ultimately, the services are designed to prevent traffic accidents and ensure traffic safety in a more efficient manner.

By providing these services, the city seeks not only more efficient - but also fairer and more transparent - enforcement.

The agencies in charge of traffic enforcement can use such services not only to manage their manpower more efficiently, but also to facilitate the handling of other related work– such as the manual enforcement and issuance of parking tickets.

Main Policy Contents

1) Legal Basis

The Road Traffic Act (June 13, 2008, Act No. 9115) provides the definitions of 'stopping' and 'parking,' the regulations concerning standing and parking, and the appropriate method of enforcement.

Article 87 (2) of the Enforcement Decree of the Act stipulates that evidence may be gathered using unattended equipment when identifying parking violations through the parking enforcement services.

Article 87 (Special Exceptions, etc. to Parking Regulations with Delegated Authority)

① Notwithstanding the provisions of Article 86 (2) 2, the Special Metropolitan City Mayor or the Metropolitan City Mayor may take the necessary measures directly under Article 35 of the Act against vehicles that violate the parking regulations so as to ensure the smooth flow of traffic and public safety.

Where the Special Metropolitan City Mayor or the Metropolitan City Mayor directly discovers and regulates a vehicle that has violated the parking regulations pursuant to paragraph (1), he/she shall make known such instances to the district leaders and country heads that have jurisdiction over the locations where such violations occur by furnishing them with the appropriate evidential materials, such as photographs of a vehicle on which a notice indicating that a vehicle is subject to the imposition of an administrative fine has been attached, or any photographs, videotapes or any other visual recording medium of a vehicle that has violated the parking regulations taken by an unattended monitoring device (hereinafter referred to as "photographic evidence"), and a document that describes the location at which the violation has occurred, the details of the violation, and the license plate number of the vehicle.

2) Authority of Enforcement

Government officials of the cities and counties, as well as the police, have the authority for parking enforcement.

If each mayor of special and metropolitan cities delegates his or her enforcement authority to the district leaders and county heads, the

enforcement officials of each autonomous district have the authority for enforcement.

Under Article 86 (Delegation or Entrustment of Authority) ② Pursuant to Article 147 (2) of the Act, each mayor of special and metropolitan cities shall delegate the following authority to the district leader and county heads under his/her jurisdiction: <Amended on June 20, 2008>

1. The authority to appoint and dismiss traffic enforcement officials (belonging to each district and county) under Article 12 of the Act, and the authority to take measures against vehicles that violate the parking regulations referred to in Article 35 of the Act;

2. The authority to have the task of towing, possessing and returning vehicles performed in proxy by an agent pursuant to Article 36 (1) of the Act, and the authority to place an order to take measures and conduct the education necessary for the performance of works pursuant to Article 36 (3) of the Act;

3. The authority to impose and collect fines under Article 161 (1) (3) of the Act (limited to violations falling under any of Articles 32 through 34 of the Act).

3) System Structure

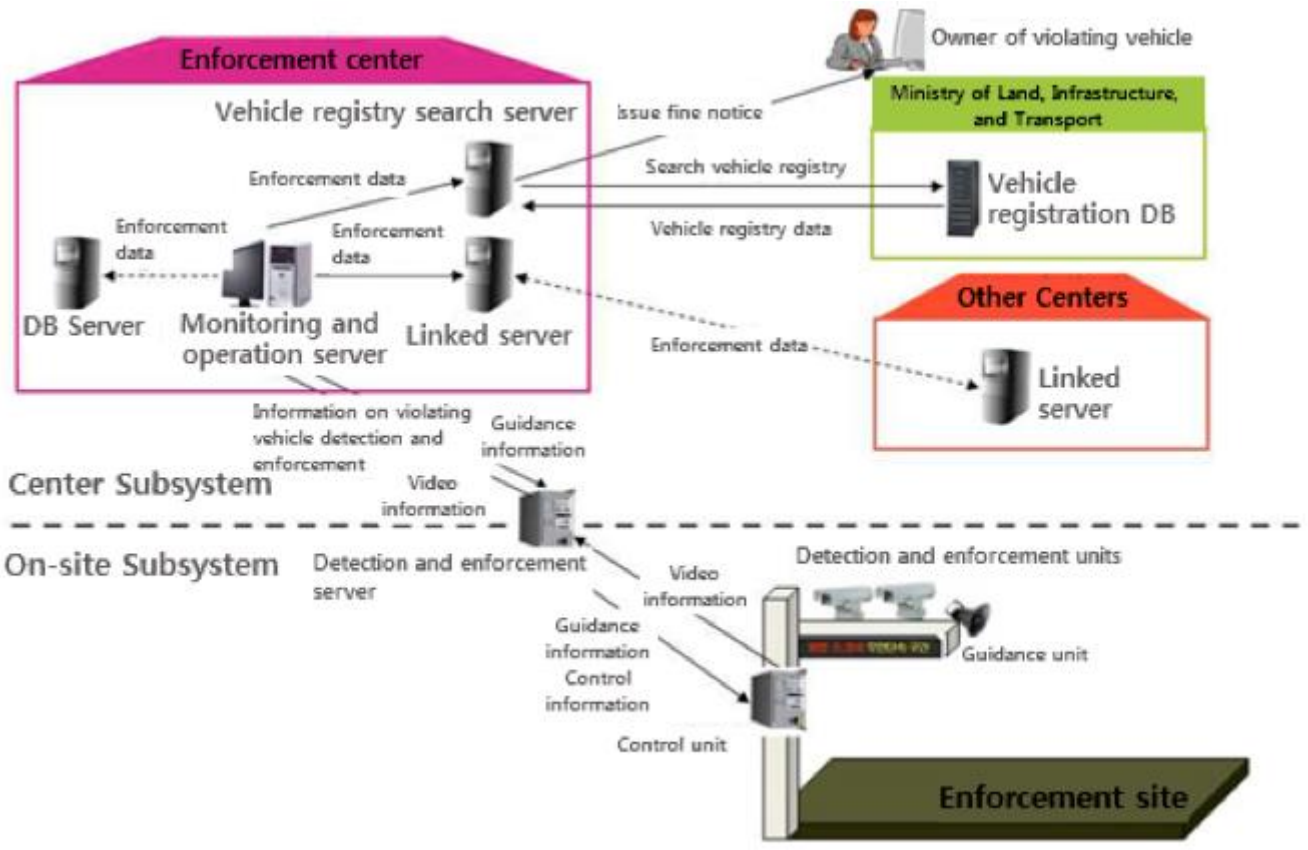
The automated parking enforcement service system is composed of on-site subsystems and the center subsystem. Specific components may vary depending on the equipment specifications and methods of enforcement. However, a typical system composition is as indicated in Figure 1 below. Figure 2 shows Seoul's parking enforcement system.

On-site subsystems should be fitted with the equipment necessary for identifying parking violations and collecting evidence. Ideally, the enforcement agency (center) should be able to monitor the parking enforcement areas and the current status of enforcement in real time.

The enforcement agency (center) should have the necessary equipment for imposing fines on the owners of vehicles that have violated the regulations based on the evidence produced by the system. It is also recommended that they possess a server for the real-time monitoring of the enforcement sites and operation of the parking enforcement services.

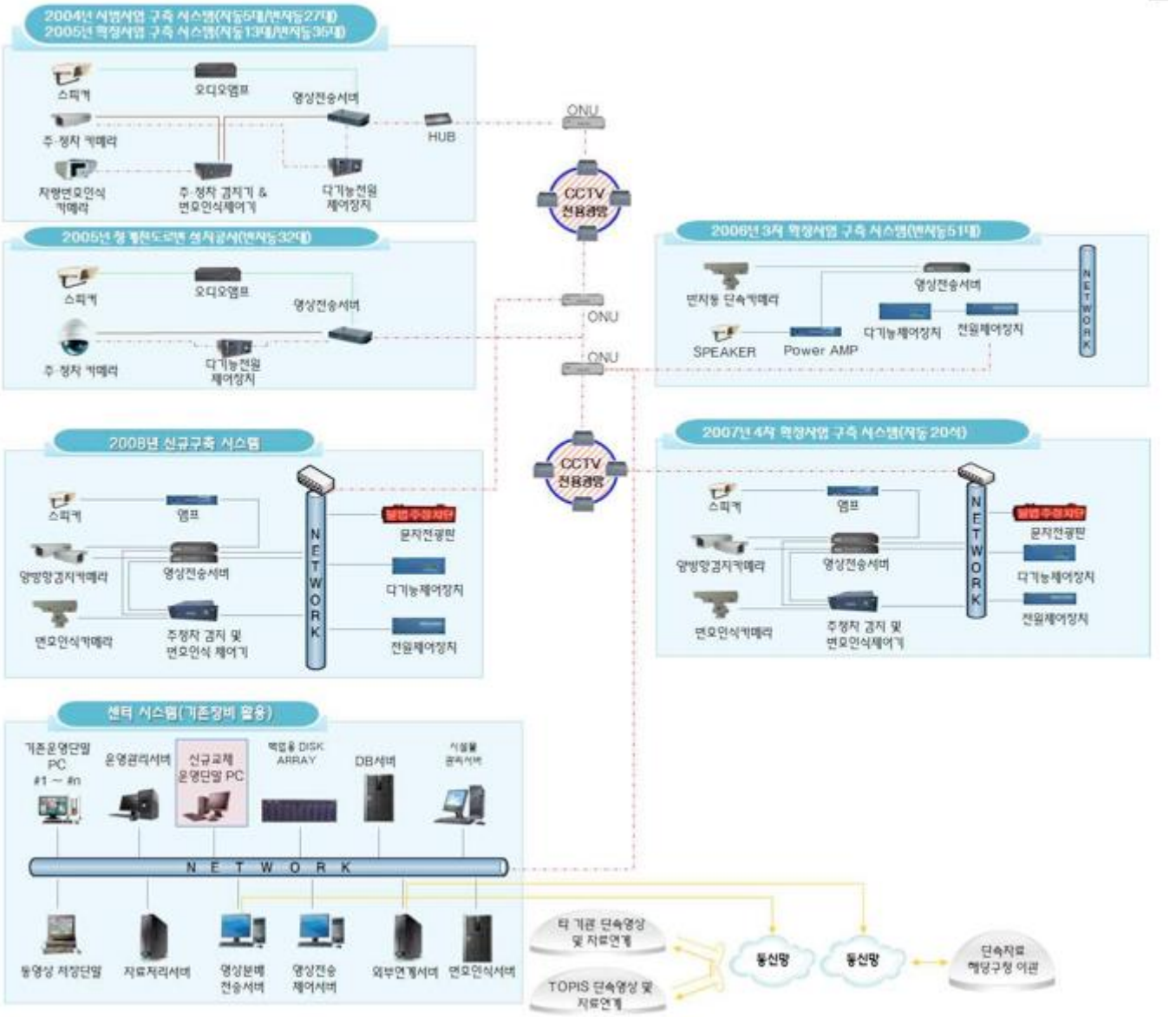
The enforcement agency (center) may also choose to build a DB or link the relevant information from other agencies, and build a DB server or linkage server for such purposes.

Figure 1: Illegal Parking Enforcement System



Source: Ministry of Land, Infrastructure, and Transport (2009)

Figure 2: Seoul's Illegal Parking Enforcement Systems



Source: Ministry of Land, Infrastructure, and Transport (2009)

The table below lists the components of the on-site subsystems and center subsystem.

Table 1: Components of the Illegal Parking Enforcement System at Enforcement Sites

Component	Function
Detection Camera	Automatically records the entry, movement, and exit of vehicles in and out of the enforcement site.
Enforcement Camera	A high-definition digital camera records evidence of parking violations. Operated via control signals from the on-site control unit.
Zoom Lens	This lens adjusts the detection area of the camera so as to enlarge or shrink the collected images within a specific range.
Housing	Protects cameras and lenses from vibrations and sunlight
Image Server	Compresses images collected from the site and transmits them to the center in real time. The center transmits audio data to guide the violating vehicles at the site. Transmits serial signals for various on-site control functions.
Control Enclosure	Designed to maintain the components in the optimal condition and protect them from vibration, sunlight, smoke, and other forms of interference.
Pan/Tilt	Controls the direction of the cameras so as to take photos of violating vehicles. Provides accurate and stable position control and high-speed control.
Power Control Unit	Provides a stable supply of power to on-site equipment, and enables remote power control.

Table 2: Components of the Parking Enforcement System at the Center (Control Room)

Component	Function
Operation Terminal PC	On-site monitoring, control of on-site equipment, display of status information, issuance of guidance, and printing of violation notices. Performs various functions for viewing, editing, revising, and registering the DMBS 3).
Operation & Management Terminal	Monitors enforcement status and real-time traffic situations, and stores information in a DB.
Data Processing Server	User account management, plate number recognition system data management, system operation and

		management, on-site equipment management, enforcement information list management, database link, and system management (shutdown, plate number recognition data).
Video Storage Terminal		Enables the storage, search, and display of videos from the site. Enables videos to be searched by time, date, and time zones in the event of a civil complaint. Performs event log and enforcement list management.
Database Server		Stores and backs up enforcement data, updates detection areas and parameters, controls recording commands and vehicle detection functions.
DISK ARRAY4)		Stores and manages data in preset folders at a specific cycle. Backup software consists of the Master Module, Client Module, and Disk Backup Module.
Required a)	Plate Number Recognition server	Automatically recognizes plate numbers from the photographs of vehicle number plates.
Optional b)	Video Distribution and Transmission Server	Distributes and transmits enforcement videos from each site to the departments and agencies that require them.
	Video Transmission Control Server	Processes videos from the Video Distribution and Transmission Server in formats required by the respective departments, and manages the information on the history and display status of on-site videos transmitted to each department.
a) Required: Must be set up either in the onsite system or the center subsystem. b) Optional: To be selectively implemented as required.		

3) Operation Organization

Automated enforcement services require a specific space from which to monitor the enforcement status, whereas semi-automated or manual enforcement systems require manpower to monitor and operate such systems.

The overall system of parking enforcement consists of two parts: one responsible for direct operation of the enforcement services, and the other for handling administration related to the imposition of fines. Therefore, each part should be manned with suitable personnel.

4) Current Status of Unattended Parking Enforcement Systems in Seoul

In Seoul, parking enforcement systems have been installed on 42 four-lane (or less) roads (22%), 50 six-lane roads (27%), and 96 eight-lane (or more) roads. Seoul's enforcement systems are concentrated around the city's main roads. Specifically, parking enforcement systems have been installed on 42 four-lane (or less) roads (22%), 50 six-lane roads (27%), and 96 eight-lane (or more) roads. The table below shows the status of parking enforcement systems across different roads and autonomous districts. The total number of systems in the entire city was increased from 188 in 2007 to 252 by late 2014.

Table 3: Current Status of Unattended Illegal Parking Enforcement Systems Installed on Roads (2007)

Road	Number of Systems Installed	Road	Number of Systems Installed	Road	Number of Systems Installed
Gangnam-*daero*	7	Mia-*ro*	20	Wangsimni-*gil*	6
Gangseo-*ro*	4	Banpo-*ro*	1	Ujeongguk-*ro*	2
Gyeongin-*ro*	7	Bangbae-*daero*	1	Euiju-*ro*	4
Gongdan-*ro*	1	Bongcheon-*ro*	1	Itaewon-*gil*	5
Gwanak-*ro*	3	Seogang-*ro*	1	Jayang-*ro*	1
Namdaemun-*ro*	8	Songpa-*daero*	9	Cheonho-*daero*	10
Dobong-*ro*	3	Susaek-*ro*	4	Cheonggyecheon-*ro*	32
Dong2-*ro*	2	Siheung-*daero*	5	Cheongjindong-*gil*	1
Dongjak-*daero*	2	Sinbanpo-*ro*	1	Tongil-*ro*	4
Deungchon-*ro*	4	Sinwol-*ro*	3	Toegye-*ro*	4
Mapo-*ro*	6	Sinchon-*ro*	3	Hangang-*ro*	1
Mangu-*ro*	5	Yangchon-*gil*	1	Hwagok-*ro*	1
Mokdongdong-*ro*	1	Yanghwa-*ro*	5	Hwarang-*ro*	1
Mokdong-*ro*	1	Yeonseo-*ro*	2	Hunryeonwon-*ro*	1
Mugyodong-*gil*	1	Yeongdeungpo-*ro*	2	Heunginmun-*ro*	1

Table 4: Current Status of Unattended Parking Enforcement Systems Installed in Autonomous Districts (As of December 2014)

Name of autonomous districts	Number of Systems (units)	Illegal Parking	Bus-only Lane	Installed in Bus	Transit Mall (Yonsei-*ro*)
Total	329	252	45	28	4
Jongno-*gu*	30	29	1	-	-
Jung-*gu*	37	36	1	-	-
Yongsan-*gu*	4	4	-	-	-
Seongdong-*gu*	5	4	1	-	-
Gwangjin-*gu*	6	6	-	-	-
Dongdaemun-*gu*	9	9	-	-	-
Jungnang-*gu*	8	2	2	4	-
Seongbuk-*gu*	10	10	-	-	-
Gangbuk-*gu*	28	15	1	12	-
Dobong-*gu*	9	9	-	-	-

Nowon-*gu*	10	4	6	-	-
Eunpyeong-*gu*	16	9	3	4	-
Seodaemun-*gu*	16	7	5	-	4
Mapo-*gu*	16	14	2	-	-
Yangcheon-*gu*	20	15	1	4	-
Gangseo-*gu*	7	6	1	-	-
Guro-*gu*	1	1	-	-	-
Geumcheon-*gu*	8	8	-	-	-
Yeongdeungpo-*gu*	14	14	-	-	-
Dongjak-*gu*	10	9	1	-	-
Gwanak-*gu*	11	11	-	-	-
Seocho-*gu*	22	10	12	-	-
Gangnam-*gu*	6	2	4	-	-
Songpa-*gu*	23	15	4	4	-
Gangdong-*gu*	3	3	-	-	-

Note) Bus-mounted systems are based on the bus depots.

Policy Effects

Introduced for the purpose of dealing with the chronic problem of illegal parking, the automated enforcement system delivers highly effective enforcement while reducing resistance or complaints from drivers. The system, therefore, eliminated resistance from and conflicts with drivers on the roads. The system even works in situations where the driver stays inside the vehicle. This absence of personal interaction reduces complaints and conflicts, and also reduces the administrative burden associated with the bureaucratic process of paperwork, forms and red tape.

1) Effects Before and After Installation

An article published in Volume 8, Issue 3 of Seoul Urban Studies (2007) assessed the effect of the unattended automated parking enforcement service by looking into the case of Seocho-*gu*. The following table provides a comparison between the traffic volume and the number of illegally parked vehicles before and after the installation of the enforcement system.

Table 5: Comparison of Traffic Volume Before and After System Installation

Target Location	2004	2005	Rate of Increase/Decrease
Seoul Art Center Nambu Circular Road	119,230	120,516	1.08%
Gangnam Taegeukdang (Gangnam-daero)	83,454	85.511	2.46%
Express Terminal (Sinbanpo-ro)	111.661	113,197	1.38%
Total	314,345	319,224	1.55%

Table 6: Comparison of Changes in the Number of Illegally Parked Vehicles

Target Location	Number of Enforcement Equipment	Illegal Parking Before	Illegal Parking After	Change	Rate of Increase/Decrease
Nonhyeon Station → Kyobo Tower	3 locations	163 units	47 units	-116	-71%
Kyobo Tower → Gangnam Station	1 location	144 units	90 units	-54	-37%
Gangnam Station → Woosung Apartment	1 location	116 units	66 units	-50	-43%
Total	5 locations	432 units	203 units	-220	-52%

After the introduction of the automated parking enforcement system, traffic volume increased by 0.12% - 3.10% or 1.55% on average. The number of illegally parked vehicles per day significantly decreased by 37% to 71%, with a reduction of 52% on average.

The following table illustrates the gradual and continuous decrease in the number of illegally parked cars following the introduction of the system.

Table 7: Number of Illegal Parking Enforcement by Year

(Unit: 1,000)

Division	2007	2008	2009	2010	2011	2012	2013	December 2014
Total	3,956	3,776	3,511	2,820	2,662	2,709	2,649	2,162
Seoul	902	907	804	608	441	450	427	328
Autonomous Districts	3,054	2,869	2,707	2,212	2,221	2,258	2,222	1,834

Source: Seoul Metropolitan Government, 2014

The following table shows the amount of fines imposed upon, and collected from, illegally parked vehicles by year. The amount of imposed and collected fines all recorded gradual decreases until the end of 2014. The fines imposed for violations of bus-only lanes also largely decreased until recently.

Table 8: Amount of Fines Imposed and Collected from Traffic Enforcement

(Unit: KRW million)

Division	Parking Violation		Bus-only Lane	
	Imposed	Collected	Imposed	Collected
2008	136,917	105,721	4,122	3,270
2009	131,704	107,839	5,464	3,601
2010	101,317	85,822	3,472	1,843
2011	97,200	81,474	3,713	2,014
2012	96,874	79,485	4,291	2,559
2013	93,650	70,547	3,559	2,145
December 2014	44,736	26,702	2,116	1,419

Source: Seoul Metropolitan Government, 2014

Wonju-si Data

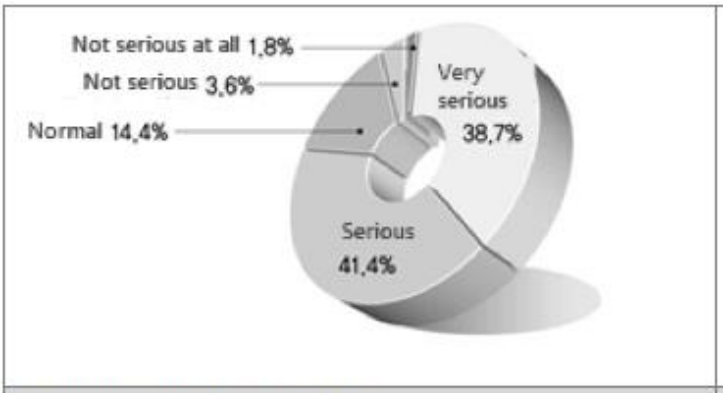
The City of Wonju announced on the 20th of last month that it had completed replacing the existing monitoring cameras at ten locations - including Rodeo Street, Nonghyup Wonju, and Dangu-*dong* GS Mart - with fully automated systems. According to the City Hall, the systems are now operating around the clock, catching 128 illegal parking practices per day on average. Wonju has installed monitoring cameras at twenty-six locations plagued with severe traffic congestion to great effect. However, illegal parking practices continued at night as well as on holidays, when monitoring personnel were scarce. Therefore, the City Hall announced that it had replaced them with automated monitoring systems capable of operating on a 24-hour basis. Wonju plans to apply this 24-hour enforcement capability to the other sixteen locations by the first half of next year.

A Wonju official said, "The fully automated system is capable of unattended enforcement around the clock, thus enabling parking enforcement at night and on holidays. This has resulted in a six-fold increase in the number of illegally parks vehicles identified." He also added, "We will also operate two vehicle-mounted cameras to enforce the parking regulations at night, focusing on areas where illegal parking has been disrupting the traffic flow." (Korea Economic Daily, November 20, 2008).

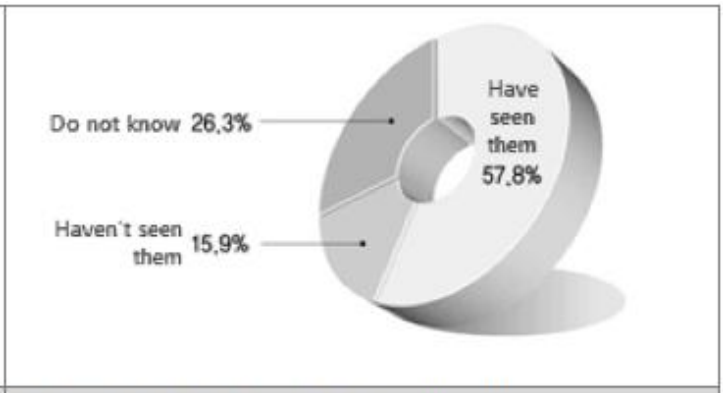
2) Effect Analysis through Demand Survey

An analysis and assessment of Suwon's Intelligent Traffic System (ITS) was conducted to survey public satisfaction with the parking enforcement systems. The following diagrams show the perceived effectiveness of the enforcement parking services as derived from the findings of the survey.

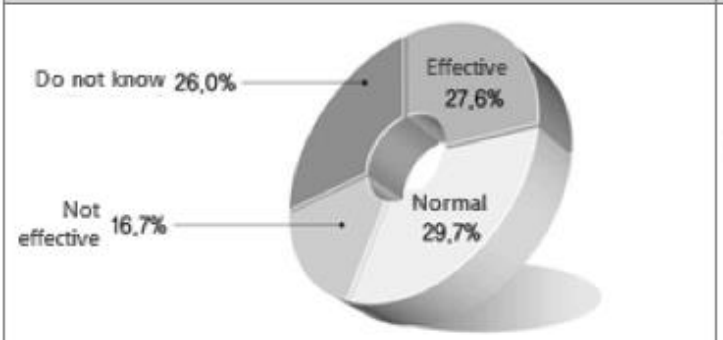
Figure 3: Findings of the Suwon demand survey



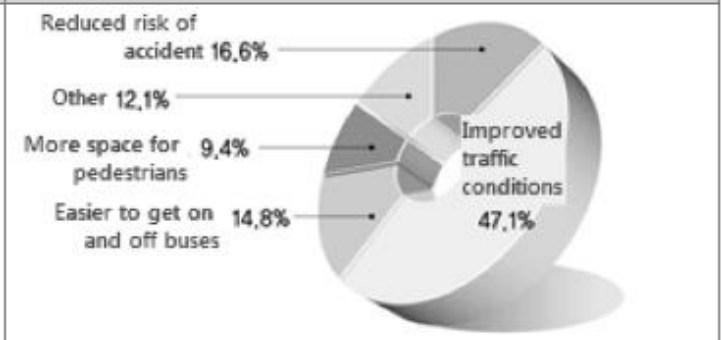
Seriousness of Illegal Parking



Awareness on Parking Enforcement Service



Effectiveness of Parking Enforcement Service Improvement



Effects of Parking Enforcement System Installation

3) Enables a significant reduction of on-site dispatches and workload while preventing illegal parking very effectively - automated plate number recognition with monitoring cameras (more than 100m away) (Geonah Information Technology, 2016)

Challenges and Solutions

1) While the automated systems contributed to an unprecedented increase in the cases of illegal parking being identified, and also proved to be highly effective in preventing illegal parking, it has since been pointed out that an excessive number of parking regulation violators were declared exempt from the punishment following enforcement.

The following table shows a gradual decrease of the collection rate (%) of parking fines since 2011. However, some commentators have pointed out that the decrease was caused by excessive exemptions.

Table 9: Amount and Percentage of Fines Imposed and Collected for Parking and Standing Violations by Year

(Unit: million won)

Division	Parking Violations		
	Imposed	Collected	Collection Rate (%)
2008	136,917	105,721	77.2
2009	131,704	107,839	81.9
2010	101,317	85,822	84.7
2011	97,200	81,474	83.8
2012	96,874	79,485	82.0
2013	93,650	70,547	75.3
2014.12	44,736	26,702	59.6

Source: Seoul Metropolitan Government, 2014

2) Fixed CCTVs face limitations in that drivers who know the locations and range of the devices can predict or avoid traffic enforcement. Therefore, drive-by enforcement equipment is expected to be used more widely as a way of overcoming the shortcomings of the previous systems.

Mobile automated enforcement equipment has proved its effectiveness in several cities. Specifically, it is a piece of all-weather removable enforcement equipment consisting of a monitoring camera (installed on the roof of a vehicle) that rotates by 350 degrees and is capable of taking up to 30 photographs per second at a speed of 40km per hour. The camera remains equally effective at night or under adverse weather conditions thanks to its infrared capability.

In 2007, the equipment was installed in four districts of Ulsan (excluding Ulju-*gun*), and the results were notable since it accounted for

27% of the total number of parking violations detected in one month (including enforcement by personnel and by fixed-type equipment).

관련 자료

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