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Governing Transportation Through Communication: A Cultural History of Intelligent Transportation Systems (ITS) in South Korea

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This article examines the role of communication in governing transportation in cities, focusing on the history of traffic management in South Korea. It analyzes 2 concrete developments: Intelligent Transportation Systems (ITS) and the Traffic Culture Index (TCI). Drawing from cultural studies of transportation and infrastructures and science and technology studies (STS), this article explores the changing sociotechnical dynamics between transportation, communication, and culture that supported the government's efforts to recalibrate scientific methods to govern urban infrastructural flows. It demonstrates how these systems furthered the long-term governmental objectives of understanding and civilizing the movements of data, bodies, and things, reflecting the increasing relevance of computational systems as a metaphor and a model for controlling urban environments. By tracing the historical convergence of communication and transportation, the article argues that this integration signifies a growing dominance of communication over transportation, marking a shift in the government's regulatory function.

Keywords: communication and transportation, Intelligent Transportation System (ITS), Traffic Culture Index (TCI), urban network system, governmentality, infrastructure

In March 1997, the Korean Broadcasting System (KBS) televised a special report titled "A Solution to the Traffic Problems of 10 Million Cars" (KBS Media, 1997). Founded in 1927, KBS has been a publicly funded national broadcaster in Korea, operating as a "public service" broadcaster that produces cultural content and programs that serve the public interest in alignment with governmental objectives. The two-part series program aired for two days, with part one entitled "Widening the Road Through System" (March 12) and part two titled "Solving Together the Traffic Problem" (March 13), highlighting the seriousness of the escalating traffic problems in Seoul that imposed significant burdens on the city's existing infrastructures (KBS Media, 1997).[2] To effectively tackle the problem of road congestion, which reporters likened to the

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[2] To put this into a perspective, in 1990, the total number of passenger cars, excluding buses and trucks was 2,074,922. However, by 1997, this number had increased threefold to 7,586,474. As of 2021, this figure has soared to 20,410,648 passenger cars (Ministry of Land, Infrastructure, and Transportation, 2022).

nation's "clogged arteries," a complete overhaul of the traffic management system was deemed necessary. The report concluded that changing the public mindset was essential, along with government measures, to incentivize preferred behaviors from citizens, such as carpooling and using public transportation.

The program's outlook was consistent with the vision for the future of traffic and urban infrastructure management in Korea, a vision upheld primarily by political and economic elites. This included officials from the Ministry of Information and Communication, Ministry of Construction (today's Ministry of Land, Infrastructure, and Transportation, MOLIT), urban planners, and city officials from the Seoul Metropolitan Government (SMG), along with major car manufacturers like Kia and Hyundai, and electronics and telecommunication service providers like Samsung and SK Telecom. These groups, based on shared problems and visions, would later become key actors promoting the development of Intelligent Transportation Systems (ITS) in Korea, supporting scientific research and the application of data-driven techniques of transportation management from the 1990s onward. This article examines the early stages of ITS's development and implementation, exploring the changing sociotechnical dynamics between transportation, communication, and culture that supported the government's efforts to recalibrate scientific methods to govern and manage mobility during this period. More specifically, it addresses how communication has come to be perceived as both a problem and a solution to the systematic governance of transportation, in response to the government's recognition of the challenges of governing increasingly complex, mobile, and urbanizing territory.

While the instrumental approach to communication and technology would generally associate such developments with values of freedom, progress, and overcoming physical barriers, this article adopts a more critical and historically informed position, viewing these developments as part of an evolving governance mechanism that *spatializes* governance by emphasizing the growing role of communication and culture in regulating urban infrastructural flows. Throughout the history of postwar reconstruction and rapid urbanization since the 1960s, communication has occupied an increasingly crucial role in the government's developmental programs of optimizing urban mechanisms conducive to economic growth, for which the free-flowing circulation of goods and people is paramount. As Korean cultural studies scholar Soo Chul Kim characterizes the developments during this period, "Mobility has been built into Seoul's urban infrastructure, including bridges, subways, bus stops, train stations, intra-urban expressways, and other public transportation systems" (Kim, 2007, p. 4). At the same time, this growth has created significant problems for both the Korean government and the Seoul city government, which have found movement increasingly difficult to govern and monitor. To address this problem, various communication technologies and techniques were developed—including vehicle sensing technologies, analog and digital transmission channels, traffic and road condition surveys, and education programs and campaigns—to promote safe driving etiquette. This period also witnessed a global rise of imaginaries about cars and drivers as part of networked systems, "increasingly imagined as a node in a communications network' who act as capacitors, receiving and storing the system's power; as processors, one link in a systemic chain of actions; and as conductors" (Packer, 2006, p. 93).

To integrate transportation as a crucial topic in communication studies, this article presents two illustrative examples. These examples highlight different facets of an apparatus that seeks to impose a systemic order on spatial movements. The analysis largely draws from the two models of communication that James Carey (2009) suggested: One relates to communication as the control of distance and scale through the integration of technologies (transmission model); the other pertains to the problem of identity and the conduct of conduct, shaped broadly through public discourses and various communication practices (ritual model). The

first part of this study focuses on the development of Korea's ITS since its introduction in 1994, examining the parallel history of transportation and communication that began to be redefined through the city's expanding data capacity. As an essential historical backdrop of ITS, the language of control, optimization, and systems thinking prevailed in public discourses about cities, and computing systems became a useful metaphor and model for thinking about control in urban physical environments. The second part of this article considers the development of the Traffic Culture Index (TCI) in 1998, which reflects the changing meaning and role of culture, particularly in shaping the minds and conducts of citizen-subjects suited for increasingly dynamic urban life. Notably, the TCI emerged from the government's collaboration with the citizen-led Green Transportation Movement (*Noksaek gyotong undong*) of the 1990s, which adopted a participatory approach to traffic regulation, rendering these interventions voluntary, citizen-driven, and thus normatively acceptable. These measures, in turn, have been used as a government's instrument to compare and evaluate citizens' driving/walking behaviors across different Korean cities, enacting a moral economy of traffic safety and civility from a distance.[3]

These two examples illustrate the historical continuity of the governmental framework for considering government activities as facilitating and regulating flows. This framework has consistently focused on pairing communication and transportation to advance its goals. The materials analyzed for this study were compiled from a diverse range of archival sources on Intelligent Transportation Systems (ITS) and the TCI, which were available at the KBS Media Archive, the National Archives of Korea, the National Library of Korea, and the Naver News Library. They encompassed various media formats, including television programs, policy whitepapers, official documents, journalistic reports, trade periodicals, and visual aids developed for traffic safety education and promotion. Anniversary publications of key public institutions, such as the Korean Expressway Corporation (KEC), the Korean Transportation Safety Authority (KOTSA), and the Association of Green Transportation Movement, were also included in the analysis. While the narrative presented here mainly focuses on the intersections of technological and cultural developments in their formative phase in the 1990s, their implications for current and future mobility governance will be discussed in the latter section of this article.

Communication and Transportation: A Historical Perspective

That communication and transportation have a mutually constitutive relationship is not a novel statement. This point is perhaps most clearly articulated by Jonathan Sterne (2006) who states:

> Unbeknownst to many people in both camps, communication scholars have been trading insults with geographers for decades: we deride transportation as a mere instrumentality, and we elevate communication as a constitutive social process. Not surprisingly, a whole string of geographers have cast the problem the other way around: communication is a mere instrumentality; transportation and movement are constitutive social processes. The truth is obviously somewhere in between the two caricatures: there are instrumental and constitutive dimensions to communication and transportation, and I am interested in their shared constitutive qualities. (p. 124)

[3] Moral economy herein is defined as "a lived arrangement in which behavior (conduct) is regularized and regulated, and how values and meanings, such as healthiness and safety, are at stakes when bodies/things move as circulatory systems" (Hay, 2006b, p. 350).

The quote underscores the pervasive skepticism across disciplines, which, despite significant overlaps in their areas of concern, has hindered the recognition of communication and transportation as existing on a continuous conceptual plane. Both are mediums that enable the movement of data, bodies, and things. They are both infrastructures of connection and disconnection. Consider the Korean term for communication, *sotong*, which literally denotes the flow of meaning or the passing through of information. The same word is also used in everyday Korean to describe traffic flow, as one would hear from a traffic news broadcast on any given day: "The flow (sotong) is currently smooth at the Olympic Expressway." Similar historical anecdotes exist, as Sterne (2006) suggests, "Throughout much of the nineteenth century, communication meant, among other things, transportation, movement, connection, and linkage" (p. 118).

Still, transportation, specifically the culture of transportation, remains a largely forgotten dimension of communication research, and the specific meanings and terms of their relationships have not been thoroughly explored in our field (Hay, 2006a). Even when transportation does occur as an object of analysis, many studies remain entrenched in individualistic and liberalistic dichotomies, adopting categories such as agency versus control and freedom versus privacy, often confined to interpersonal mobile practices or new technical devices.[4] This brings to light a broader concern raised by Jeremy Packer and Craig Robertson (2006) in their edited volume *Thinking With James Carey: Essays on Communications, Transportation, History*, which addresses the apparent split in our understanding of the relationship between communications and transportation. One of the dire outcomes of this split has been that the history of interplay between these two modes of mobility, and their implications for societal issues related to freedom, safety, and control have often evaded the scrutiny of critical analysis (Packer, 2006).

Their studies were part of the growing strands of communication research that have explored the material dimensions of communication, recognizing this relationship as a productive site for studying the mattering of media and culture beyond meanings and subjectivities (Carey, 2009; Hockenberry, Starosielski, & Zieger, 2021; Morley, 2011; Packer, 2008; Packer & Wiley, 2013; Packer & Robertson, 2006; Parks & Schwoch, 2012; Parks & Starosielski, 2015; Sharma, 2014; von Pape, Goggin, & Forlano, 2019). Many have drawn inspiration from Carey's (2009) work, both directly and indirectly, finding it particularly useful for addressing the significance of pace, scale, and pattern of movement. They expanded on his ideas by articulating the spatio-material dimensions of power and communication in their research. For instance, Von Pape et al. (2019) advocated a more integrative and "ritualistic" approach to understanding automobiles to complement the prevalent transmission framework that reduces them to mere instruments. Cautioning against an overly broad interpretation of the ritual model, James Hay (2006a) underscored that there is a certain cultural productivity in how power operates, which means that control is exerted not only through the transmission of information from one point to another. Moving beyond traditional distinctions between the transmission versus ritual model, Hay suggests probing into what "a cultural model of communication

[4] The similar critiques about the intra- and inter-disciplinary boundaries between communication and transportation had also been shared by critical geographers like Graham and Marvin (2001) who pointed out "when literatures on networked urban infrastructure have emerged in Planning, Geography, Urban Studies, Engineering, Sociology and Architecture, they have often been inward-looking, technical, and overly specialist, perpetuating assumptions about technological neutrality, and limiting the analyses to class-based formulations" (p. 17).

can and should ask about power" and "how control in modern societies is 'ritually' reproduced through communication and other practices" (Hay, 2006a, p. 41).

The focus on security and control constitutes a crucial aspect of Carey's (2009) thought about communication as a regulatory mechanism of power. The significance of telegraph technology lies not merely in the "separation" of communication from transportation but, rather, in its use "both as a model and a mechanism for control of the physical movement of things" (p. 165). The regulatory function of culture is particularly evident in concerns about safety and security, especially in the use of communication technologies to promote transportation safety (Packer, 2006; Yates, 1989). Safety, security, and control are persistent themes in recent studies of communication infrastructures, such as data centers, logistics systems, and fiber optic cables (Hockenberry et al., 2021; Hogan, 2015; Hu, 2015; Parks & Starosielski, 2015). Pairing historical concerns about control and security with evolving forms of media, these studies reveal how cultural fantasies about control constantly expand and morph into newer forms while remaining grounded in the historical legacy of militarism, colonialism, and capitalism. The desire for control is grafted onto contemporary logistical operations aimed at ensuring the smooth functioning of supply chains and movements on a global scale. This process is influenced by the uneven geography of sovereign power, material conditions, and the distribution of human labor (Hockenberry et al., 2021).

Building on these previous works that have examined transportation and communication's interrelationships, and the conception of communication as a model and mechanism for control of the physical movement of things, this article aims to explore how this concept of communication served as one of the necessary conditions for governing space and mobility in Korea since the 1990s. Close analysis of this period, which is part of a longer history of imposing control and orderliness on cities, offers a glimpse into how various forms of communication practices have been dispersed in different locations and scales, concerted in their efforts to perpetuate the government's initiative to facilitate, regulate, and regularize movements. To be sure, this is not to assume the totalizing power of their convergence. Rather, the goal is to provide an alternative account of communication that goes beyond microscale analyses of individual interaction and the liberalist rhetoric that frames these developments as extensions of human freedom, even transcending the physical limitations of human mobility.

Intelligent Transportation Systems (ITS) and Governing Transportation Through Communication

The problem of governing movement has always been a long-term concern for modern governments. In the context of the 1990s in Korea, it was clear that the problem of transportation, understood as a problem of optimizing the flow, required a certain arrangement of information and communication technologies to streamline and systematically manage the road system. The concept was most succinctly captured by the title of KBS's 1997 report, "Widening the Road Through a System," which posited that effective traffic management would increase road capacity, akin to physically expanding the road (KBS Media, 1997). The program underscored that the traffic problem in Seoul was not simply due to an oversupply of vehicles for the roads available. Instead, the problem lay in the lack of systematic traffic flow management, for which they used the biophysical analogy of "an artery of the nation" (KBS Media, 1997, 00:01:23). The period was also characterized by the growth in public discourses on information and

computing technologies, accompanied by optimism and anxieties over the impending digital and global transformation. The most tangible sign of such transformation was the increasing number of closed-circuit television (CCTV) monitors that began to pervade various urban spaces in Seoul, from parking facilities and department stores to airports and residential sidewalks. Out of the confluence of these intersecting historical trajectories, ITS was introduced, which many anticipated would dramatically reshape urban mobility in Seoul (Kim, 2007).

Until the late 1990s, the data governing the road system mainly relied on drivers' self-reports, CCTV footage, and traffic patrol observations. However, the system was deemed fundamentally inadequate from a systematic management point of view, as it relied on subjective assessments of the drivers, which were not reflective of an ongoing "real-time" traffic condition. From the 1980s onward, Seoul's transportation infrastructures gradually expanded to include a combination of both digital and analog technologies, such as vehicle detection loops, ARS telephone services, road signs, and radio broadcasts, which aimed to communicate information about constantly changing road status. Despite advances in technical infrastructures, poor maintenance and frequent road work hindered the real-time transmission of data to the control center.

Certainly, ITS was developed through an array of governmental initiatives that far predated the 1990s. Monitoring population movement has been a keen interest of the modern Korean state in the postwar period of the 1960s, with some earlier precedents tracing back to Korea's colonial period in the early 20th century (1910–1945). Colonial planners from Japan recognized traffic data as essential for the systematic operation of the city, in line with the objective of the Japanese Government-General to transform the city of Hanyang (Seoul) into the Japanese colonial capital, Keijo. Implementing this colonial rationality in Seoul's urban landscape meant imposing a grid and rotary system to facilitate the circulation of goods and people, through which "the modern logic of circulation and sanitization penetrated the city's thoroughfare" (Henry, 2014, pp. 17–18).[5]

The significance of data collection and management of these flows became even more pronounced as Seoul's population and its vehicles increased in number. According to sociologist Han-Sang Kim (2016), the U.S. military presence in Korea was one of the factors that facilitated postcolonial Korea's integration into the culture of speed and mobility. It included the production of film propaganda that "promoted automobile-related future expectations" (Kim, 2016, p. 64). This, alongside the construction of cross-country expressways, the nuclearization of the family, and the rise of the automobile industry, gave rise to what Kim calls "my-car modernity." By 2000, Seoul's population surpassed 10 million, making it one of the densest metropoles in the world. As the population grew over the years, so did the number of vehicles on the road. By the end of 1970, there were only 125,409 registered vehicles (passenger, boarding, and cargo vehicles combined) across the nation, with 59,000 registered in Seoul alone. However, in just 30 years, by the year 2000, the total number of vehicles in

[5] "With scientific data on population increases, transportation routes, sanitation facilities, and building regulations, officials sought to harness Keijo's resources in the creation of a unified urban system. Road development, the basis for the efficient circulation of an increasing number of goods and people within the city, perhaps best exemplifies this assimilatory rationality" (Henry, 2014, p. 49).

the country skyrocketed to 12,059,276, with 2,440,992 registered in Seoul, representing a 100-fold increase in the number of vehicles over those three decades (Son, 2004).

In response, the government developed a penchant for perpetual anticipation and control mechanisms to handle growing complexities within its territory to actively manage and regulate the movement of people and goods. The approach that followed relied on the integration of scientific techniques in government planning, particularly in the areas of demographics, disaster prevention, public health, economy, security, and safety, among other things. Among these, the systematic techniques of data collection (e.g., classification schemes, counting methods, regular intervals between counting times and counting stations, etc.) and visualization (e.g., maps, diagrams, tables, and graphs) allowed them to have a clearer understanding of the increasingly complex nature of urban life, rendering it more legible, predictable, and thus more governable. Alongside these initiatives, the national traffic survey became a standard practice throughout the 1960s and 1970s, complementing the rapid construction of highways and expressways throughout the country. These surveys required intensive human effort, often relying on high school and college students' labor. For example, a news article from 1970 captured a snapshot of a typical traffic survey conducted in Seoul that deployed about 1,700 high school students to various locations in Seoul:

> Weariness had taken hold of them, having not been provided anything to eat. One of them voiced their exhaustion, "I'm tired from sitting on the street without eating breakfast from 7 a.m." Another complained, "When the investigation is over, I get paid only 150 won for lunch. Breathing dust on the street during study time is killing me." The students were indignant about the whole ordeal, with one remarking, "The school says it's social service, but there's nothing that helps us." ("A Class Taken by a Traffic Survey," 1970, p. 7)

The traffic data generated through such extensive human labor, justified in terms of national security benefits, will spur an ever-increasing managerial need for much faster and continuous monitoring of changing traffic conditions.[6] For instance, traffic data surveys in the 1980s started to integrate advanced communication technologies, such as electromagnetic sensors called vehicle detection loops (see Figure 1). In 1997, it was reported that as many as 1,300 vehicle detection loops had been installed throughout Seoul's expressways (KBS Media, 1997). These loops, which consisted of a coil of wire installed just beneath the road surface, were connected to a traffic signal controller to create an electromagnetic field above the loop. When a vehicle passes over the surface, it causes a disturbance to the electromagnetic field, which the controller then interprets as the passing of a vehicle (Traffic ITS Incorporated, 1994).

[6] As mandated under the National Transport System Efficiency Act in Korea, the national traffic survey, like population census, compiles detailed data on the registration and utilization of transportation modes; operation details including routes, traffic volume, and mileage; the volume of passengers and freight transported; how much does it cost to use and maintain those facilities; and external costs such as traffic congestion, accidents, environmental pollution, and greenhouse gas emissions caused by logistics activities.

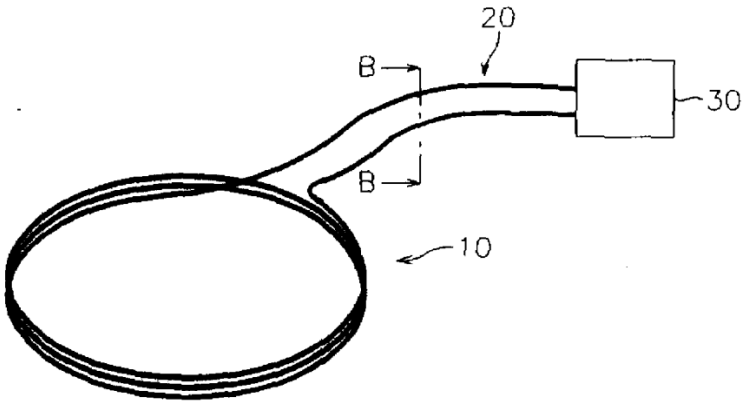

Figure 1. Vehicle loop sensing cable (Traffic ITS Inc., 1994).

During this period, various counting methods were tested by research institutes and company research and development (R&D) departments. These tests experimented with GPS satellite networks, ultrasound, and radiofrequency recognition, all of which aimed to devise efficient and reliable ways to count the number of vehicles on the road and transmit the data to local traffic monitoring centers. In turn, the data obtained from the loop detectors served as a foundation for scientific research aimed at developing predictive models for future traffic flows. This meant that the government's monitoring capabilities extended its temporal scope from representing past conditions to tracking ongoing changes on the road, with the ultimate goal of developing algorithms to predict (and possibly modify) future traffic patterns.

From this historical standpoint, the development of ITS in the 1990s can be viewed as continuing the governmental drive to impose rationality and orderliness on cities, which increasingly embraced information and communication as instruments for managing their complexities. What is distinctive about ITS was that it mirrored an emerging framework for understanding cities, which viewed them as intricate and complex networks of sensors and feedback loops. This period was characterized by the prevalent use of control-oriented languages and systems thinking in government planning practices, viewing drivers and passengers as components in a system rather than independent entities—a perspective reinforced by "a theoretical transition away from the notion of urban space as a neutral container and toward an understanding of it as a conductive medium for the movement of people, information, and objects" (Tierney, 2016, p. 11). Arguably, this understanding of the city as an adaptive and interconnected architecture would co-constitute the emerging discourse of "Smart Cities" in the early twenty-first century. This tendency, characterized by William Mitchell (1995) as the "growing domination of software over materialized form" (p. 5), had been integral to the Korean government's overarching objective of computerizing the nation since the 1980s.

Looking more closely at how ITS was designed to work, a pivotal document titled "Technical Condition for Dedicated Short-Range Communication for ITS" (Ministry of Information and Communication,

2000) provides crucial insights. This collection of policy research papers, archived in 2000 by the Korean Ministry of Information and Communication (now the Ministry of Science and ICT), outlines the basic framework for ITS. Technically, it was proposed to function like what Kathleen Frazer Oswald (2016) called a "nexus system," a term originating from John Urry, where different layers of the system work together synchronously (see Figure 2). First, its transportation layer is composed of four principal components: passengers, vehicles, roads, and the control center. Second, there is a telecommunication layer responsible for the exchange and flow of information between these components. Lastly, as a byproduct of these layers, an organizational layer addresses the policy, financial, and societal aspects of the system (Ministry of Information and Communication, 2000). In theory, various technological elements—ramp metering systems, vehicle detection loops, control center dashboards, ARS telephone services, electronic traffic signages, and radio broadcasts—collectively facilitate "control through communication" across at least three levels (Yates, 1989). On the one hand, vertical flows of communication involve the downward dissemination of rules, procedures, and instructions. An upward communication would relay data, inquires, feedbacks, and reports from a network of sensors installed in vehicles and along roadways. On the other hand, lateral flows of communication would coordinate actions and information at the intermediary level.

This networked approach to transportation would merge and reconfigure the relationships between various transmission media, from broadband networks of private enterprises like KT, SK, and LG, which provided both wired and wireless communication services, as well as public broadcasting networks like radio and television, which worked collectively toward an integrated framework to collect, synthesize, and use extensive traffic-related data. A persistent issue, however, was the lack of uniformity among the data sets collected, as they often remained fragmented within different siloes of the governmental apparatus (Ministry of Information and Communication, 2000). For example, the National Police Agency managed traffic accident reports, the National Weather Service handled weather conditions, and the Ministry of Construction and Transportation oversaw road construction information. In addition, different standards adopted by different local jurisdictions hindered the comprehensive and reliable traffic status information to interoperate at the city level and to disseminate the information to the drivers.

It was against this backdrop that ITS Korea was founded in 1999 as an advocacy group dedicated to integrating new technologies into transportation policy. This organization originated from an informal interest group of academics, research institutions, corporate stakeholders, and government officials who had been meeting since the 1980s to discuss the problem of traffic in Seoul. These same members would form an organizing committee for the ITS World Congress in Seoul in 1998, engaging in global outreach efforts to its counterparts in the United States, Europe, and Japan, including ITS America, to further shape its research agenda and strategies (Ministry of Construction and Transportation, 1989–1997).[7] Although ITS Korea did not have formal authority, its members, mostly through technology and policy research, helped shape policy directives supporting the national ITS framework and related scientific R&D activities (see Figure 2). In many

[7] The organizing committee for 1998 ITS World Congress in Seoul included representatives of automaker companies (Hyundai, Daewoo, Kia), Electronics (Samsung and LG), construction (Hyundai, Donga, Daewoo, Daelim), Logistics (Hanjin, Daehan), Telecommunication (SK), and mechanics (Mando), along with research institutes, governmental officials from the Ministry of Information and Communication and Ministry of Construction, as well as major media companies such as KBS and Joong-ang Ilbo.

ways, the activities of ITS Korea emulated those of ITS America (founded in 1991), adopting its layered systems architecture and research initiatives focusing on electronic tolling systems, automated vehicle management, and traffic-sensing technologies (Auer, Feese, & Lockwood, 2016). These cross-sectional exchanges on a global scale further solidified the significance of the network, both discursively and materially, the centrality of which was reflected in ITS Korea's networked organizational structure.

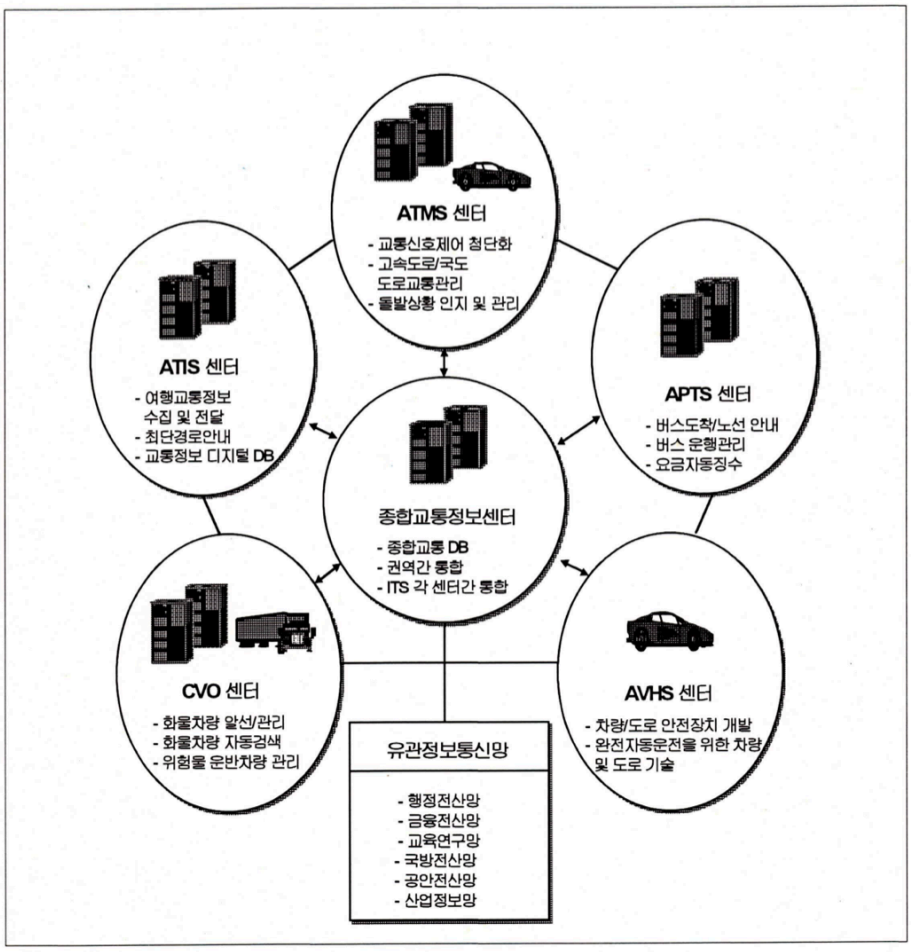

Figure 2. A diagram for Intelligent Transportation Systems (ITS; Ministry of Information and Communication, 2000). The organizational structure of ITS depicted as a network connecting different nodes, including advanced traffic management systems (ATMS), automated traveler information systems (ATIS), advanced public transportation systems (APTS), commercial vehicle operations (CVO), and advanced vehicle & highway systems (AVHS).

The seemingly liberating and decentralizing governing structure embodied in the concept of network, however, called for a persistent need to establish uniformity and standards across different parts of the network. For instance, common watchwords like "interoperability," "compatibility," and "a coordinated

national approach" became major concerns for ITS. This meant that the problem of governing transportation through communication was simultaneously understood as a problem of regulation and standardization, extending communication's capacity to disperse and then connect different parts of the cities, thereby fulfilling its capacity to "govern at a distance." In other words, for the technological advancements in road management systems like ITS, there were practical challenges at the broader institutional and cultural levels that needed to be addressed to ensure the effectiveness of these systems.

On the surface, the increased complexities caused by distributed communication methods *required* a systematic approach to understanding them—the very technical basis on which the global data economy and capitalist system rest. More broadly, it is crucial to recognize the equally substantial cultural work that operates in conjunction with these technical advancements, making these progressions seem reasonable and inevitable. Notably, with the theme "Toward the New Horizon Together for Better Living with ITS" for the ITS World Congress in Seoul in 1998, proponents of ITS declared their belief in a techno-optimistic vision for the future, a prevalent frontier mentality, and a normative emphasis on "better life" (Ministry of Construction and Transportation, 1989–1997). As Carey (2009) would put it, this public pronouncement of a futuristic mirage was an invitation to the public "to participate in the ritual of control in which fascination with technology masks the underlying factors of politics and power" (p. 150). ITS Korea's cultural initiatives during this period, including public relations campaigns and media production, indicated that the government's aim of imposing control and order had to integrate these nongovernmental practices of shaping a way of life through culture as technology and the conduct of conduct. This certainly involved changes in the role and concept of government as a governmentality and the citizens' role within it. After all, the development of technical systems alone would only be partly effective and remain incomplete without the cooperative and safety-centered behavior and mindset of the drivers, as well as an institutional arrangement to properly manage them. That is, the role of culture was essential for complementing technical systems like ITS, as "it is impossible to think about safety or mobility without taking into account attempts to govern conduct" (Packer, 2006, p. 73). The next section examines how ITS's control is culturally and "ritualistically" produced and maintained via the example of the TCI.

Traffic Culture Index (TCI) and Maintenance of Control Through Culture

As stated above, the primary goal of ITS, as declared by its advocates, was to provide real-time, comprehensive information about daily traffic status to individual drivers, thereby assisting in the city's traffic management efforts and enhancing road safety. The collective necessity of regularly disseminating information to drivers and collecting reports from a wide spatial range led to the establishment of the Traffic Broadcasting Station (TBS) by SMG. Since 1990, TBS, a government-operated FM radio station that later expanded to include its own television channel in 2005, has been broadcasting traffic conditions to drivers through their radio programs every half hour.[8] With the ever-increasing number of cars, each equipped with a built-in radio receiver, TBS FM radio programs captured a significant niche in Seoul's radio listenership.

[8] As a government-run broadcast system, TBS has been legally mandated to produce non-commercial and non-political public interest contents only, largely featuring "soft news," including music, culture, weather, and discussions on traffic-related news and SMG policies—although this problematic distinction has long been a source of contestation.

For instance, a survey conducted in 1993 revealed that TBS programs quickly stood out in popularity, with 12 programs ranking among the top 29, contending with national broadcasters such as KBS and MBC. The study's profession-specific data showed that TBS programs were particularly favored among office workers and drivers (Gallup Korea, 1993). Traffic updates on TBS have mainly been sourced from citizen reporters, wireless transmitters, and CCTVs. Notably, historical accounts of TBS highlight its participatory feature and the role of the citizen-drivers, whose reports have been utilized even in policing and criminal investigations. For instance, a news article from *Dong-a Ilbo* appraised the enthusiastic participation of citizen reporters for TBS, noting that the phrase "please check the license plate number of the preceding car" became a highly anticipated ritual among its listeners (Shin, 1995, p. 35).

The active engagement of TBS listeners in contributing to traffic news illustrates how drivers and their behaviors became integral to the network of intelligent transportation governance during this period. On the one hand, utilizing real-time traffic information became a key part of refining drivers' rationality required in navigating Seoul's complex traffic, which involved various practices including careful planning, time-management (which contributed to their frugal and efficient fuel consumption), quick adaptation to changing road conditions, and staying informed about traffic-related laws and policies—all of which contributed to a more civilized and safe driving behavior.

More importantly, perceiving drivers' safety-conscious behaviors as a way of demonstrating one's civic virtue became a crucial prerequisite for further changes in traffic management. It helped the government's realm to be expanded into what was commonly referred to as "traffic culture" by Korean authorities, defined as "beliefs and behavioral styles of people related to transportation" (Green Transportation Movement, 1998, p. 12). The rationale for such intervention was that, although cars indeed were private property, their use necessarily occurs on public roads, thereby requiring individual users to embrace a degree of public responsibility. Importantly, these attempts to broaden the government's scope into the nonjudicial domain of everyday conduct have not operated solely in negative ways, such as by denouncing and penalizing illegal parking, speeding, and lack of driving etiquette. From the Foucauldian perspective of governmentality, it can be said that power is *exercised* through rituals in daily life, which are instrumental to how individuals internalize the imperative to control and modify their behavior. This shaping of everyday driving behavior has manifested in multiple and productive ways through incentivizing and encouraging drivers' law-abiding behaviors, participatory traffic reports, and self-regulatory and monitoring efforts, such as installing black box cameras and electronic transponders.

Government intervention in the so-called traffic culture often relies on the authority of technoscientific apparatuses to operationalize and manage people's driving behavior more systematically and with greater precision. An example of this was the creation of the TCI in the 1990s. The TCI, codeveloped by the Korea Transportation Safety Authority (hereafter KOTSA)—a public organization known previously as the Transportation Safety Promotion Authority since 1981—and the Green Transportation Movement (hereafter GTM), a nongovernmental group advocating for traffic safety since 1993, exemplified a strategic shift toward using scientific rationality to standardize and discipline the behavior of motorists and pedestrians. Through the program, the government was able to enumerate and assign a specific score to each city's general traffic culture based on granular analyses of people's driving behaviors (55 points) and walking behaviors (20 points), as well as traffic safety efforts by the local government (25 points; see Table 1).

Table 1. Scorecard for Traffic Culture Index (TCI). KOTSA (2023).

Research item		Evaluation index	Score (max)	Method
Driving behavior (55 points)		Rate of compliance with crosswalk stop line	12	Field Observation
		Rate of using turn signal	8	
		Rate of compliance with traffic signal	10	
		Rate of wearing safety belt	7	
		Rate of wearing of safety helmet by drivers of two-wheeled vehicles	7	
		Rate of using a smart device while driving	4	Survey
		Rate of DWI (Driving While Intoxicated)	3	
		Rate of compliance with speed limit	4	
Traffic safety (25 points)	Traffic safety status (11 points)	Professional capacity of the local government	2.5	Literature Review (Data submitted by the local government)
		Compliance with local traffic safety policies	3.5	
		Efforts of the local government to earmark traffic safety budget	2	
		Safety control level for commercial vehicles by local government	3	
	Traffic accident occurrence (14 points)	Number of vehicular accident casualties per population unit and road extension	5	Literature Review (Traffic accident statistics)
		Number of pedestrian casualties per population unit and road extension	5	
		Number of commercial vehicles and vehicular accident casualty per road accident	4	
Walking behavior (20 points)		Rate of compliance with signals at crosswalk	7	Field Observation
		Rate of using smart device while walking on the crosswalk	7	
		Rate of jaywalking on the non-crosswalk part of the road	6	Survey

The existence of a standardized form, designed to be customizable to make it useful for each city's traffic-related policy and infrastructure improvement, meant that the evaluation could be easily scaled and compared across different regions, thereby enacting a moral economy of traffic safety from a distance (see Figure 3). Throughout the process of implementing the assessments, a continuous emphasis was placed on maintaining scientific rigor and objectivity, which was ostensibly accomplished by dividing individual driving

behaviors into dividualized micro-segments, such as the drivers' "rate of wearing seatbelt," "rate of compliance with crosswalk stop line," and the "use of turn signals" and pedestrians' "rate of using smart device" and "jaywalking." The results of the pilot study co-conducted by KOTSA and GTM in 13 major cities across Korea in 1998 showed that no single city scored above 50 out of 100, with Changwon's 49.8 being the highest (Hong, 1998).

The publication of the alarming results, which indicated that the country was "failing in its traffic culture" (Hong, 1998, p. 3), was meant to induce self-driven adjustments and the optimization of both cities' and individual drivers' transportation-related conduct without the need for direct coercion. Therefore, by advancing the national traffic culture, the TCI served as a government instrument that, on one hand, provided a normative and scientific basis for rationalizing and *ritualizing* the government's further intervention into traffic culture. Following the pilot study, the TCI program expanded to include 25 cities in 1999. As of 2024, it covers 229 municipalities, including cities, counties, and districts. While the specific items have been slightly modified over the years, the results have been published annually, especially since they were formalized by the Traffic Safety Law in 2008 (KOTSA, 2023).

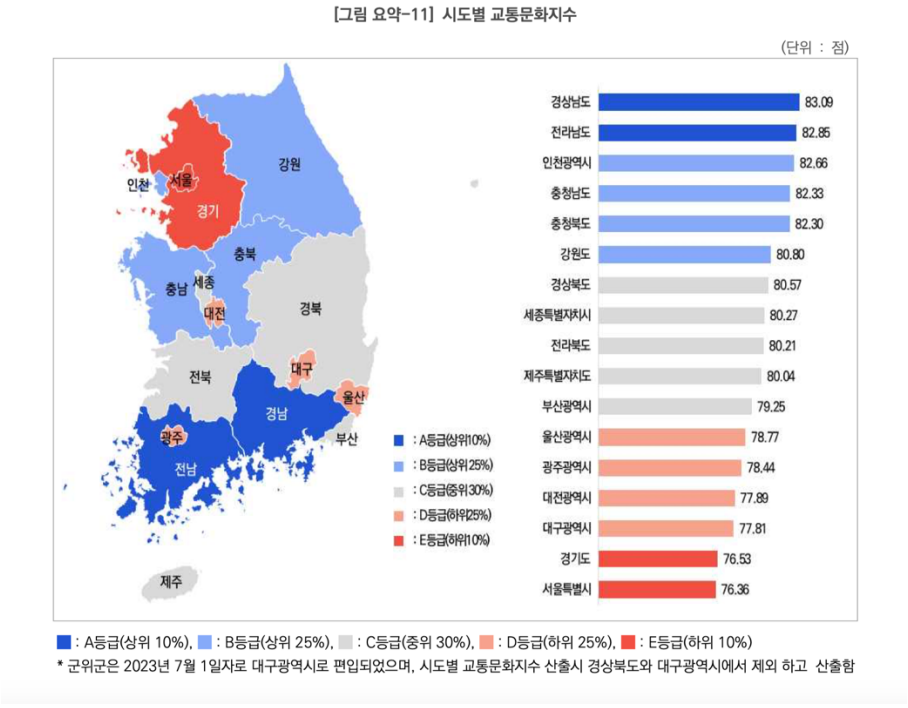

Figure 3. Traffic Culture Index by Region (KOTSA, 2023).

Another critical aspect of the TCI program was its provisional status, meaning that it was intended to be implemented and completed by each city through the voluntary enrolment of citizens. For instance, the field observers for the 1998 pilot study were mostly recruited from organizations such as the YMCA, Friends of the Earth Korea, and the Citizens' Coalition for Economic Justice. The fact that the study was

initially authored and authorized by such prominent civic organizations made such intrusion normatively acceptable. Besides, their involvement indicated that the traffic problem was not solely an issue for the government; it was also intertwined with broader environmental concerns that directly impacted the quality of life for the citizens, one of which included creating a human-centered, instead of car-centered, traffic culture. This strategy of aligning governmental concerns with the moral imperatives of enhancing the quality of life for citizens increased the stakes associated with the TCI program, which was perceived as addressing public health issues, as well as the civic and environmental wellbeing of the citizens, beyond simply reducing traffic congestion. Furthermore, because it effectively positioned traffic as an element of such a broad urban ecology, citizens' voluntary participation was even more underscored and applauded, as a way of demonstrating their public responsibility—an operative rationale of governmentality through which the individuals have modeled themselves as ideal citizen-drivers.

Lastly, it is critical to recognize that the TCI's assessment of traffic culture has not adequately addressed the prevalently gendered aspect of its formation—an oversight that is particularly telling of how the government's imperative to facilitate *and* regulate the ever-increasing desire for freedom of personal mobility has been applied unevenly across different population groups. Despite the seemingly scientific and value-neutral tone embodied in governmental apparatuses like the TCI, the discourses and practices within traffic culture have often displayed discomfort and even overt anxiety toward women and teenage drivers. During this time, there was a growing narrative acknowledging the presence of these groups. However, there remained skepticism about their driving and accident coping skills when compared with adult men, thus suggesting the need for a special kind of intervention. For instance, the KBS documentary on ITS mentioned earlier in this article began by denouncing unsafe behaviors on the road, particularly singling out female drivers. The reporter's comment that "These days, housewives flock to the sauna and shopping centers in cars, adding to the problem of excessive fuel consumption for short distances and causing congestion" (KBS Media, 1997, 00:44:27) reflected the typical gendered perspective prevalent in the period.

The perception that both acknowledged and problematized women's participation in traffic culture often ascribed to them an alleged lack of experience and a tendency to exhibit "emotional responses to frustrating situations" ("A Surge in Women," 1989, p. 15). This view was echoed in specific instructions, manuals, and guidebooks tailored for women whose presence on the road was deemed dangerous and therefore needed to be made safe. While these instructions acknowledged the rising number of female drivers and even called for changes in the public mindset, which was hostile toward them, they also continued to endorse existing gender stereotypes. For example, a safety guidebook for female drivers published in 1996 titled *Why Cars Are Better Than Man* [*jadongchaga namjaboda deo joeun iyu*] serves as a case in point. In this book, the author advises the following:

> High heels are enemy for driving. [. . .] Laced clothes and wide and long-sleeved clothes are dangerous because they interfere with driving. Avoid wearing pants or skirts that are too tight because they can cause back pain. [. . .] In areas where you may be a target of car crimes targeting women, such as quiet roads, wear a baseball cap. Driving with your hair hidden in your hat may help you disguise your gender at night. (Lee, 1996)

These instructions not only perpetuated stereotypes about women, but also reproduced the problematic notions of safety that associated femininity with danger. Typical female attire, such as high heels, laced clothes, skirts, and long hair, was directly labeled as a risk to road safety. The approach thus emphasized altering the behavior of the potential victims over calling out the root cause of the problem, thereby putting the onus on them to protect themselves, even to the extent of disguising their identities.

Conclusion

Thus far, this article has sought to map the complex sociotechnical dynamics between communication and transportation, which have been integral to the government's strategic management and optimization of urban flows, closely tied to its long-term goal of gathering knowledge about its territory. By approaching ITS and the TCI as key governmental technologies, and specifically as "part of a longer history of managing movement via communication technology" (Oswald, 2016, p. 124), this article demonstrated how the merging of communication with transportation aligned with the evolving mechanism of power. The physical urban environment and urban traffic culture in Seoul have become ongoing targets for government interventions at both the macro-level management of urban infrastructure and mobility (transmission model) and at the micro-level shaping of individual mobile conduct (ritual model), all of which have served as testing grounds for its technoscientific apparatus. Within this framework, communication has been utilized both in the management of vehicle movements—through specific techniques and technologies of data gathering and systematic oversight—and in governing and facilitating the prosocial behavior of citizen-drivers to establish a safe and orderly traffic culture, embodying the concept of governmentality.

The interplay between technology, culture, and governance discussed in this article, while centered on the specific context of 1990s' Korea, continues to have significant relevance today as it shapes the foundation of contemporary managerial techniques like ITS. This is perhaps most evident in the latest ambition to innovate and "platformize the highway," including initiatives to develop smart highways and reinvent ITS into "C-ITS (Cooperative-ITS)," which involves the continued deployment of a suite of communication technologies, including black box cameras, smart CCTVs, and license plate/image recognition technologies (Korea Expressway Corporation, 2019, p. 194). These technologies collectively serve the government's goal of producing knowledge about movement, promising the benefit of reducing human labor in the monitoring and management of traffic by integrating these tasks into automated and interconnected communications networks. However, as the latter part of this article has shown, the enactment of these technological systems requires a discursive work of problematizing security and safety as a civic responsibility, cultivating people's receptivity to such measures, and establishing an institutional framework to properly manage them. In all these ways, the ongoing transition toward "smart" and "automated" transportation systems underscores a broader societal negotiation between technology, governance, and citizenship.

In contrast to the dominant discourses that promote a totalizing rhetoric of progress, freedom, and safety about these transitions, this article presents an alternative narrative. This suggests that the same process can be interpreted as reflecting an increasing dominance of communication over transportation, a shift through which the government's regulatory function continues to evolve. In this framework, the power of communication, with its ability to diffuse and connect, has been instrumental in expanding the

government's reach into broad spatiotemporal zones. While this article does not primarily focus on the differentiated individual experiences shaped by the sociotechnical dynamics outlined above, future research will explore these aspects more concretely, particularly concerning female and young drivers. The cultural and material impacts of being perceived as dangerous subjects on the road, which justified more safety precautions and sociotechnical interventions, are highlighted as key areas for future analysis. Overall, this article has demonstrated the analytical benefit of an integrative perspective that encompasses transportation and communication as joint forces facilitating the flow underpinning the technical and material basis upon which the global apparatus of capitalist economy and liberal governance operates.

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