

Article

Toward Sustainable and Inclusive Regulatory Policies Meet with Public Demands

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Abstract: This study presents methods for finding and utilizing demand-oriented data to meet public demands for creating sustainable and inclusive regulation policies. It attempted to analyze these methods scientifically, by collecting information on public demands. The results confirmed that there is a demand for policy that utilizes consensus in the regulation standards of newly emerging services. They also indicated that the legal system should be in alignment with the priorities associated with the setting of standards for regulation-related policies. Additionally, a group network analysis revealed that standards were linked to area management, confirming that area management should also be considered when resolving regulatory issues related to new industries and services. Finally, the results suggested that a land management system for regulatory policy is needed to allow for the autonomous formulation of regulatory policies through the small-scale management of land. The present study can be used to better comprehend civil complaint data and as a reliable reference in the policymaking process, ensuring more sustainable and adaptive regulations.

Keywords: regulatory policy; regulatory reform; new industry; public demands; demand-oriented policy; policymaking process; minority opinion; standard

1. Introduction

The definition of “regulation” in any given national and legal context varies depending on a country’s perspective on the scope, the type, and the purpose of the government intervention. Even though regulations are intended to reflect the opinion of the majority of the people and the universal values of society, they may still be viewed as roadblocks. Regulation policies are crucial for a country’s transition into the global digital age because they may influence a country’s global competitiveness. However, while developing a strategy for establishing a demand-oriented policy is important in the creation of sustainable and adaptive regulations, it is still insufficient, according to empirical studies. At the same time, little guidance has been offered in this regard. Therefore, this study attempts to overcome the limitations of existing studies by means of data-based regulation research, involving the collection and analysis of regulatory complaint data, in order to evaluate demand and supply-oriented policies. The current study suggests measures by means of which demand-oriented data may be found, so as to help develop better regulatory policies that are distinguished by strategies tailored to their context, rather than by strategies that mirror the policies of other countries.

Research on demand-oriented policy creation was initiated by efforts to establish policies that included minority opinions in the policy formation process [1–4]. Through the experiences of existing policy failures, we began to devise a way in which even minority opinions might be reflected in policies [5,6] that were demand oriented. It has become apparent, however, that regulatory policies

are one of the most effective methods of creating new awareness of the need for further regulations in the policymaking process [7]. For example, the use of complementary payment systems on the internet, such as accredited authentication, has directly led to the creation of innovative new industries. Indirectly, the issue of supplementation has also increased because of these regulations, and this problem has had to be solved through further regulation.

Research using demand-oriented data has proceeded as follows. The company innovation strategy “VoC” (Voice of the Customer) was used to gather information and opinions on products and product difficulties so as to improve them and establish future development strategies [7–10]. It was considered that government policy should utilize civil and environmental complaint data to inform decision-making data in future policymaking [11,12]. Former studies, however, had not adequately explained smaller intervening factors by demarcating data.

Government regulations are designed to create beneficial economic and social outcomes for individuals and businesses, but the rapid advent of novel technologies and services has rendered existing regulations inadequate and created a pressing need for regulatory challenges. With regard to the temporary regulatory suspension, the question of which regulations to suspend and how to defer them remains. By means of channels such as the “Regulatory Reform Sinmungo” (a bulletin board of civil complaints for regulatory reform) in South Korea, the government has been actively identifying and solving people’s difficulties by listening to their opinions and offering solutions. This research tries to collect and analyze data from the Regulatory Reform Sinmungo, which consists of grievances and feedback (such as suggestions for improvement) regarding existing regulations.

With the appearance of new industries and services, there has been a rise in issues that cannot be resolved with existing regulatory policies. The Korean government has successfully tackled this situation through temporary regulatory suspension. This study presents a case for policy decision making in which the gap between policy supply and demand can be analyzed using demand-oriented data. This study also demonstrates how to actively incorporate input based on people’s grievances and requirements into the process of regulatory reform. Moreover, it analyzes which subjects are top concerns for the public and uses this analysis to suggest implications for future policies.

2. Literature Review

This study expanded on the theory of Actor-Centered Institutionalism (ACI) [13] and applied cases related to institutional demands and responses using regulatory-related civil petition data in the empirical aspect. According to ACI, an agent interacts under institutional constraints. The adaptive regulation policy [14,15] was used as a further theoretical background for the research.

ACI is a model that combines historical institutionalism [16,17] with a rational selection model that emphasizes the preferences and choices of actors. It emphasizes that the specific behavior of an actor, under institutional conditions, is determined by the preferences and choices of the actor, who is active in this process. However, historical institutionalism, which emphasizes institutional influence, is distinguished from agent-centered institutionalism because it focuses on the passive role of actors [18].

According to ACI, policies are produced as a result of interactions between actors and institutional conditions. This perspective focuses on how active actors, that is, actors affected by the institutions, behave. This is because institutional conditions lead to policy outcomes. Hence, the effect of an actor’s interaction with an institution is regarded as the proximate cause of a policy outcome [19,20].

Traditionally, historical institutionalism [21,22] emphasized external shocks as the only reason for change in a system, and failed to properly explain how internal discrepancies, conflicts, and agents’ choices could also lead to changes. In this study, in order to overcome this limitation, attention was paid to inherent causes for change, and the focus was placed on the “idea” as an inherent propeller of system change [22,23]. In doing so, the present study takes note of the importance of the idea in rational choice institutionalism [24–29]. From the standpoint of rational choice theory, which seeks to explain and predict social phenomena based on the assumption of individual rationality, an idea—theoretically

speaking—is explained as a concept that may engender problems. For such a model to function, however, it is necessary to facilitate rationality by actively collecting data. This can be done by establishing a communication channel through which the public can share opinions and ideas.

In the ACI model, it is explained that the system is both a field of interaction between actors and a factor limiting the behavior of participating actors [29]. Hence, a final policy outcome is determined by the interactions between actors. The variables of interaction between actors appear dynamically in the system in which the conflict appears, and the interaction methods include unilateral action, negotiated agreement, majority vote, and hierarchical direction [29]. Consensus through these interactions is divided into salience, spot contracts, distributive bargaining, problem solving, and positive coordination. Of these, problem solving entails reaching consensus in order to improve overall production, rather than the distribution of solutions. Interaction patterns, along with institutional conditions, are a key factor influencing the direction of a final policy outcome. Therefore, this study aimed to diagnose systemic structures through an analysis of the interaction between policy demands and responses. Civil petition data were utilized in the problem-solving process, within the ambit of a regulatory system. Finally, future development plans were considered.

Perceptions about regulations vary depending on the interests of stakeholders. In particular, issues of personal interest are more prone to complaints stemming from differences in perception of the regulation in question. In particular, those whose rights are directly restricted by a specific regulation may perceive it as a roadblock or a thorn in their side. It is believed that existing regulatory policies are becoming obstacles to emerging technologies and industries. It is likely that policies that do not actively reflect changes happening in a society or that fail to evolve with technological developments will be considered out of touch with reality. There are concerns that such outdated regulatory policies will hinder a country's industrial competitiveness at the global level, and regulatory reforms are, therefore, implemented to avoid and overcome such unfavorable outcomes.

Regulation is government intervention in the marketplace, to restrict corporate and individual behavior, in order to realize a desirable socio-economic order [30] (p. 18). In other words, it is the administrative policing of private activities, according to rules established in the public interest [31] (pp. 4–7). Therefore, it can also be defined as a government's effort to control civilian behavior [32] (p. 1). Taking these definitions together, regulation can thus be understood as the government restricting the rights of, or imposing duties on, individuals and corporations in the public interest, in order to create a desirable socio-economic environment. In a democratic country, however, the government cannot infringe upon designated individual freedoms or impose arbitrary obligations in the name of public interest or a desirable socio-economic order—it can make regulations only through state-imposed laws. Most regulations are social regulations, aimed at ensuring personal safety and maintaining social order. This suggests that, with changing times, the intensity of regulations imposed on the public will vary. Therefore, changes in the legal system are essential to address emerging regulation-related issues.

Until now, efforts to identify policy demands related to regulations have been superficial and inadequate at best. They have often involved public opinion polls, surveys, or expert consultations, whose findings were then used to set the following year's policy tasks. However, to foster public participation in the regulatory reform process, it is necessary to discard the current method in which a handful of decision makers create policies, without sufficient insight into policy demands. Instead, civil complaints data, until now considered to be dark data, should be utilized to understand what the public really wants and needs. Policies based on these data would more effectively reflect public opinion and help overcome the limitations of current methods.

In this study, the researchers, as actors, complemented the micro mechanisms of ACI by analyzing the contents of complaint data and cases related to the interaction of fellow actors, within the institutional constraints of regulation.

3. Materials and Methods

South Korea has been transitioning to “Government 3.0” since 2010, in that it is trying to establish a national policy based on the supply of customized services. The vision of Government 3.0 is that of a trusted government concerned with a nation’s wellbeing. Consequently, public information is openly shared, partitions between ministries are eliminated, and cooperation between individual citizens is fostered. The core value of Government 3.0 is thus to secure government transparency and promote citizen participation. The government is working to create a cycle in which data are released, valuable feedback is garnered, and is then used to create new value for citizens and markets. Civil complaint data, held by various government agencies, can be used to establish demand and supply-oriented policies. These data are owned by the government and can be used as a reference for the decision-making process when establishing a demand-oriented government policy. In particular, Moon’s government has established various policies for new industries and services, so that the most important issue addressed is that of regulation. Therefore, the government has tried to reflect the opinions of citizens in policy by creating a regulatory reform framework, from around 2014, to collect regulatory opinions. The Korean government serves as a window for opinion-gathering to receive and process suggestions for the improvement of regulations under the Basic Act on Administrative Regulations for regulatory innovation made by the people through the Regulatory Reform Sinmungo (reference from RRS website). It is, thus, pursuing measures to promote demand-oriented regulatory policies.

The current study collected raw information from the Regulatory Reform Sinmungo and extracted civil complaints data. The filtered data were first separated into two categories: demand-oriented data (policy demands), and supply-oriented data (alternatives). More precisely, public inputs, in the form of opinions, grievances, and suggestions constituted the demand-oriented data; and the government’s responses containing solutions and corrective measures constituted the supply-oriented data (alternative opinions for policy creation). Next, both sets of data were analyzed separately. The results and discussion are based on these analyses. Figure 1 shows the steps that were followed.

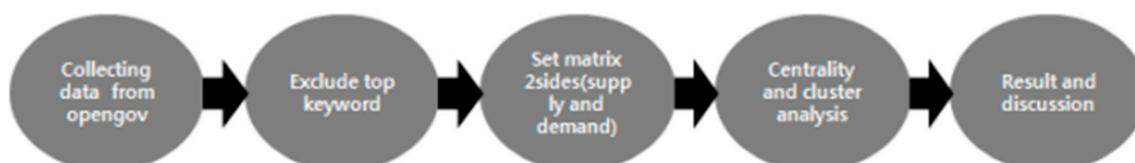


Figure 1. The research process.

To conduct the analyses, semantic network analysis [33–37], which is a form of unstructured data analysis [38–41], was used. As mentioned above, the data pertaining to regulations was taken from complaints filed in the Regulatory Reform Sinmungo, which is operated by Korea’s Office for Government Policy Coordination. It serves as a channel for regulatory improvement and strives to enhance the public’s experience of regulatory reform policies by collecting opinions on regulation issues; regulatory problems in new industries and reform policies; feedback from citizens regarding regulatory issues; and the impact of regulations on new industries. It further conducts contests to encourage people to come up with clever suggestions for improving policies [42]. The framework for its operation is specified in the Framework Act on Administrative Regulations, which is entrusted with the task of receiving and processing proposals for improving regulations. It began collecting civil complaints in 2014, especially complaints regarding regulations, which were received by civil complaint channels like the People’s Sinmungo (although the agency has been actively collecting data to better align policies with public demands, these efforts are incomplete without a system to use the collected data for making more effective policies). The Regulatory Reform Sinmungo collected and analyzed data from March 2014 to January 2019.

Semantic network analysis—a type of big data analysis method that detects patterns and relationships within a large volume of text by examining content and lexical structure—was performed on the collected data on civil complaints. Of late, the scope of its use has been expanding to include analysis of civil complaints, social media, and people’s opinions. Thus, the present study sought, through semantic network analysis, to understand the significance of government-collected data on civil complaints related to regulations.

4. Results

This section presents the results of the semantic network analysis of demand-oriented and supply-oriented data, and the analysis of suggestion ratios, in terms of groups.

4.1. Semantic Network Analysis of Demand-Oriented Data

A semantic network analysis of main keywords resulted in the formation of the following three groups (see Figure 2): Group 1 (G1) included words related to "use," "case," "regulation," "time," "standard," "application," and "registration"; Group 2 (G2) included words related to "building," "construction," "act," "article," "area," and "provision"; and Group 3 (G3) included words related to "facility," "business," "law," "management," and "accordance." The term "standard" appeared in G1 and was verified to be related to content relevant to regulation standards. However, content pertaining to the related terms "law," "act," and "right" was distributed evenly among the groups. Given that regulations are designed to promote public interest—the prime objective of government activities—fundamental systems are established and run by the force and guidance of law to achieve this end. The goals of the government are to stabilize the economy, increase employment, guarantee public safety, provide education, support technological innovation, protect, and improve the environment, and enhance public welfare.

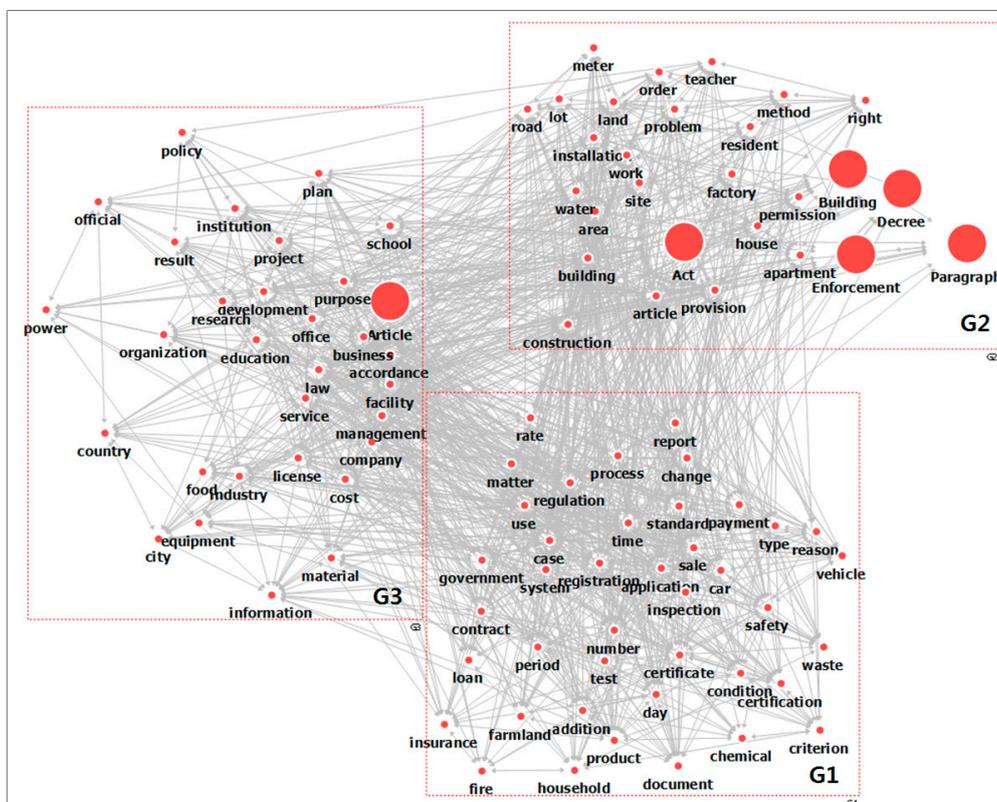


Figure 2. Semantic network analysis of the public’s suggestions (demand) on regulations.

When examining the word cluster of each group separated through the cluster analysis, we found that G1 (regulation standard) mostly handled content on the standards of regulations. In particular, from the analysis of words such as “chemical,” “fire,” “criterion,” and “process,” it was confirmed that requests were mostly made for the establishment of standards for items related to government regulations. G2 (construction act) included words such as “land,” “water,” “area,” “lot,” “house,” “resident,” and “apartment,” and it was concluded that it mainly contained requests for regulations related to building construction. In the case of G3, it mostly contained content on facility management and included words such as “service,” “cost,” “company,” and “food.” Figure 2 shows the details of each group (see Appendix A).

4.2. Semantic Network Analysis of Supply-Oriented Data

Existing regulations, formed using the traditional approach, leave a considerable gap between policy demand and supply, especially at a time when innovative technologies are spawning new industries. To close this gap, the government has opened itself up to active communication with citizens to encourage more public participation in shaping regulations. The data comprising government’s responses to civil complaints are leading to enriched discussions, and they may be analyzed as follows.

Three clusters were discovered through semantic network analysis (see Figure 3). First, G1 was concerned with vehicle standards and mainly dealt with issues such as “training,” “safety,” “regulation,” “registration,” “car,” and “child.” Second, G2 was concerned with residents’ rights and included issues such as “worker,” “waste,” “service,” “sale,” “life,” and “damage.” Finally, G3 covered the topic of area management and contained issues such as “facility,” “building,” “development,” “land,” “field,” and “parking” (see Appendix B).

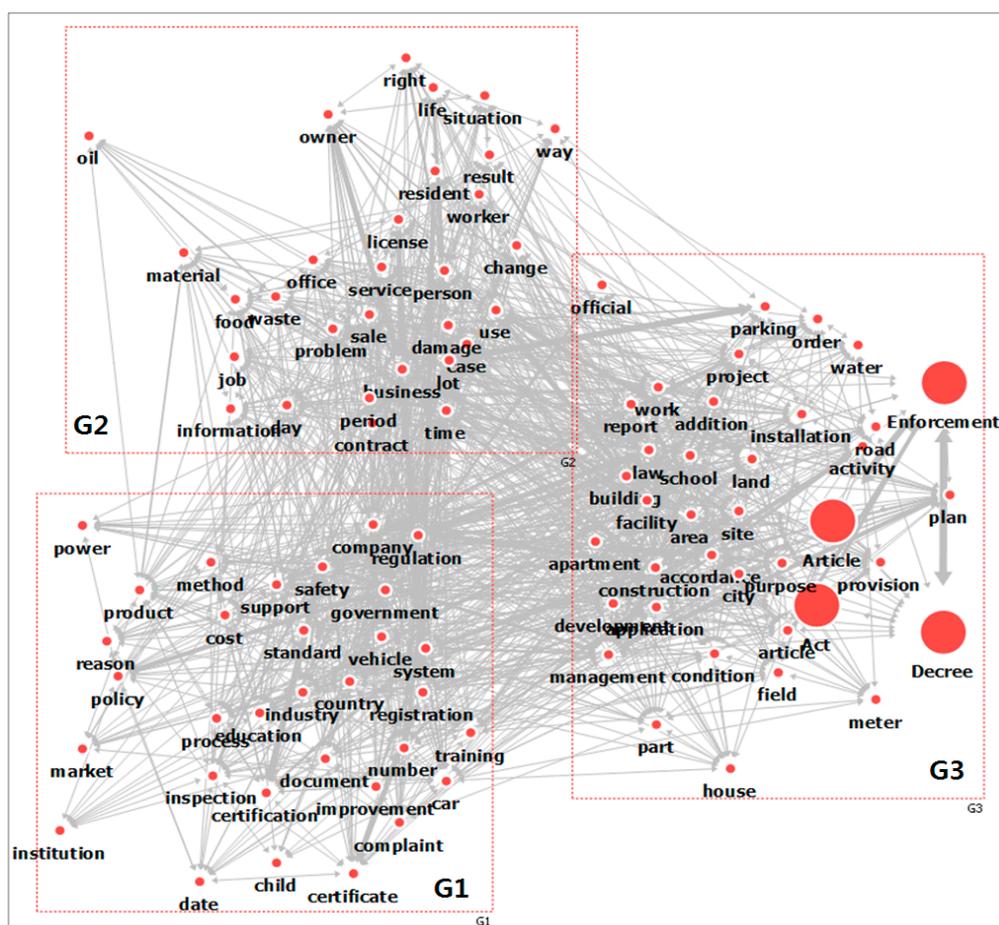


Figure 3. Semantic network analysis of responses consisting of suggestions and solutions.

4.3. Network Analysis of the Group

Networks confirmed the connectivity of groups by further demarcating words into groups to simplify the group network. As such, “group” and perhaps also “network” seemed to have at least two meanings here. A group can establish relational data with individual keywords derived through the above cluster analysis, and the connectivity among the groups can be verified in a simplified manner.

First, the visualization of group networks in demand-oriented data was demonstrated (see Figure 4). G2 (construction act) displayed strong connectivity (841) with G3 (facility management). The analysis also showed that regulation standards are connected with facility management (588), suggesting that standards of regulations have a substantial impact on management. Therefore, it can be implied that, as a measure for future content on regulation, hardware-based factors (e.g., construction) should be strengthened with software-based (e.g., management) factors. Additionally, to strengthen the management of the implementation of regulation reform policies, the establishment of standards should first be reinforced.

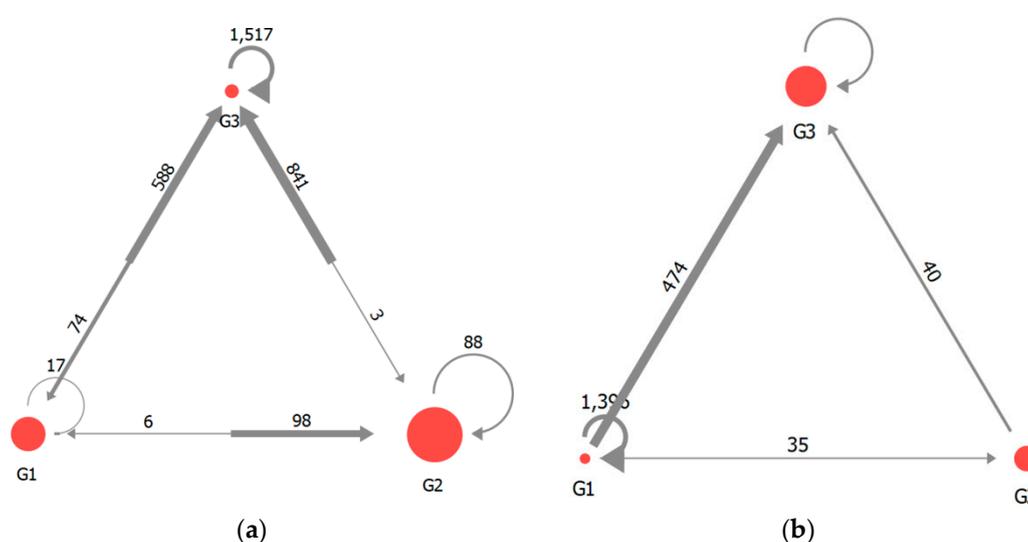


Figure 4. Network analysis of the group. (a) Demand-oriented groups: Group 1 (G1, regulation standards), Group 2 (G2, construction acts), Group 3 (G3, facility management); (b) Supply-oriented groups: Group 1 (G1, vehicle standards), Group 2 (G2, resident rights), Group 3 (G3, area management).

Next, it was demonstrated in supply-oriented data that vehicle standards and area management are closely related. Numerous civil complaints about the standards of new vehicles appeared (see Table 1), especially calling for adjustments in current regulatory policies that are not applicable because of laws or enforcement ordinances. Area management is a possible resolution, which implies that a new approach must be taken that considers the area involved, when improving regulations concerning new vehicles. When looking at civil complaints related to regulation reform, it can be understood that, with the recent emergence of new industries, many regulations related to kickboard scooters and other vehicles prevent them from being commercialized. Such civil complaint data should be used to identify emerging social issues, and appropriate demand-oriented regulation reform policies should be developed in response (see Appendices A and B).

Table 1. Contents of civil complaints from the Regulatory Reform Sinmungo.

Group	Contents of Civil Complaints
Demand-oriented group	<p>222 Decrease in competitiveness against countries like China in the field of personal mobility because of relevant laws (Kang**, 14 March 2019) Context: A license is necessary to drive an electric kickboard. Electric kickboards must be driven on roads used by automobiles and must not use the bicycle lanes.</p> <p>500 Regulation on self-driving mobility (crime prevention robot) (Lee**, 8 August 2019) Context: There is a need for crime prevention patrol in the area during late-night hours, but there is not enough of a police force for this. With the nationwide enforcement of the local police system in 2021, there is a need for policy alternatives to lead the fourth industry. The reality is, however, that there is a lack of legal definition and regulation on movement areas (roads or sidewalks) when using self-driving anticrime robots for unmanned patrols.</p> <p>962 A proposal on the implementation of the drone registration system, the mandatory purchase of drone insurance and the establishment of a specialized agency for the management of drones (Jeong**, 10 June 2018) There must be a registration procedure for drones. I would like to propose a mandatory registration system to control the reckless use of drones due to the mass production of low-cost drones in China. For example, the regulations of existing traffic laws are expanding to accommodate the increasing use of electric wheels and kickboards. Furthermore, acquiring insurance for drones should be made mandatory. Given the growth of the drone market, many people are injured by falling pieces of drones because of technical failures. Additionally, I would like to propose the establishment of a specialized agency for the management of drones. Currently, there are many unspecialized regulatory management departments for flight permits and the like. Given that there is no department responsible for these regulations, the number of drone-related crimes and accidents is expected to increase.</p>
Supply-oriented group	<p>222 Decrease in competitiveness against countries like China in the field of personal mobility because of relevant laws (Kang**, 14 March 2019) The decrease in competitiveness against foreign players is happening rapidly. As they are equipped with motors, electric kickboards are not permitted to be used on bicycle paths. Is it appropriate to drive them on vehicle roads when they are being driven without protection? Or is it appropriate to drive them safely on bicycle paths? If those who mention the safety of pedestrians look at a bicycle path on a Saturday, they will find that a fast-riding group of bicyclists is more frightening and dangerous than electric kickboards.</p> <p>500 Regulation on self-driving mobility (crime prevention robot) (Lee**, 8 August 2019) Personal mobility vehicles (kickboards, electric wheels, and electric cars) and self-driving robots are vehicles. As per the law (Road Traffic Act, article 13 clause 6), they must be driven on roads for automobiles, but they are not suitable for those roads. They are slow and interfere with the driving of automobiles, creating a variety of problems. Indeed, in urban areas, personal mobility vehicles are used on sidewalks and bicycle paths. Therefore, these vehicles and self-driving anticrime robots (operated from the outside) should be driven on sidewalks and bicycle paths.</p> <p>962 A proposal on the implementation of the drone registration system, the mandatory purchase of drone insurance and the establishment of a specialized agency for the management of drones (Jeong**, 10 June 2018) Please ensure the safety of pedestrians from the reckless use of drones. Appropriate regulations should be formulated to prevent crimes and accidents caused by them. Please institutionalize mandatory drone insurance, so that drone users are careful, and others do not have to worry about their safety.</p>

4.4. Analysis of Suggestion Ratios by Group

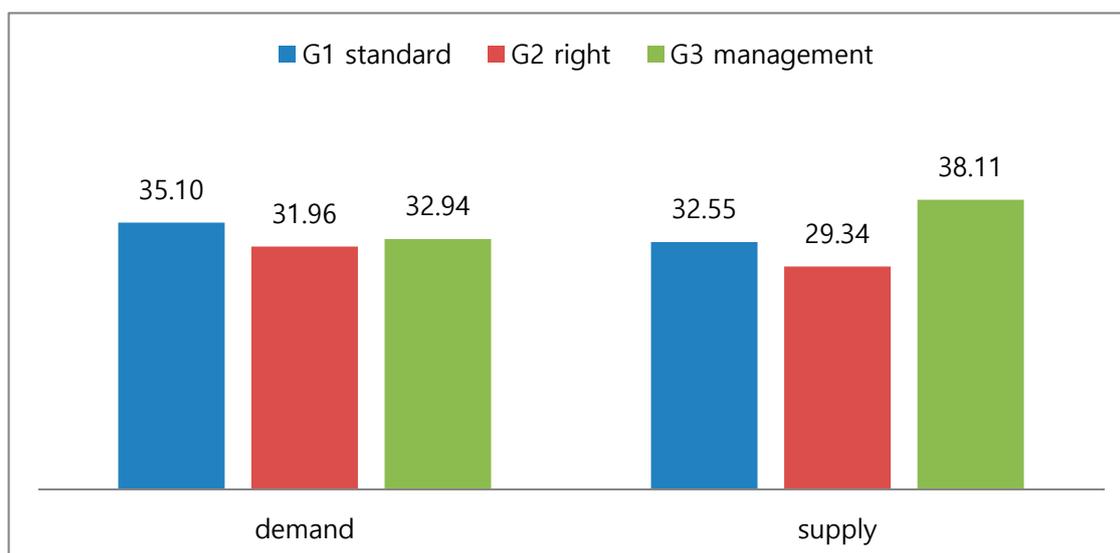
The word frequency and ratio of each group were analyzed to determine whether certain topics received more attention than others. It was found that, in policy demand data, a high proportion of content was related to regulation standards (G1).

In policy supply data, area management (G3) was the most prominent group, indicating that the government showed interest in establishing standards for area management such as issues related to construction, cities, and buildings (see Table 2).

Table 2. Analysis of the difference in proportion of suggestions for each group.

Division	Demand			Supply		
	Issue	Freq.	%	Issue	Freq.	%
G1 Standard	Group 1 (regulation standards)	6983	35.10	Group 1 (vehicle standards)	6773	32.55
G2 Right	Group 2 (construction acts)	6358	31.96	Group 2 (resident rights)	6106	29.34
G3 Management	Group 3 (facility management)	6554	32.94	Group 3 (area management)	7930	38.11
	Total	19,895	100%	-	20,809	100%

Based on the information above, the frequency of the main issues for each group is shown in Figure 5. Regarding policy demands, issues on standards and rights were handled most frequently; regarding supply, words related to management were used most frequently. This suggests that there were many problems concerning legal standards and rights related to regulation in policy demands. The strengthening of management systems was proposed as a resolution.

**Figure 5.** Analysis of suggestions by group.

5. Discussion

The present study analyzes data related to civil complaints and finds ways to utilize them for policymaking and better regulation. Recently, the government introduced various ideas that are in line with its attempts to provide people with improved policies [43,44]. The present study can be used as reliable reference material in the policymaking process. The following suggestions are offered based on the results of this research.

Until now, policymakers have not focused on the benefits of minority opinions for reasons of regulatory equity and avoidance of responsibility. Policymakers working in public offices respond sensitively to public opinion and thus fail to use this window of opportunity to collect feedback that could benefit consumers. The diverse reasons for this include an incentive structure that does not allow policymakers to focus on minority opinions, as well as insufficient time and resources. As an alternative, this research attempted to analyze existing information on public demands scientifically. It categorized the results of this analysis into a horizontal problem and provided policy implications for the agenda. This study's insights can be utilized to continuously improve policy efficiency by

discovering common issues in public opinions regarding regulation, classifying them, and then trying to systematically improve them.

From the perspective of agent-centered institutionalism, the use of civil petition data, as a product of active agent interaction, provides an important basis for institutional development. For the development of regulatory-related policies in the future, a window for collecting the opinions of actors, based on where the regulation is taking place, should be opened to induce interaction for active system improvement [45–47]. To effectively bridge the gap between policy demand and supply, it is important to take note of factors such as the location of a grievance. If a certain area has a higher frequency of a particular complaint, detailed information about that issue must be collected so that a resolution can be offered at the earliest possible time. At the government level, it is necessary to collect civil complaint data related to place-based regulations as a window for active interaction. This can help the development of a more sustainable and adaptive regulatory policy, away from the existing historical institutionalism, toward agent-centered institutional design. For the development of sustainable and adaptive regulatory policy, some specific alternatives from the ACI micromechanism are as follows.

Civil complaints related to regulations can be used as reference material for government policies [20,32,48]. For instance, they can be used as basic plans for the adjustment of policies related to emerging products such as kickboards and drones. As is evident from the aforementioned analysis, regulatory policies should be developed considering the concept of area (e.g., the regulatory sandbox that exempts the enforcement of regulations for a certain period in a given area [49]), a concept that has hitherto not received sufficient attention in policy formulation.

As confirmed by the results of this study, it is necessary to consider the significance of area. This suggests that a land management system for regulatory policy is needed to allow for the autonomous formulation of regulatory policies through the small-scale management of land. It is worth considering an area-based participation system of “participatory policymaking in regulation,” an application of the concept of “participatory policymaking” in which regulatory policies are formulated with the participation of citizens [50,51]. This calls for a software-based, rather than hardware-based, management of regulatory policies. To realize this, the creation of policies through people’s participation should be strongly considered. It is essential to actively listen to the inconveniences and difficulties caused by recently emerging means of transportation. It is crucial to actively study the regulatory details concerning new industries and services that are difficult to regulate through existing systems. Instead of investing too much in research and development to prepare for an unpredictable future, the government needs to execute policies by addressing actual inconveniences, which will lead to their efficient and effective resolution. Therefore, the dark data can be used for regulation-related policies to overcome the limitations of existing research and establish differentiated strategies through demand-oriented policies.

A multidimensional analysis of data on civil complaints is still required. Using big data analysis, we must collect a variety of policy ideas, upon which a transparent, evidence-based management system for policy decision-making can be based [52]. Previous policies, formulated by a handful of administrators, did not reflect the concerns and requirements of consumers, for whom the policies were first formulated. Therefore, it is necessary to close the gap between policy supply and demand by actively using data from civil complaints.

6. Conclusions

In this study, the micro-operating mechanism of ACI was supplemented by analyzing the contents of the civil petition data related to responses under the institutional constraints of regulation and the active actors’ policy participation [53]. This study is differentiated from previous studies that focused on the relationship between actors and policies, in that it investigated the micro structural characteristics of regulatory policies through analyses of how these policies were received.

This study has further sought to analyze data on civil complaints relevant to regulation reform, and differences in perception of policy demand and supply, in order to draw possible implications for future policies. It has aimed to actively utilize government-owned data on civil complaints, left unused because of the absence of a proper application model. It has also attempted to find ways to incorporate this data in policies.

The analysis results are as follows. First, while regulation-related civil complaints mostly request improvements in systems, it was verified that the solution lies in the improvement of the standards of existing systems. From the perspective of policy demanders, it was confirmed that the need for authentication systems was required in establishing the standards of regulatory policy. In particular, it was confirmed that there was a high demand for regulation policy in the fields of chemicals, loans and payments, and farmland.

From the standpoint of alternatives, it is possible to reasonably assume the probable public response to a new industry, which is important for identifying new policy demands. From the perspective of the policy alternative, it is suggested that the policy in terms of the management of regulatory policy should be implemented first. This implies that it can be developed through the revision of laws and regulations. For instance, the content of vehicle standards is closely related to area management. However, the use of new means of transportation is not being permitted in terms of existing regulations. This indicates that it is necessary, not only to set standards for new means of transportation, but also to support these means through the management of physical areas such as buildings, residential areas, and parking spaces, rather than to focus on the functions of such facilities.

According to the semantic network analysis by groups [34–36], there was a strong relationship between construction laws and facility management in the policy demand data. It was observed that construction laws and regulations greatly influenced the management of a facility. In order to improve management, it is, therefore, first necessary to examine construction-related laws or regulations. According to an analysis by group, while standards and rights were the main factors implicated with regard to policy demand, it was observed that the need for management was the principal factor with regard to policy supply. There were many problems related to standards and rights in civil complaints concerning regulatory policy, and to address them, solutions need to be found in terms of the government's governance system.

The policy formation process can be improved by exposing the public's misconceptions, as well as utilizing data to understand policy demands and find relevant solutions. This study has emphasized the role of the government in providing policies based on the perspective of policy providers, but policies should also reflect the opinions of policy consumers, even those whose opinions are not especially common [54,55].

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Appendix A

Table A1. Semantic network analysis of regulations.

Group 1 (Regulation Standards)			Group 2 (Construction Acts)			Group 3 (Facility Management)		
Keyword	Degree Centrality	Frequency	Keyword	Degree Centrality	Frequency	Keyword	Degree Centrality	Frequency
addition	0.25	125	act	0.47	973	article	0.41	604
application	0.35	161	building	0.16	98	accordance	0.44	229
car	0.24	214	decree	0.15	297	business	0.52	540
case	0.46	405	enforcement	0.15	257	city	0.15	122
certificate	0.29	172	paragraph	0.10	97	company	0.37	404
certification	0.19	123	apartment	0.18	122	cost	0.29	161
change	0.31	144	area	0.45	611	country	0.14	164
chemical	0.12	96	article	0.46	566	development	0.33	212
condition	0.19	113	building	0.52	376	education	0.26	146
contract	0.23	111	construction	0.48	321	equipment	0.15	103
criterion	0.15	124	factory	0.19	133	facility	0.62	672
day	0.21	155	house	0.16	115	food	0.16	107
document	0.19	136	installation	0.28	129	industry	0.19	161
farmland	0.15	96	land	0.28	289	information	0.20	137
fire	0.11	125	lot	0.16	99	institution	0.20	158
government	0.29	324	meter	0.14	141	law	0.51	463
household	0.13	103	method	0.19	107	license	0.23	136
inspection	0.29	143	order	0.21	149	management	0.46	238
insurance	0.16	104	permission	0.20	108	material	0.20	136
loan	0.13	127	problem	0.26	171	office	0.24	163
matter	0.14	106	provision	0.34	155	official	0.12	114
number	0.26	148	resident	0.18	120	organization	0.15	101
payment	0.19	105	right	0.14	115	plan	0.20	145

Table A1. Cont.

Group 1 (Regulation Standards)			Group 2 (Construction Acts)			Group 3 (Facility Management)		
Keyword	Degree Centrality	Frequency	Keyword	Degree Centrality	Frequency	Keyword	Degree Centrality	Frequency
period	0.24	157	road	0.23	208	policy	0.11	123
process	0.16	103	site	0.27	134	power	0.10	135
product	0.26	250	teacher	0.16	104	project	0.24	150
rate	0.14	108	water	0.28	175	purpose	0.30	156
reason	0.18	123	work	0.25	188	research	0.21	114
registration	0.34	194				result	0.17	109
regulation	0.45	532				school	0.26	185
report	0.29	117				service	0.33	166
safety	0.28	203						
sale	0.29	158						
standard	0.39	233						
system	0.28	191						
test	0.26	132						
time	0.41	329						
type	0.27	136						
use	0.47	251						
vehicle	0.17	194						
waste	0.15	112						

Appendix B

Table A2. Semantic network analysis of regulation alternatives (improvement suggestions).

Group 1 (Vehicle Standards)			Group 2 (Resident Rights)			Group 3 (Area Management)		
Keywords	Degree Centrality	Frequency	Keywords	Degree Centrality	Frequency	Keywords	Degree Centrality	Frequency
car	0.28	222	business	0.59	629	act	0.26	489
certificate	0.19	170	case	0.40	403	article	0.31	332
certification	0.21	150	change	0.23	148	decree	0.12	162
child	0.08	108	contract	0.15	112	enforcement	0.11	141
company	0.52	526	damage	0.18	116	accordance	0.34	112
complaint	0.18	147	day	0.24	195	activity	0.20	117
cost	0.25	200	food	0.24	162	addition	0.25	173
country	0.36	236	information	0.21	180	apartment	0.30	142
date	0.14	115	job	0.18	122	application	0.32	153
document	0.23	146	license	0.22	144	area	0.51	509
education	0.24	142	life	0.17	137	article	0.26	217
government	0.36	365	lot	0.30	176	building	0.43	372
improvement	0.20	184	material	0.17	151	city	0.27	136
industry	0.28	225	office	0.21	150	condition	0.24	130
inspection	0.22	131	oil	0.08	112	construction	0.51	372
institution	0.10	109	owner	0.15	114	development	0.39	217
market	0.12	110	period	0.27	192	facility	0.45	524

Table A2. Cont.

Group 1 (Vehicle Standards)			Group 2 (Resident Rights)			Group 3 (Area Management)		
Keywords	Degree Centrality	Frequency	Keywords	Degree Centrality	Frequency	Keywords	Degree Centrality	Frequency
method	0.20	123	person	0.44	537	field	0.22	112
number	0.30	184	problem	0.31	273	house	0.16	118
policy	0.19	176	resident	0.19	132	installation	0.24	127
power	0.11	116	result	0.18	134	land	0.36	236
process	0.21	142	right	0.13	171	law	0.56	562
product	0.25	317	sale	0.30	208	management	0.45	245
reason	0.15	142	service	0.29	171	meter	0.13	114
registration	0.30	188	situation	0.15	150	official	0.10	117
regulation	0.69	792	time	0.49	443	order	0.18	163
safety	0.37	249	use	0.40	237	parking	0.15	114
standard	0.31	244	waste	0.26	160	part	0.20	131
support	0.23	124	way	0.13	132	plan	0.22	133
system	0.40	361	worker	0.22	115	project	0.27	190
training	0.24	123				provision	0.20	134
vehicle	0.27	206				purpose	0.34	171
						report	0.24	129
						road	0.20	137
						school	0.25	174
						site	0.28	144
						water	0.18	188
						work	0.36	193

References

- Bleda, M.; Valente, M. Graded eco-labels: A demand-oriented approach to reduce pollution. *Technol. Forecast. Soc. Chang.* **2009**, *76*, 512–524. [\[CrossRef\]](#)
- Edquist, C. *Innovation-Related Public Procurement as a Demand-Oriented Innovation Policy Instrument*; Lund University, CIRCLE-Center for Innovation, Research and Competences in the Learning Economy: Lund, Sweden, 2015.
- Edler, J.; Boon, W.P. “The next generation of innovation policy: Directionality and the role of demand-oriented instruments”—Introduction to the special section. *Sci. Public Policy* **2018**, *45*, 433–434. [\[CrossRef\]](#)
- Schwedes, O.; Hoor, M. Integrated transport planning: From supply-to demand-oriented planning. Considering the benefits. *Sustainability* **2019**, *11*, 5900. [\[CrossRef\]](#)
- De Mesquita, B.B.; Morrow, J.D.; Siverson, R.; Smith, A. Policy failure and political survival: The contribution of political institutions. *J. Confl. Resolut.* **1999**, *43*, 147–161. [\[CrossRef\]](#)
- McConnell, A. Policy success, policy failure and grey areas in-between. *J. Public Policy* **2010**, *30*, 345–362. [\[CrossRef\]](#)
- Edler, J. *Demand Oriented Innovation Policy; The Co-Evolution of Innovation Policy–Innovation Policy Dynamics, Systems and Governance*: Cheltenham, UK, 2010; pp. 1–32.
- Zaltman, G.; Coulter, R.H. Seeing the voice of the customer: Metaphor-based advertising research. *J. Advert. Res.* **1995**, *35*, 35–51.
- Aguwa, C.C.; Monplaisir, L.; Turgut, Ö. Voice of the customer: Customer satisfaction ratio based analysis. *Expert Syst. Appl.* **2012**, *39*, 10112–10119. [\[CrossRef\]](#)
- Jaworski, B.; Kohli, A.K. Co-creating the voice of the customer. In *The Service-Dominant Logic of Marketing*; Routledge: London, UK, 2014; pp. 127–135.
- Choi, H. Geospatial data approach for demand-oriented policies of land administration. *Land* **2020**, *9*, 31. [\[CrossRef\]](#)
- Lee, J.; Choi, H. An analysis of public complaints to evaluate ecosystem services. *Land* **2020**, *9*, 62. [\[CrossRef\]](#)
- Scharpf, F.W. *Games Real Actors Play: Actor-Centered Institutionalism in Policy Research*; Routledge: New York, NY, USA, 2018; pp. 1–305.
- Waring, J. Adaptive regulation or governmentality: Patient safety and the changing regulation of medicine. *Sociol. Health Illn.* **2007**, *29*, 163–179. [\[CrossRef\]](#)
- Garmestani, A.S.; Allen, C.R.; Cabezas, H. Panarchy, adaptive management and governance: Policy options for building resilience. *Neb. Law Rev.* **2008**, *87*, 1036.
- Thelen, K. *How Institutions Evolve*; Cambridge University Press: Cambridge, UK, 2004; pp. 1–20.
- Thelen, K.; Mahoney, J. Comparative-historical analysis in contemporary political science. In *Advances in Comparative-Historical Analysis*; Cambridge University Press: Cambridge, UK, 2015; pp. 3–36.
- Sunhee, K. *New Institutionalism and Policy Analysis*; Yoonseongsa: Seoul, South Korea, 2020; pp. 1–487.
- Scharpf, F. Institutions in Comparative Policy Research. *Comp. Political Stud.* **2000**, *33*, 762–790. [\[CrossRef\]](#)
- Scharpf, F. *Games Real Actors Play: Actor-Centered Institutionalism in Policy Research*; Westview Press: Boulder, CO, USA, 1997.
- Hay, C.; Wincott, D. Structure, agency and historical institutionalism. *Pol. Stud.* **1998**, *46*, 951–957. [\[CrossRef\]](#)
- Steinmo, S. Historical institutionalism. In *Approaches and Methodologies in the Social Sciences: A Pluralist Perspective*; Porta, D.D., Keating, M., Eds.; Cambridge University Press: New York, NY, USA, 2008; pp. 118–138.
- Blyth, M.M. Institutions and ideas. In *Theory and Methods in Political Science*, 2nd ed.; Marsh, D., Stoker, G., Eds.; Palgrave Macmillan: New York, NY, USA, 2002; pp. 292–310.
- Immergut, E.M. The theoretical core of the new institutionalism. *Pol. Soc.* **1998**, *26*, 5–34. [\[CrossRef\]](#)
- Bevir, M.; Rhodes, R.A.W. *A Decentered Theory of Governance: Rational Choice, Institutionalism, and Interpretation*; Institute of Governmental Studies, University of California: Berkeley, CA, USA, 2001; pp. 1–55.
- Katznelson, I.; Weingast, B.R. *Preferences and Situations: Points of Intersection between Historical and Rational Choice Institutionalism*; Russel Sage Foundation: New York, NY, USA, 2005.
- Peters, B.G.; Pierre, J.; King, D.S. The politics of path dependency: Political conflict in historical institutionalism. *J. Pol.* **2005**, *67*, 1275–1300. [\[CrossRef\]](#)
- Shepsle, K.A. Rational choice institutionalism. In *The Oxford Handbook of Political Institutions*; Binder, S.A., Rhodes, R.A.W., Rockman, B.A., Eds.; Oxford University Press: Oxford, UK, 2006; pp. 24–26.

29. Abbott, K.W. Enriching rational choice institutionalism for the study of international law. *Univ. Ill. Law Rev.* **2008**, *5*, 5–46.
30. Choi, B.S. *Government Regulation-Political Economy of Regulation and Deregulation*; Beobmunsa: Seoul, South Korea, 1992.
31. Mitnick, I.P. *The Political Economy of Regulation: Creating, Designing and Removing Regulatory Forms*; Columbia University Press: New York, NY, USA, 1980.
32. Meier, K.J. *Regulation: Politics, Bureaucracy and Economics*; St. Martin's Press: New York, NY, USA, 1985.
33. Stohl, C. European managers' interpretations of participation: A semantic network analysis. *Hum. Commun. Res.* **1993**, *20*, 97–117. [[CrossRef](#)]
34. Doerfel, M.L. What constitutes semantic network analysis? A comparison of research and methodologies. *Connections* **1998**, *21*, 16–26.
35. Doerfel, M.L.; Barnett, G.A. A semantic network analysis of the International Communication Association. *Hum. Commun. Res.* **1999**, *25*, 589–603. [[CrossRef](#)]
36. Schultz, F.; Kleinnijenhuis, J.; Oegema, D.; Utz, S.; Van Atteveldt, W. Strategic framing in the BP crisis: A semantic network analysis of associative frames. *Public Relat. Rev.* **2012**, *38*, 97–107. [[CrossRef](#)]
37. Drieger, P. Semantic network analysis as a method for visual text analytics. *Procedia-Soc. Behav. Sci.* **2013**, *79*, 4–17. [[CrossRef](#)]
38. Dwyer, R.E. Expanding homes and increasing inequalities: US housing development and the residential segregation of the affluent. *Soc. Probl.* **2007**, *54*, 23–46. [[CrossRef](#)]
39. Crawford, K.; Schultz, J. Big data and due process—Toward a framework to redress predictive privacy harms. *BCL Rev.* **2014**, *55*, 93–128.
40. Datameer. Paf: Using Big Data Analytics to Increase Operational Efficiency. 2017. Available online: <https://www.datameer.com/wp-content/uploads/2017/04/Using-BigData-Analytics-Improve-Operational-Efficiency-PAF-1.pdf> (accessed on 26 September 2020).
41. Dutta, D.; Bose, I. Managing a big data project: The case of Ramco Cements Limited. *Int. J. Prod. Econ.* **2015**, *165*, 293–306. [[CrossRef](#)]
42. Fosso, W.S.; Akter, S.; Edwards, A.; Chopin, G.; Gnanzou, D. How “big data” can make big impact: Findings from a systematic review and a longitudinal case study. *Int. J. Prod. Econ.* **2015**, *165*, 234–246. [[CrossRef](#)]
43. Coglianese, C.; Zeckhauser, R.; Parson, E. Seeking truth for power: Informational strategy and regulatory policymaking. *Minn. Law Rev.* **2014**, *89*, 277–341. [[CrossRef](#)]
44. Brown, I.; Marsden, C.T. *Regulating Code: Good Governance and Better Regulation in the Information Age*; The MIT Press: Cambridge, MA, USA, 2013.
45. Mintrom, M. Strategic actors, institutions, and interpretations of the policy process. *J. Public Adm. Res. Theory* **1998**, *8*, 445–448. [[CrossRef](#)]
46. Ginosar, A. Public-interest institutionalism: A positive perspective on regulation. *Adm. Soc.* **2014**, *46*, 301–317. [[CrossRef](#)]
47. Little, D. Actor-centered sociology and the New Pragmatism. In *Rethinking the Individualism-Holism Debate*; Springer: Cham, Switzerland, 2014; pp. 55–75.
48. Min, K.; Jun, B.; Lee, J.; Kim, H.; Furuya, K. Analysis of environmental issues with an application of civil complaints: The case of Shiheung City, Republic of Korea. *Int. J. Environ. Res. Public Health* **2019**, *16*, 1018. [[CrossRef](#)]
49. Financial Conduct Authority. Regulatory Sandbox. 2015. Available online: <https://www.fca.org.uk/publication/research/regulatory-sandbox.pdf> (accessed on 1 October 2016).
50. Higuchi, S.; Goto, H.; Sekiguchi, N. Establishing Community Enterprise in Kinosaki. In *Communities Constructing*; 2005; pp. 117–120. Available online: <http://faculty.washington.edu/jhou/rim/2004/papers/HiguchiGotoandSekiguchi.pdf> (accessed on 26 September 2020).
51. Kida, D.D. *Local Political Participation in Japan: A Case Study of Oita*; Routledge: London, UK, 2018.
52. Ferro, E.; Loukis, E.N.; Charalabidis, Y.; Osella, M. Policy making 2.0: From theory to practice. *Gov. Inf. Q.* **2013**, *30*, 359–368. [[CrossRef](#)]
53. Etienne, J.; Schnyder, G. Improving the Micro-Foundations of Actor-Centered Institutionalism. Available online: <https://ssrn.com/abstract=1600067> or <http://dx.doi.org/10.2139/ssrn.1600067> (accessed on 1 May 2010).

54. Cheng, W.; Appolloni, A.; D'Amato, A.; Zhu, Q. Green Public Procurement, Missing Concepts and Future Trends—A Critical Review. *J. Clean. Prod.* **2018**, *176*, 770–784. [[CrossRef](#)]
55. Appolloni, A.; D'Amato, A.; Cheng, W. Is Public Procurement Going Green? Experiences and Open Issues. In *The Applied Law and Economics of Public Procurement*; Piga, G., Treumer, S., Eds.; Routledge: London, UK, 2012; ISBN 978-0-415-62216-5.



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