Land Use and the Efficiency of Transportation Laws with Regard to Air Pollution in Tehran Metropolitan Area

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Abstract

Air pollution is a major concern and challenge of Tehran urban management. Various rules, regulations and laws had been codified with respect to this matter. Investigating the effectiveness of laws and regulations and the responsibility of the governmental trustee is one of the administrative and executive aspects of air pollution control that has received less attention than its technical and infrastructural dimensions. This study highlights the legal and executive challenges of air pollution and its related actors; the enforcement of laws and regulations concerning air pollution in the field of land-use and transportation has been addressed. The purpose of this article is to suggest an applicable (applied) framework embracing a descriptive-qualitative method. The following data has been extracted through documentaries, library studies, and semi-structured interviews. Finally, the role of each actor concerning air pollution has been analyzed in Tehran urban area using the actuator network theory by cluster analysis in UCI-NET6 software. Study of the feasibility of the reviewed laws and regulations illustrated that among 79 extracted substances, only 17.8% of those were fully completed. Moreover, 60% of laws have a single trustee and the remaining 40% is defined as a joint action between the systems. The 8, out of 20 main actors have been recognized who are the law trustees. These actors are responsible for carrying out 87 percent of all studied regulations. The results show that the Department of Environment, which is responsible for matters related to safeguarding the environment, has no significant role in implementing the air pollution regulations as the main body responsible for the air quality control, and it has no topological connection with other organs either. Sectorial and organizational views and lack of supervisory and punitive mechanisms and government issues implementing rules and regulations of for air quality control policies are the most important problems in the low realizability of policies and laws.

Keywords: Laws and Regulations; Air Pollution; Transportation; Land use; Tehran

1. Introduction

Globally, around 12.6 million people lose their lives due to environmental hazards annually. Air pollution, which is an environmental hazard, is now the fourth-highest cause of early death worldwide (The World Bank, 2018). The hazardous onset of the phenomenon of air pollution goes back to the beginning of the industrial revolution. At that time, SO2; the most important element of air pollutants, was released as a result of industrial activities and fossil fuels. After the industrial revolution, the growing population and increasing industrial activities led to a daily increase in the use of all fossil fuel types, which in itself can cause a rise in the number of air pollutant emissions such as carbon dioxide and greenhouse gases. These growing emissions in the environment along with the massive land-use changes and destruction of forests brought air pollution and climate changes with it, in metropolitan areas (Mousavi Sarvine baghi, 1393).

However, nowadays air pollutant emissions are very diverse. O3 and suspended particles of less than 2.5 microns named PM2.5 are considered as the most common and important air pollutants (Hannah & Max, 2018). In addition to industrial pollutants, urban traffic is also another common source of pollutants (Nitrogen oxides and volatile organic compound) (Tilly, 1975). It should be noted that about 38.1% of CO, 34.7% and 13.1% of VOC available in the air is due to the urban traffic, according to the environment department agency's report in 2017.

The damage caused by air pollution in Iran was estimated at about 2.44 % and 2.48 % of the country's gross domestic product, in 1990 and 2013 respectively, and incurred an average expenditure of 13 billion dollars annually, for the country (Bank & IHME, 2016). Regarding the published report in 1392, the share of the movable source of air pollution in Tehran was about 85%. It can be said that this issue denotes the high importance of travel demand management and the public transportation developments in Tehran urban area. However, the share of metro, bus and taxi in urban transportation has been around 42% in 139, in total.

Air pollution is a complex urban problem. Therefore, the various aspects of the issue of air pollution must be described through a theoretical explanation of the issues involved.

- Air pollution as a municipal issue has a managerial origin. (Letcher & Vallero, 2019, 42)

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- Air pollution affects cities performance (Miao et al,2019,501)
- Air pollution is tied to the economic, social and physical dimensions of the city.
- Urban policies affect air pollution (DorothéeSlovic,2018, 2)
- Air pollution is associated with urbanization and its development and forces affecting the city (Lin, Zhu, 2018, 313)

Thus, it can be deduced that air pollution in Iran is one of the main challenges of management. Although this subject has been addressed repeatedly from the technical aspect, air pollution has another dimension as well which should be considered and that can be titled 'the effective laws and regulations on air pollution.' In this paper the challenge of air pollution and its effective actors are surveyed from two aspects:

Public urban transportation, traffic, and allocated budgets and actions: traffic flow in network, urban mixed-mode commuting, intermodal passenger transport, travel demand, the car market and their quality change in the amount of pollutants emitted.

Urban land-use has a great impact on air pollution in the city with respect to the following factors:

• Change in city size /range and privacy
•Change in city form
•Changes in land-use intensity due to congestion and elevation
• Removal of green landfills
• Travel pattern

In fact, air pollution control policies and laws emphasize two aspects.1 Demand management 2- Activity control policies. Given the large number of trustees on the issue of air pollution, internal and inter-departmental conflicts are one of the most important challenges facing those involved in this issue. To address this problem, the effective actors should be identified in each decision making procedure and then their position can be determined, and the power structure related to every decision would be extracted.

2. Theoretical Framework

The level and density of the pollutant sources and their spatial distributions in urban geography plays the pivotal role share in urban air quality. The World Health Organization (WHO) had divided the source of air pollutants into 3 categories: Stationary, Mobile, and Indoor Sources. In Iran, by virtue of Article, 3 of the Law concerning prevention of air pollution, these air pollutant sources, which fall under domination of this law, are classified into three groups:

- Motor vehicles
- Factories and workshops and power plants
- Commercial and household resources and other resources

Edussuriya divides the pollutant sources into 2 groups. Pollutants resulting from environment activities and resources from human activities. On the strength of "the clean air law", human activities were categorized into 2 classes: (Edussuriya, Chan, & Yec, 2011)

a) Movable Sources: Any source such as vehicle and non-vehicle which might be making pollution through movement

b) Fixed sources: Any pollutant sources such as industries, mining operations, agriculture, service, commercial, office and household areas that cause pollution by releasing emissions in fixed areas.

Since the lead cause of air pollutants are divided into 2 massive sources of natural and human, the factors affecting air pollution can also be classified into two natural and human groups.

These factors encompass: industry and technology, growing urbanization and population growth (Obeng-Odoom, 2015), body (Yousefian, 1391) and urban form (Nelson & Sanchez, 1997), land-use and transportation (Chenwei, 2018). , climate (Ranjbar Sa'adat Abadi & Mohammadian Mohammadi, 1388), temperature (Santamouris & Kolokotsa, 2016), Wind (Tominaga & Stathopoulos, 2013), natural and green elements (Owen et al., 1998), complications and topography of earth (Givoni, 1998)

The foregoing factors can also be divided into two categories of direct or indirect effective factors. The movable source of air pollutant producers, namely" motor vehicles", fixed sources of air pollutant producers like in "industrial use", and increasing urbanization all affect air pollution directly and indirectly.

Since the 1970's, creating deterrent environmental policies has been taken into account as a solution against pollutant industry activities and economic factors (Eslamlouian & Dehghan Menshadi, 2008: 31). The government and governance institutions and management have taken action on policies, regulations, and operational plans for air quality control, at different levels of international, national, and local (cities) levels.

At the international level with the enhancement of welfare and income levels in developed countries, the demand for environmental quality is going to increase, at the same time, the revenue growth of the polluting industries will be reduced. Consequently, governments will transfer their pollutant industries to developing countries (Eslamlouian & Dehghan Menshadi, 2008: 33). The developing countries (third-world), need to attract foreign investments to get to the top of the world competition circuit and to enter the international trading market, be involved in technology transfer and improve the welfare of society. Therefore, some laws and regulations have to be enacted to support and facilitate the entry of foreign investors (Ziaee, 1393: 209).

On the other hand, at national and local levels, the various discussions relevant to the manner of implementation and possibility of air pollution reduction policies has been one of the main challenges. The impact of laws and regulations on air pollution can be explained in three ways:

- Changing the urban structure: laws and regulations for change in land use, zoning, etc. (Baum-Snow & Kahn, M.E, 2005: 150) have an impact on travel generation, transport patterns, and so on.

- Changing the people's attitude and behaviors: in the discussion of air pollution, advertising and culture, constraints or transportation incentive policies, construction, vehicle dependency, and so on, on space consumption, public tendency towards public and private vehicles , behavioral patterns, etc. (Outwater, et al., 2014: 29-33).
- Changing the urban function: the quality of vehicles, the intensity of frequencey vehicles use, the performance of industries and the level of technology required for industry, the quality of vehicles as one of the sources of pollution, the nature of government and the development of the smart city (yinLee, 2016).

3. Research Background

Wang indicates that the effect of actions and applied policies are different in diverse sections. Despite the impact of applied policies, the challenges which are related to industry and traffic still exist (Wang, et al., 2018). Wamsler and his colleague point out that the conflicts within the management sectors are the main obstacle in the field of environment, and how the government intervenes to achieve the sustainable development should be studied (Wamsler & Raggers, 2018). The study of the impact of air pollution laws on India shows that the rules and regulations have had little impact on the reduction of air pollution. It has been concluded in this paper that a higher demand for air quality leads to the effective implementation of air pollution regulations (Greenstone & Hanna, 2014). Chang and Wang indicate that laws and programs to reduce pollutant production should be discussed along with other current policies, because of significant operational interactions with other current policies (Chiang Chang & Wang, 2010). Karimi and Mousavi Madani show that efficiency and detailed limitations of law is not an issue that can be solved by examining the effectiveness of law and regulations in Iran. Accordingly, how to implement regulations is the main challenge (Karimi & Mousavi Madani, 1396). Lesani and Edalatjoo have concluded that the legislators are not fulfilling their role due to not studying the principles of the Iranian constitution and acting in favor of protecting the environment and those who play a role in doing so. (Lesani and Edalat joo, 1396)

Najafi et al. indicate that the centralization of the rules on a large scale, and non-assignment of business affairs by the local government are the reasons for the failure of air pollution reduction programs, after examining the role of the municipality in the formulation and implementation of laws related to air pollution in cities (Najafi, Afzali, Hatami-Nejad, & Shamsi, 2012).

In a research project in Washington, USA, the government policies are considered through the reduction of environmental pollutants from the perspective of policies, governmental laws, legislation, subsidies and grants. It is noted that some fiscal policies should be proposed instead of incentives (Schultze, 1975). In 1967, the governmental and private laws and regulations, in terms of air pollution in the USA,were surveyed. Finally, air pollution control was proposed through private sector guarantees alongside government legislation in macro, federal, and local levels (Conard Juergensmeyer, 1967).

In another research, the study of the legal system of Iran's environmental assessment and that of the world's leading countries has concluded that in developed countries, the requirements for strategic environmental assessment are mainly evident in two levels of legislation; policy and decision making. However, in Iran, the first phase which is the precondition of the second stage is not well defined (Khosh manesh zadeh et.al, 2012). Debirie and Kiani's research also suggests that Iran's environmental impact assessment has been conducted on a wholistic level (Dabiri and Kiani, 2008).

In a study in 2018, the spatial relation among economic development and environmental regulatory policy setting has been studied and the conclusion was that there is a significant relationship between the available environmental regulations and productivity of green production factors (Wang, Sun, Wang, Zhang, & Zou, 2018). Biswas and his colleagues (Biswas, Farzanegan, & Marcel, 2012) show that underground economics exacerbates pollution due to non-compliance with laws and regulations. In a similar vein, Cole and Elliott Nesses conclude that organizational corruption, which is realized in the executive body and the judiciary of government, has a reverse relationship with the adherence and enforcement of environmental laws and regulations by analyzing the environmental standard possibility and organizational corruption (Cole & Elliott, 2005).

The Fetres and Karimi research also confirms the negative significant relationship between the open degree of economy and air pollution average (Fetres & Karimi, 1396). Maddah and Raoufi analyzed the government expenditure impacts on the environment as well. It was found that increasing government costs in public education development, adopting the necessary rules and regulations, strengthening the facilities and public infrastructure have a deterrent effect on the emission of pollutants (Madhad & Raufi, 1396). Herati et al. have examined the impact of political and business variables on the environment by using the date from 110 countries. Furthermore, they concluded that there is a meaningful positive relationship between economic-political factors (such as coping with corruption, democracy, and freedom), and environmental performance (Harati, Taghizadeh & Amini, 1394). Nazari and colleagues proved that the effects of economic growth variables, density degree, energy consumption and the number of vehicles on environmental pollution were positive and significant in Iran during the years 1353-92. The degree of economy openness, temperature and rainfall rate in the country, have a negative significant relationship on environmental pollution (Nazari, Mahdavi Adeli & Dadagr, 1393). Moreover, Pajooyan and Tabrizian

confirm the direct relationship between economic growth and environmental pollution (Pajooyan & Tabrizian, 2008).

To sum up, the foregoing subjects have been categorized into three groups. Firstly, the research studies the impact and efficiency of laws and regulations. Secondly, the areas which consider the type and way of implementation and their effective factors. And thirdly, subjects that measure the impact of organization and management variables on air pollution and the environment. It should be noted that the efficacy of the rules and regulations are only as good as their implementation, the legal system and the executive structure.

4. Methods

In this research, the laws and regulations are discussed concerning air pollution in terms of land-use and transportation. Hence, after extracting a collection of laws and regulations according to the subject and their custodian who runs it, the possibility of their feasibility is evaluated by surveying the system performance report, interviews with managers and related experts. In the present paper, an applicable (applied) framework embracing a descriptive-qualitative method is utilized. The following data had extracted through documentary evidence, libraries studies, and semi-structured interviews. Furthermore, thematic analysis was recruited as a method for evaluating textual data (rules and regulations).

The work process has been expressed in the first stage as a body of laws and regulations on air pollution that were extracted in the form of documentary evidence and library studies. Therefore, the rules and regulations that came under the list of air pollution and land-use were determined. Furthermore, the 24 semi-structured interviews with managers and experts in trusteeship organizations on air pollution laws and regulations were aimed at verifying the feasibility of laws and identifying operational gaps in implementation.

The sampling was similar to snowball. Finally, using the network actuator theory, the role of each actor is studied in Tehran's air pollution. Network structure analysis provided us with the ability to better understand the relationship of power in the decision making process and also to realize how a limited number of actors acquire this power to affect the system performance. The actuator network theory is an interpretive-analytic approach which consists of a collection of tools and perceptions in which its exposure is beneficial with complicated and ambiguous multidimensional reality (Nimmo, 2011: 109). This theory is based on Relational Materiality and believes that existence and entities would be meaningful in relation to other phenomena (Ghazi Tabatabae & Dadhir, 1386, p130).

Cluster analysis is used to cluster the actors in the UCI-Net software. Strategy for hierarchical clustering is an agglomerative and bottom-up approach and starts with clusters containing single observations and continuously merges them based on a similarity strategy until all clusters are merged into one big cluster, or a stopping criteria is met.

5. Results

The laws and regulations, rules and limitations can play a vital role in controlling the air quality and preventing contamination. In addition, the most important laws and regulations and country's policies have been analyzed in the field of air pollution which are as follows:

•Article 50 of the Constitution

• The1404 Landscape document

•Announcement policies of Iran's Leader about "Environment"

•Environmental Protection and Improvement's Law (Approved 1353/3/28 and Amendment 1371/8/24)

•Five-Year Plan of Economic, Social and Cultural Development of the Islamic Republic of Iran (1374-1378)

•The Prevention of Air Pollution Law (Approved 1374/02/03)

- The Law on the Prevention of Air Pollution regulation (approved on 1376/02/14)
- The Law on the Prevention of Air Pollution regulation (approved on 1379/06/16)
- The Law on the Prevention of Air Pollution regulation (approved on 1381/04/05)
- The Third Five-Year Plan of Economic, Social and Cultural Development of the Islamic Republic of Iran (1383-1383)
- The Fourth Five-Year Plan of Economic, Social and Cultural Development of the Islamic Republic of Iran (1384-1388)
- The 5th Five-Year Plan of Economic, Social and Cultural Development of the Islamic Republic of Iran (1393- 1394)
- The Sixth Five-Year Plan for the Economic, Social and Cultural Development of the Islamic Republic of Iran (1396-1400)
- Clean Air Law (Approved 1396/05/18)
- Approval of the Air Pollution Reduction Program in eight major cities (The Council of Ministers, 1390/12/16)
- Approval of the requirement for executive machinery to deal effectively with air pollution (The Council of Ministers, 1393/2/10)
- Approval of the establishment of a working group on the implementation of a comprehensive plan to reduce the pollution of metropolitan areas (The Council of Ministers, 1395/4/2)
- Approval of decreasing air pollution in cities (The Council of Ministers, dated 1396/10/24)
- Approval to grant facilities for a renovation plan regarding the naval business in the country (1397/3/13)
- Approval of the High Council for the Coordination of Traffic reduction in Cities

- Approval of the National Working Group on the Reduction of Air Pollution in Metropolitan areas
- Terms of Detailed Plan of Tehran (1392/2/11)

Table 1
Selected laws and regulations

Executive	**Subject**	**Status(1.done/2.waiting/in process/3.incomplete)**
Ministry of Industry, Mine and Trade, Environmental Protection Agency, Provincial Government	Transferring pollutant units out of city border	Waiting/In process
Ministry of Oil (within the city),Ministry of Roads and Urban Development, Ministry of the Interior	Increasing the public transportation share according to the Public Transportation Development law and fuel management	Waiting/In process
Ministry of Industry, Mine and Trade, Environmental Protection Agency	Prohibition of production and the numbering of carburettor motorcycles	Waiting/In process
Ministry of the Interior- Municipality	Developing a travel demand management plan to reduce intra-city travel	Incomplete
Ministry of the Interior- Municipality	Urban green space per capita should increase one meter annually by the end of the fifth development plan of the Islamic Republic of Iran	Waiting/In process
Ministry of the Interior- Ministry of Roads and Urban Development	Approval and implementation of the LEZ (Air Pollution Reducing Range)	Done
Ministry of Roads and Urban Development- Ministry of the Interior	Assign seasonal parts from the studies of conducting and comprehensive plans/and cities improvement to study environmental issues	Waiting/In process
Municipality	Profits and non-profit services would be organized in Tehran detailed plan in residence area in order to reduce the demand for travel	Done
Municipality	In all protection zones (green and open) Any construction with minimum level of occupancy and build are allowed in the form of special designs	Done
Municipality	Creating Facility and the necessary predictions to expand the development of pedestrians and bicycles	Incomplete
Police	Preventing from commuting the pollutant vehicles	Waiting/In process
Ministry of Communications and Information Technology	Infrastructure expansion of e-service infrastructure in order to reduce intra-city travel in public and private sectors Twice as much as the current situation	Waiting/In process

Moreover, the 79 laws and regulations were extracted which were relevant to air pollution in the field of land-use and transportation by analyzing the laws. Each trustee system has been recognized and their performance has been reviewed. Meanwhile, the related items regarding contamination resource management (CRM) have a major share. Studying the law implementation status shows that 43 % of the law requirements have not been adhered to completely or are in the process of being implemented. There is only 18% of these laws which have been fully carried out. In terms of CRM, 56% of these cases have not been implemented and the remaining 33% of the rules are in process or underperformed, and only 11% of the law requirements have been conducted to perfection. These percentages of transportations are 31, 44 and 25 % respectively. It can be said that the most incomplete laws and policies have been in the fields of management of polluting sources, transport, and traffic. The laws and policies have been in the area of polluting resources management, transport, and traffic. The policies and laws that are attributed to land use have the highest degree of reliability among other areas (about 67% are in process / underperformed and 28% have been done).

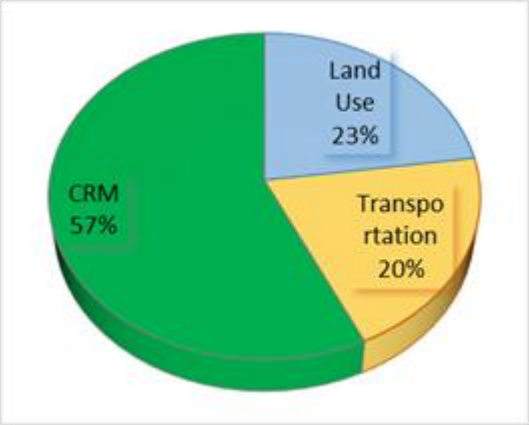

Fig.1. Laws share by subject

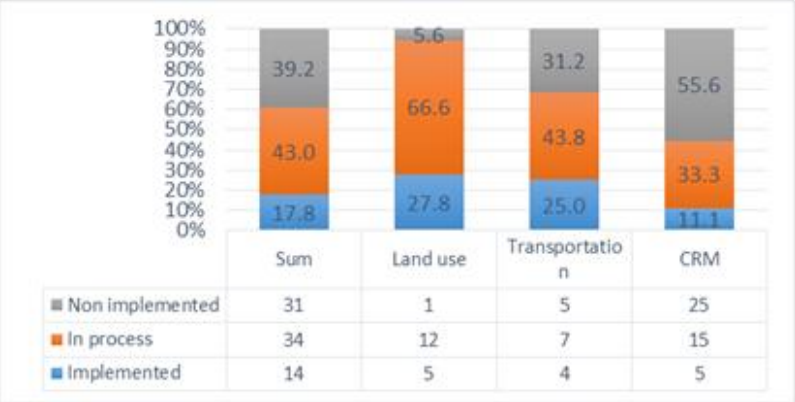

Fig. 2. The law's implementation status

To follow, the executive structure and policymakers of the policies and reviewed regulations have been investigated. The results of the analysis show that 60% of the rules of the system have a single trustee and 40% are defined as being a joint action between the systems. The feasibility study of the policies and laws of these two categories shows that 16% of the laws have been implemented by a single trustee, while 6% of the laws that have joint custodian have been fully implemented. On the other hand, the examination of non-fulfillment of policies and regulations shows that all unfulfilled laws, 62 % of them have a single trustee and 38 have joint custody (35.4% versus 21.5% of the total reviewed laws and policies). Thus, it is nearly impossible to make a definitive statement about the impact between the individual or the common custodians on non-fulfillment of the projects. But it can be implied that the lack of common custodians increases the likelihood of implementation.

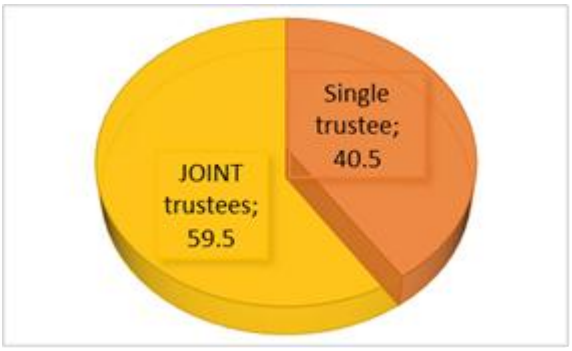

Fig. 3. The laws performance.

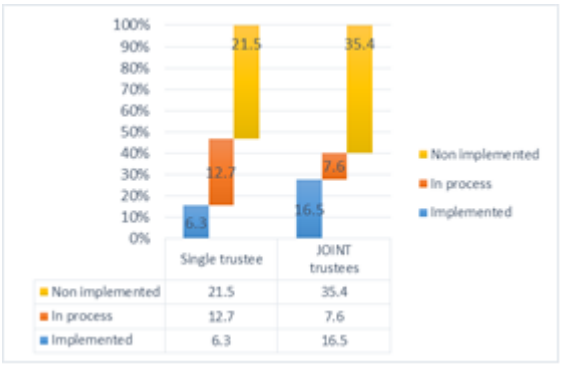

Fig. 4. The laws trustee status

At this stage, in order to explain and analyze the role of actors in air pollution, the role of actors is examined on the basis of laws and regulations and their relation to the issue of air pollution. As a result, regarding the laws and regulations, 20 actors were identified. Overall, the reviewed laws and regulations indicate that the seven actors such as the municipality, the Ministry of Industry, Mine and Trade, the Ministry of Interior, the Police, the Ministry of Petroleum, the Environmental Protection Agency, the Ministry of Roads and Urban Development play a vital role in the 87% of the total analyzed rules. These actors are major contributors to air pollution. Meanwhile, the Municipality and the Ministry of Roads and Urban Development, fulfilled their duties with desirable performance of 58% and 37% respectively, and the Ministry of Industry, Mining and Commerce, the Ministry of Petroleum, and the Police had an unsuccessful performance with 88%, 81%, and 66%, respectively. It should be emphasized that this judgment is only based on the contribution of the systems on the possibility of the rules and does not take into account the effect of the laws.

Table 2
The role of actors in air pollution laws in the field of land use and transportation

Actors	**Degree of centrality**	**The incomplete rules**	**The in process/ waiting rules**	**conducted rules**	**The system's share of the execution of the rules**
Municipality	7	6.3	7.6	17.7	31.6
Ministry of Industry, Mine and Trade	5	19	1.3	1.3	21.5
Ministry of the Interior	7	5.1	10.1	3.8	19
Police	3	12.7	6.3	0	19
Ministry of Petroleum	7	11.4	2.5	0	13.9
Environmental Protection Agency	5	11.4	0	1.3	12.7
Ministry of Roads and Urban development	3	1.3	5.1	3.8	10.1
Government	1	5.1	0	0	5.1
National Iranian Standards Organization	3	3.8	0	0	3.8
Ministry of Energy	4	3.8	0	0	3.8
Provincial Government	2	0	0	1.3	1.3
Central Bank	-	0	1.3	0	1.3
Manufacturers and importers of motorcycles	-	1.3	0	0	1.3
Forests, Range and Watershed Management Organization	1	0	0	1.3	1.3
Islamic Republic of Iran Broadcasting	-	1.3	0	0	1.3
Management and Planning Organization of Iran	1	0	1.3	0	1.3
Courier motor transport companies	-	1.3	0	0	1.3
Vice Presidency for Science and Technology	3	1.3	0	0	1.3
Ministry of Communications and Information Technology	-	0	1.3	0	1.3
Ministry of Economic Affairs and Financal	-	1.3	0	0	1.3

Surveying the structure of the relations between actors in the subject of air pollution laws shows that municipality, ministry of interior and ministry of petroleum have common activities with the other seven actors. Furthermore, the Environmental Protection Agency and Ministry of Industry, Mine and Trade have a major role in the rules and policies among systems with the other five actors. The most common action is between the municipality and the Ministry of the Interior in seven cases. Moreover, the Ministry of the Interior has six relationships with the Ministry of Roads and Urban Development as well as the Environmental Protection Agency with the Ministry of Industry, Mine and Trade.

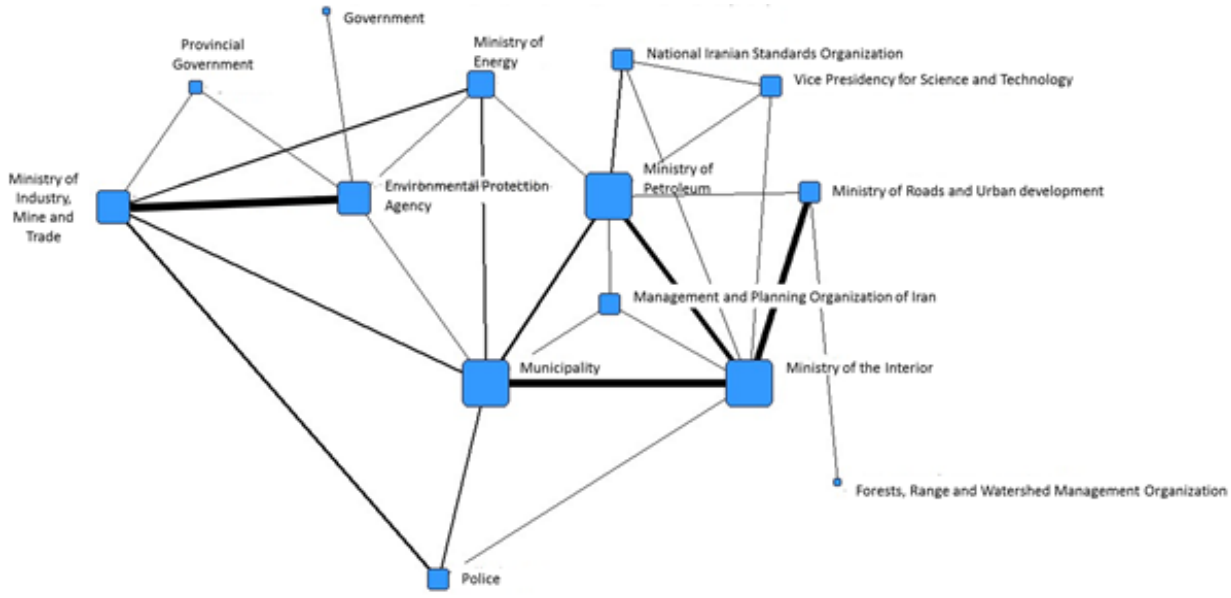

Fig. 5. Actors linkages' structure

6. Discussion

Today in the polls, air pollution is mentioned as the most important issue in the city of Tehran (Transportation and Transport Department, 1397). Analyzing a review of the regulations, policies, and laws and regulations have shown that the laws and regulations are low (17.8%) related to air pollution in the field of transportation and land use (79 items). This topic could be reviewed from various perspectives.

- Way of Performance
- Multiple Terms and Conditions
- Lack of unit trustee system
- Interference of Functional system
- Sectorial and organizational view
- Lack of ssupervisory and punitive mechanisms
- Demand management

Several actors (20 main actors) were identified in the study field; a collection of government and urban management bodies, laws and regulations, other institutions involved in urban affairs and their way of performance influencing urban air pollution. On the one hand, there are the private actors such as the industries (automakers, motor technicians, diesel engines, polluting industries around cities) and commercial companies (importers, knowledge-based companies, manufacturing companies and technology development companies, car importers, etc.), manufacturers and contractors and property and land dealers in the city, involved in municipal affairs (transportation and traffic, urban planning and architecture, environmental organization, police, city council, Ministry of Roads and Urban Development) And besides these , there are some governmental agencies which can indirectly influence policies and actions, and affect air pollution; like The Standards Organization, the Ministry of Industry and Mines and Trade, the Islamic Consultative Assembly, the Oil Company, the Islamic Broadcasting Organization, and so on.

To investigate the role of actors in air pollution, the graph of the relationship between the actors and their relationship was analyzed .

Remarkably, the environmental status of the organization is poor both in terms of implementation and monitoring. Clustering the relationships of actors indicates the absence of an effective relationship between the municipality as the trustee of the air pollution issue in the city and the EPA (Environmental Protection Agency) as the national trustee.(Chart6)

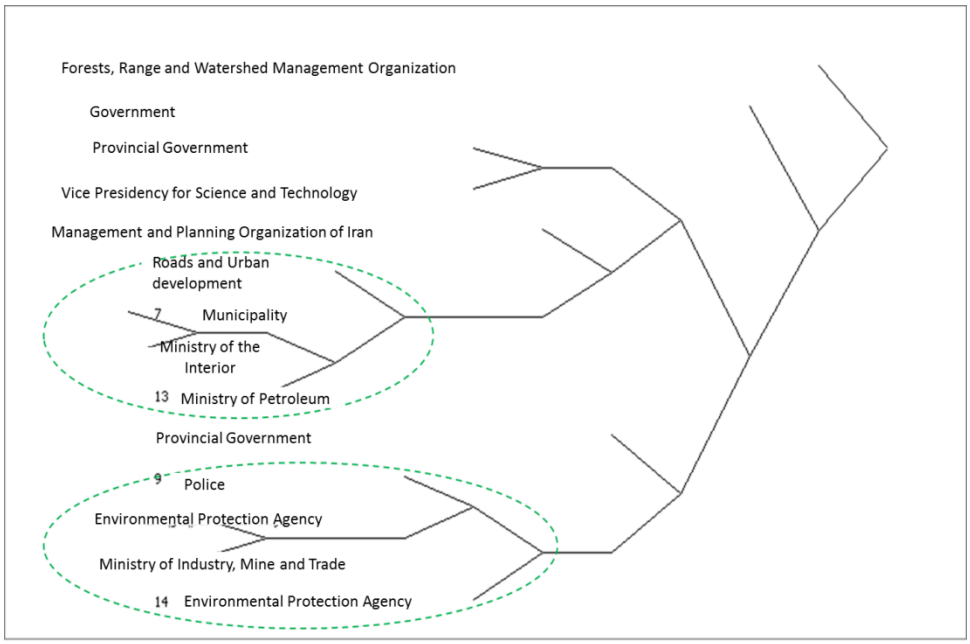

Fig. 1. Cluster analysis of actors

According to the interviews, sectorial and organizational view,parallel authority and absence of strong executive and supervisory bodies, is one of the most important issues of low levels policies, laws, and regulations. The municipality lays down traffic rules. The police are responsible for their performance. The environment gives a standard to the municipality which are mandatory. While the Transportation and Traffic Department, Air Quality Control Agency and the environmental organization emphasize on the promotion of the standards of technical inspection. In 1397, the Iranian parliament approved the bill that the period for a major technical inspection of new cars would increase from two years to five years.

On the other hand, the conflicts can be seen among the sectors through the natural competitiveness among the economic development and environmental protection versus the Ministry of Industry, Mine and Trade and

Environmental protection organization. Even functional conflicts are observed between the two departments of urban planning and architecture as the building trustee in the city, and the transport and traffic vice president of urban traffic and air quality control.

The pattern of the world's most successful cities is based on travel demand management through "increasing cost and risks of traffic and using private cars and attracting public transport. However, a decade ago, the transportation policy of Tehran was a supply-oriented investment in the transportation network. Invisible subsidies on gasoline prices, can be considered another reason.

Another important point which is a major issue in demand management, and has been neglected in the urban planning system, is the use of urban land use and site location. The municipal revenues dependency on construction duties create interference in the city and disrupt the organic order of space. Location of urban land is formed on the basis of economic saving and exchange value of the land. Environmental criteria are considered less noticeable. It also causes the tendency towards the suburbs, increases Pendulum trips, the formation of new centers, dependence on private transportation, changes in wind aerodynamic behavior, reduction in green levels.

It should be noted that the experiences of successful city management suggest that the local government's power and authority will lead to managerial integration, however, in Tehran metropolitan area there are many administrations such as the police, legislators, and performers, supervisors, each of which is on a single deck. The interesting part is that according to the network actors' analysis, the environment has main deficits in the central role of enforcing air pollution regulations. Currently, the organization has no executive power and has a more of a regulatory role (only 12.7% of the rules are independently performed by the Environmental Protection Agency). Despite its supervisory role, it does not have the same topological relevance of strong relationships with all organs (only 25% of activists are involved, while it is expected that the central role of the environmental organization be evident as the main custodian. From this perspective, the need to upgrade the role and the status of the environmental organization as the main custodian of air pollution control is evident.

The considerable share of incomplete policies and regulations (43%) show that the systems make the rules of eliminating responsibility, but incompletely and this means they are dysfunctional. The basic weakness is that there is no self-sustaining mechanism in the system where, if the system or industry does not perform its task in relation to the environment, something undesirable will befall the system .

On the other hand, Tehran has problematic structural problems that could be referred to as a pattern of movement in the city. Appropriate locating of land-use changes in urban structure and urban rehabilitation in order to reduce work trips, proximity to housing and activity, public transport development and to reduce the dependence on a private car should be considered.

On the other hand, Tehran has vague structural problems that can be related to the pattern of movement in the city.

- inefficient land use planning
- mono-centric spatial organization
- long distance between home and workplace
- public transportation weaknesses
- being dependence on private cars

7. Conclusion

To sum up, the related actions of air pollution can be divided into two categories: positive and negative. A series of activities that prevent the generation of pollutants is one of the key actions to control sources of pollution and emissions. Activity limitation of polluting industries, worn out vehicles, vehicle quality control and other factors come in this category. Positive action is being taken to address the demand management and pollution-escalating factor. Strengthening public transport, mixed-use, travel management, land use and land use patterns, urban forms, and more, are some types in this category. Both of these actions are taking place in urban areas and are matched with the category of power, law, and politics. Multiple rules and its procedures, interference of systems, and the lack of regulatory and punitive mechanisms, land speculators, cramp to informal practices, or deregulation in the land use debate, legalization, behavior, culture, and attitudes of people and citizens are among the most important challenges is air quality control.

Lastly, in this paper, a collection of policies, rules, and regulations for air pollution in the field of land use, transportation and demand management were extracted and relations between actors were analyzed. The number of extracted items was 79. In the meantime, the share of each component was 23%, 20%, and 57% respectively, and only 17.8% were fully completed. Moreover, 60 percent of the rules have a single trustee system and 40% are defined as a joint action between the systems. According to the laws and regulations, 20 actors were identified. To evaluate the role of actors in air pollution, the relationship between actors was mapped and the relationship between them was analyzed. The municipality, Ministry of Industry, Mine and Trade, Ministry of Interior, Police, Ministry of Petroleum, Environmental Protection Agency, Ministry of Roads and Urban Development, as main actors, are responsible for 87% of the total surveyed law.

In order to resolve the identified problems, it is necessary to improve the organizational position and executive power of the EPA (Environmental Protection Agency). As such, it plays a pivotal role in implementing and enforcing air pollution laws and regulations. In order to improve the efficiency of urban laws and regulations, it needs to define a common urban policy process between the municipality and the EPA.

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