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Study of Managerial Trends for Supply and Consumption of Fule in Great Tehran

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ABSTRACT

Regarding to the escalating trend of environmental pollutions, especially air pollution in Great City of Tehran, the perspective and study of the conditions for supply and consumption trends of fuels, with specific to fossil fuels, can lead to formation of significant figures and data. On the other hand, recognition, and if possible, reformation of environmental management schemes in the supply and consumption sector for fossil fuels, can turn to be highly, efficient in erasure of the existing imbalance in domestic supply and consumption of fuels. For this purpose, several studies have been taken place to cover the procedures for fuel supply, and to promote management skills in Great City of Tehran. Based upon the findings of this study the utmost consumption rate of fuels, such as oil, gasoline, petrol and natural gas, belongs to the District 4 of Tehran municipality, with nearly %9.34 of Tehran's total fuel consumption figure. By viewing the said percentage, it could be interpreted that the district 4 is the vastest and most populous district in Tehran, and is made of middle and high class social strata. In addition to that, the lowest fuel consumption rate, is, that of Tehran's district 22, with nearly %0.75 of Tehran's total consumption rate, which is due to the fact that, this district has been, recently, annexed to Tehran's Twenty different districts. Meanwhile, district 22 is along side Alborz Mountions strips and Tehran-Karaj motorway: while being less populous, with a social texture made of low income strata and labourers. This study, is based on Coontz and Odanel management theories and managerial five faceted obligations for the overall supply and consumption systems, and for gradual eradication of the current in appropriate fuel supply and consumption trends, which, on one hand, leads to a decline in these produce and resources and, on the other hand, leads to environmental pollutions, specially air pollution, regarding the existing cultral frame work in Tehran and its economic and socio-political status.

INTRODUCTION

Regarding the importance of energy and fuels, especially fossil fuels, which have very limited resources, in the world. However, there exist huge sources of oil and gas in Iran. Due to the limited amount of existing fossil fuels, in the world , lack of an appropriate supply and consumption system, will lead to their ending in long term and finally, it will face a shortage of fossil fuels(6). With due attention to the increasing population of earth, the current trend of supply and consumption of fuels results the significant wastage of these products and their excess consumption. This trend threatens us with a decline in these source and on the other hand, it leads to environmental problems, such as environmental pollutions, specially air pollution. Therefore, in order to safeguard and preserve the existing fuel resources and to prevent the intensification of environmental pollutions, exeution of environmental management trends, is indispensible for provision, distribution and consumption of different fuels and to change the consumption pattern of the above mentioned products, in different consuming sectors (7). As a result of Tehran's vast domain and populous nature, alongside the intensified air pollution, which is mainly due to excess consumption of fossil fuels, the fuel supply and consumption system. In addition to the services provided by this sector, it has faced numerous difficulties. Currently, Tehran's branch of NIOC, supplies fuels, such as paraffin, variety of super petrols, normal and unleaded petrol, gasoline, fluid gas, fluid cylinders and other products, such as tar and engine oil. In addition , a major part of Tehran is pipelined for usage of natural gas, for all household, commercial and industrial purposes (8). During the lst and 2nd development plans, the general guidelines, in relation to fuels, and specially in the 2nd plan, in different points, specially in the clause of article 19, principle outlines, in relation to the issues of energy and fuels, have been determined, which is a turning point in the energy related issues in the country (5). Currently, all organizations and all social strata have become relatively aware of the necessity for provision of a promoted model and cultural pattern for supply and consumption of a variety of fuels.

The purposes of this is to study is to propose an effective step, toward proper management of environment, in the fuel supply consumption system. The goal, pursued by this survey is to gain access to the solutions for practicing a promoted management method of fuel supply and consumption system in the Greater Tehran and to prevent wastage of fuels. Besides, the execution of policies and methods, which would guarantee appropriate usage of these products, without a decline in the national production standard and social welfare, in addition to their appropriate supply and consumption and a decline in environmental pollutions, specially air pollution, which is due to an excess consumption of fuels(9).

MATERIALS AND METHODS

The method and the type of studies, presented in this article, are as applicable method, being principally achieved, based on continuous data and information, gained from measures and samples of oil companies and processing of figures and data and their comparison with the patterns for "Coontz and Odanel" management system, upon case managements (Fig.1).

The places, surveyed under this study, included: petrol stations, gas stations, shops selling these products, companies supplying

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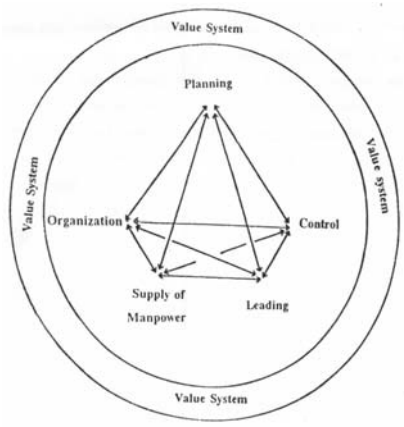
fluid gas capsules , in addition to the counters, erected for figuring consumption of natural gas; with a survey on the consumption rate of these products and the current deficiencies in the existing supply and consumption system of these products in different sectors, such as households, commercial, industrial and vehicle, production sectors.

Fig. 1. **Management Principles system and the Kontz and O'Dannel and Value System**



RESULTS

Following the initial survey, it was clarified that fuel supply in Tehran, takes place, currently, regarding the major oil reservoirs of North- East and North – West, of Tehran, Rey , Nazi- Abad, and Mehr- Abad districts. The capacity of fuel reservoirs in Tehran, currently, doesn't suffice more than a month's consumption of Tehran. In addition, there are 86 active petrol stations; 12 districts for sale of oil products and 25 gas stations, in addition to 16 active companies, for supply of fluid gas cylinders, which supply fluid products to the citizens.

Based on the surveys conducted, consumption rate in Tehran's district 22, was studied and it was clarified that the lowest fuel consumption rate, such as parafin, petrol , gasoline and natural gas, is related to Tehran's district 4, with 9.34% and Tehran's total consumption rate (Fig.2). The said figure can be interpreted, due to the fact that the said district, covers the vastest area in regard to surface area and population in Tehran, and accomodates middle class social stratum, upwards, and majority of consuming sectors such as household, commercial and industrial sectors, indicate higher consumption rates.

In addition, the lowest consumption rate relates to district 22 of Tehran, which consumes 5.75% of Tehran's total consumption rate, since this region is a newly constructed area, along sides mountain strips of Alborz and Tehran–Karaj highway, accomodating a lower population with lower household consumption rate, with the social stratum of this region, being low income strata and laborers. In addition, fuel consumption rate in Tehran's 22 districts, is shown in Fig. 2 , based on percentages, for each single district. It was shown based on this survey, that the total capacity of reservoirs, for storage fuels and operational fuels, in Tehran fuel warehouses, for fuels, such as engine's petrol, parafin, gasoline, light and heavy fuels, equals to 1,124,200 m^3 (Table 1).

Fig .2. **Percentage of fuel consumption for Tehran's 22 districts**

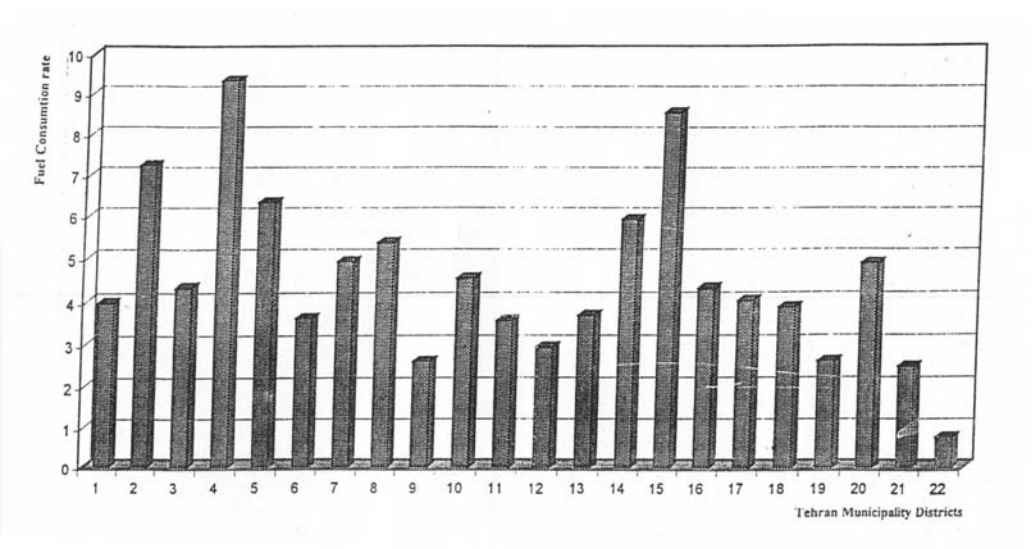


Table 1. **Capacity of fuel storage and operational reservoirs in Tehran, (m^3)**

Warehouse		Petrol	Oil	Gasoline	Oil fuel	Light fuel	Heavy fuel	Tatal
Storage Reservoirs	North west	39200	37700	115500	--	--	--	193100
	North east	59600	34800	60300	--	--	--	154700
	Mehrabad	--	--	--	--	6000	6000	12000
	Naziabad	--	62800	11000	--	--	--	73800
	Rey District	37100	65000	70700	140800	11000	22000	346600
Total capacity of reservoirs	Tehran Warehouse	136600	200300	257500	140800	17000	28000	780200
Capacity of operational reservoirs	Rey District	60000	80000	80000	80000	22000	22000	344000
Capacity of total No reservoirs	Tehran Warehouses	196600	280300	337500	220800	39000	50000	1124200

Table 1, shows the capacity of reservoirs for storage of feuls and operational reservoirs, stationed, respectively, from the highest to the lowest quantities of these stations, in City of Tehran. Currently, all Tehran's districts, except districts 5, 12 , 15 and 18 take advantage of natural gas facitities. Distribution of gas stations in Tehran, is as follows:10 gas stations in districts 3 and 10, with one single gas stations in each of the districts 8, 18 and 19, being located, mainly in the polluted, congested and populous areas of Tehran, leading to an unequal supply system in Tehran, which has resulted in an increase in the duration, needed for gaining access to fuels. Distribution of fluid gas stations , for fuel supply to vehicles in Tehran, is irregular and disperse, so that district 12, accomodates 3 stations. However, since the districts1,2,7,10,11,14,17 and 19 lack gas stations, localization of these stations have led to intensification of traffic jams and further air pollution, due to these crowded areas. Natural gas consumption rate in Tehran, equals 5,962,201,715 m^3 in household, commercial and industrial sectors, with the total number of consumers in these sectors, being 602,525 subscribers. It is necessary to mention that, these regions, are deprived of natural gas pipelines, for cooking and heating purposes, from fuels, such as fluid gas and gasoline cylinders. Based on the existing figures for oil products consumption rate in the year 1999 in Tehran, consumption rate had been 8.5 million liters of petrol per day, 5 million liters of parafin per day, 8 milion liters of fluid gas per day. Currently, more than 1,100,000 capsules of fluid gas are used and 60,000 gas engined vehicles, use fluid gas, amounting to 580-600 tons, for their vehicles. Consumption of these fuels, in household and commercial sectors in autumn and winter, increases, compared to other seasons, due to cooling of weather conditions, with cooler districts of Tehran, such as Shemiranat district, indicating higher consumption rates.

DISCUSSION

Difficulties in supply and consumption of fuel in Tehran, is due to factors such as, low state of general knowledge, technical deficiency of supply and consumption systems and low state technology of this system and absence of appropriate environmental management framework in this field, with some of them pointed as follows:

A) Wastage of fuel products and fuel in transportation, supply and consumption networks in this system partially, due to wastage of fuel in transportation sector, by vehicles, drivers, due to their negligence and hastiness in fueling and / or due to straightening the fuel costs, which leads to excess fueling and wastage of fuel. In addition, supply of fuel with unreal prices, leads to wastage of products. Wastage of fuels, in household and commercial sectors, by the usage of fuels at unneccessary times and inaccuracy in consumption of these products.

B) Absence of special stations for fueling of motorbikes, which results in their lack of coordination with vehicles, and an increase in duration, needed for fueling of vehicles.

C) If the fueling would take place by operators themselves, fueling process will be quicker, more accurate and without any spillage.

D) Other difficulties include old supply equipment in petrol stations, low standard of technology for provision of fueling services, leading to wastage of fuels, and an inappropriate technical state and old worn out vehicles, with higher consumption rates, as every single year of vehicle's age , consumes 0.111 liter more per 100 kilometers.

E) Non- standard equipment and fuel consumption systems, due to the absence of necessary rules and

regulation, with regard to supply and consumption and fuels.

F) Absence of natural gas pipelines, in all of Tehran's districts, which leads to an increase in consumption of alternative fuels, such as gasoline and fluid gas.

Since for determining the present status of every organization such as the City of Tehran in terms of supply and consumption, determining the current role of Tehran City in the management matrix of fuel supply and consumption is necessary, the levels of this matrix based on the Kontz and O'Dannel theory in four levels, including 0 to 4 (Table 2), indicates the complexity and sophisticated quality of Tehran City in terms of effective management of fuel supply and consumption and its columns concering key managerial subjects (planning, organization, control and supervision, supply of manpower, leadership and motivation, investment, information systems).

Table 3 indicates general matrix of fuel supply and consumption mangement and, based on this , an optimized system. The position of fuel supply and consumption menagement according to available observations and data is in the fuel supply and consumption management system of Tehran City, being between levels 2 and 3 (Table3).

Table 2. **Grading Levels of Fuel Supply and Consumption Management Matrix**

Level 4	Management in fuel supply and consumption has reached on an optimum level and the management had been established in an inclusive manner.
Level 3	Fuel supply and consumption and manpower management had officially started to work but had not yet manifested itself.
Level 2	Besides the fuel supply and consumption manager, most managers have realized the importance of fuel supply and consumption , however , he has not been sufficiently supported.
Level 1	An individual or a team have been appointed as the fuel supply and consumption affairs and the fuel supply and consumption management has been formed.
Level 0	No individual or unit is responsible to the fuel supply and consumption management and no supervision is exercised over the system.

Naming some other environmental problems in Tehran, as a result of problems related to supply and consumption of fuels, is air poluution, traffic jams and noise pollution. Today, air pollution and its destructive effects are people's concern, because Tehran is one of the most polluted regions in the world. Tehran's air pollution, mainly due to an increase of vehicles and consumption of fossil fuels, is due to an excess in the supply and consumption of these products. Fuel consumption in Tehran, just in transportation sector which consumes petrol and gasoline, has led to the diffusion of 3000 tons of CO, 450 tons of hydrocarbons and 130 tons of NOx, 30 tons of SO2, 30 tonsof smog and 2 tons of Pb in Tehran's air. Concentration of CO, recurringly is 9 ppm in average for 8 hours. These terrifying figures, are due to exessive and unnecessary consumption of different kinds of fossil fuels, just in transportation sector, which has resulted in poisoning the breathing air of civilians, resulting in manifestations of numerous pulminary, cardiac, nervous and gastrointestinal diseases. Specially, the impact of Pb on children's brains, is one of the most important and fatal recognised impacts, ever. In adition, noise pollution, and congestions, due to transportion of more than 2,000,000 vehicles in Tehran, has brought about destructive side, effects for Tehran citizens. The proposed solutions, for promotion of fuel supply and consumption system in the company of an environmental system, include:

1.Appropriate distribution of petrol and fluid gas stations, in each of Tehran's 22 districts, in a way that these regions would accommodate a petrol station, so to prevent formation of long queues in gas stations.

2.Appropriate scheduling and conductiong urban surveys, for finding an appropriate location for gas stations in regions with a high rate of output, so that these gas stations world be located in congested and polluted areas.

3.Construction of small gas stations in lands, with surface areas of 300-1000 meters, for motor bike's fueling.

4. Provision of necessary facilities for vehicle owners, to encourage them to consume natural gas and gas – engining of their vehicles, in order to lower environmental pollutions and to prevent excess consumption of a particular fuel type.

5.Trying to eradicate technical problems in gas stations and development of scientific and technical research, to promote technology for construction of gas stations and their equipment and to promote quantity and quality of servicing sectors.

6.Technical training of gas stations, operators, provision of training sessions for the public and informing people on their models for proper consumption of fuels, via mass media and the related organizations, throughout different social strata.

7.Establishment of rules and regulations and standards, for fuel consuming and worn out equinpment, for construction of vehicles, with more than 20 years of age and repairing them to the best possible status, for joining Tehran's fully active transportation system.

8. Control and supevision, for prevention of fuel wastage in gas stations.

9. Development of natural gas popelines network in all Tehran's districts, so to cover all the 22 disticts with natural gas pipeline network.

10.Provision of different fuel types, with their real pricings, to prevent their wastage, and to gradually lower energy subsidizations.

11.Usage of emerging energies and recycling them; including solar, wind and electrical energies, and replacing fluid gas and natural gas, instead of fossil fuels, in order to lowerpollution.

12.Continuous promotion and supervision and caring for enviromental issues in fuel supply and consumption sector.

13.Enlarging high quality taxi transportantion system to prevent fuel consumption by vehicles, and to exectue Tehran underground project faster and to develop other servicing facilities, such as post and telecommunication sectors, to decrease unnecessory journeys around Tehran.

14.Operation controlling censors in gas station pumps to prevent overfilling of vehicles with different type of petrol and gasoline fuels, and to maintain and inspect vehicles equipment, such as fuel indication amper.

Table 3. **Fuel Supply and Consumption Management Matrix**

Level	Planning	Organization	Control & Supervision	Supply of Manpower	Leading & Motivation	Investment	Information Systems
4	Planning aiming at maximum effectiveness as a common practice and as a definite strategy	Management has fully merged into other structures and responsibility limits are fixed	Control and supervision with the most appropriate technology and consistent reporting in an effective manner	Supply of manpower at a very specialized level, conducted in various sub-groups	Regular, mechanized communication together with various emotional relationships	Investment is finally in favor of green plans for preservation with a precise evaluation	Following inclusive reports and definite goals, supervising over consumption and offer, reporting faults
3	Planning for official optimization of the system, with no obligation for execution and support thereof	Supply and consumption management, queue managers and their responsibilities being well outlined	There are control, supervision and stages thereof being well outlined, with supervision reports	Management and the organizational sub-group thereof being well outlined, attracting effective and specialized forces	Establishing of emotional and human relationship as well as a direct contact with the consumer	Investment being for returning of all investments in a medium-term and long term	Fuel offer and consumption reports exist but they are not available
2*	Planning had not yet been precisely determined by senior managers	There is the organizational post of supply and consumption managers but queue managers and their limits of authority have not yet been determined	Control and supervision are part of the plan, but managers have not yet been officially appointed	Quantity of manpower has increased at this stage proportionately to the progress of the project.	Through a committee consisting of the fuel supply and consumption manager and other senior managers, customer relations are established.	Investment is carried out as per return period standard in the short term.	Supervision reports are presented based on provided information and the fuel supply and consumption unit has temporary participation in determining of the budget.
1	A collection of unwritten fuel supply and consumption policies are available.	Fuel supply and consumption management is part-time and with limited authority.	Supervision control is in the form of unexecuted projects.	Fuel supply and consumption manager has little workforce.	Existing of unofficial relations between the fuel supply and consumption manager and consumers	At this level, investment is carried out with low expenses.	Weak information system is faulty at the level of reporting.
0	There is no clear, definite plan	No person having been appointed as fuel supply and consumption manager	No supervision over fuel supply and consumption system.	No effective manpower for system optimization	No emotional human relationship.	No investment for promoting fuel effectiveness	No information system on fuel supply and consumption system

* Status of Fuel Supply and Consumption Management in Great Tehran

REFERENCES

1.Ahmadinejad A (1999): A surrey on wastage of oil products in domestic distribution and delivery network; National Energy Committee publications, Affiliated to Ministry of Energy.

2.Air Pollution Control and Quality Company (1997): Project for repairment of worn out vehicles in Tehran; Municipality of Tehran.

3.Bagherzadeh I (1999): Fossil fuels management, International Research Center for Energy Affiliated to Oil Ministry.

4.Ministry of Energy (1998): Courses on energy management, Ministry of Energy.

5.NIOC (1997): Survey on distribution system and model and consumption of oil products; National Iranian Oil Company.

6. NIOC (1998): Report on fuel supplying services to Great Tehran; National Iranian Oil Company.

7.NIOC (1999): Project for promotion of appropriate culture for consumption of oil products; National Iranian Oil Company.

8.Office for Coordination and Planning of City of Tehran (1997): Recognition of fossil energy system of Tehran, Municipality of Tehran.

9.Smith G (2000) Principles of energy management, Daneshgahi Publications; Translated by: S Sadeghi.