Instituto Cultural Minerva

Institute of Brazilian Issues

The George Washington University

Washington, DC

REGULATION OF THE WATER SUPPLY AND SANITATION SECTOR

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Minerva Program, Spring 1999

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INTRODUCTION

This final paper completes my participation in the Spring 1999, Minerva Program organized by the Institute of Brazilian Issues at the George Washington University. My choice of topic is "THE REGULATION OF THE WATER SUPPLY AND SANITATION SECTOR " which flows from the fact that this is one of the most important sectors of the so-called "public services", but whose discussions about its regulation are just beginning in Brazil. At the same time, it is one of the sectors that is most difficult to obtain participation from private companies.

Basically, the work is presented in two parts. The first one contains a conceptual approach to the theme of regulation, while the second part discusses, in a more detailed way and under several aspects, the regulation of the water and sanitation sector.

In particular, when approaching the theme of drawing a fare system, the objective is not to achieve a final model, ready and complete to calculate fares, but to discuss the advantages and disadvantages of each option that can be adopted. In fact, this is the general orientation of my paper.

Within this text in general, it is necessary to realize that the regulation of this sector, so sensitive in its social and political aspects, will not be simple and will demand of those engaged in this task not only a great effort, but also a fair amount of creativity.

PART I

1. REGULATION: CONCEPT, THEORY AND MAIN ASPECTS

In the last two decades, the theme of regulation occupied an important space in the debate concerning the new relationships between the State and market in the economic field, and between the State and society in the political field. The ambit of the debate has been the revision of the previous ways of State action, characterized by the intervention, and the adoption of new political and economical mechanisms in the interactions among those spheres.

1.1. REGULATION, DEREGULATION AND RE-REGULATION

1.1.1. REGULATION

The regulation concept in the economic field is usually considered in a very imprecise way. There is consent that the term means some interference imposed by the State to the economic agents' performance. In economic theory, the interventions are justified to solve problems generated by the market failures, but in the historical experience of a significant portion of the countries, the action of the State has been much wider.

While the economic theory is based on the Anglo-Saxon countries, in which the market grew quickly, in other areas, including countries now considered developed, the markets were little advanced, almost non- existent in some cases and, therefore, had much larger problems than market failures.

In those cases, the regulation reached a vast field, including the planning of growth and industrial diversification, the coordination of important agents, the distribution of resources, several market reservations and the direct action in some areas of the productive sector. It was worth more to enlarge and to diversify the production capacity than to worry about efficiency, market power and the consumers and users' interests. In this way, the regulation covered a spectrum that went very far from the prescriptions of economic theory, reflecting the historical role that the State had accomplished in several steps in the process of economic development.

1.1.2. DEREGULATION

The role of the State and the corresponding regulation have been increasingly reviewed in the last two decades. The principal reasons for this change are the maturity reached by the market and the society and the fiscal and financial crisis of the State, both due to the role of the "propeller" accomplished by the State during a long period. In this new context, many sectors developed a conscience for a more efficient market, the need for a broader participation of society, and for a better defense of consumers and users against the market power of some economic agents.

Besides the two factors already mentioned, the rising and the invigoration of the so-called "new-liberal" movement also contributed to the transformation of the new panorama. In the political field, this can be linked to the ascension of the conservative governments of Thatcher and Reagan, and in the field of economic theory, to the influence of economists like Haiku, Buchanan and Friedman.

Another two causes, more or less independent, were the globalization and the technological development, especially in the information field. The first one reduced the autonomy of the national policies creating the need of a larger flexibility in the private sector to undertake the reforms requested in a competitive environment in a global scale. The second one reduced tremendously the costs of access to the information and removed features that characterized some sectors as natural monopolies, solving problems that justified the intervention of the State in the economy.

Based on the comprehension that the role of the State became significantly reduced, a widespread process of deregulation started. Its intensity went forward besides the apparatus created to operate the "developmentists" States, reaching even those countries whose regulation never had a wider scope. In the economical theory the market failures became jeopardized and, more than this, arose the debate about the regulation itself that would be substituting the market failures with government's failures.

1.1.3. RE-REGULATION

The indiscriminate deregulation also brought many problems. The first more expressive experience was in the South Cone of Latin America, more exactly in Argentina, Chile and Uruguay. In those countries, a wide and fast deregulation of the economy was promoted in the second half of the 70's,

which culminated in a serious crisis at the end of decade. However, the sector in which the problems appeared more evidently was the financial system, especially in the USA in the beginning of the 80's and in Japan at the end of the same decade. In the international panorama, the crisis of the European monetary system in 1992 and the crisis of Mexico in 1994 also happened.

Nowadays, a deeper understanding about the theme of regulation seems to have formed an area of consent of expressive width in the political spectrum. The indiscriminate deregulation gave up place to re-regulation. Definitively, nobody tries to reestablish the old regulation and much less the corresponding role of the State. The re-regulation would now be market-oriented, in the sense of:

a) To be selective and just adopted when it's impossible to eliminate the dysfunction of the market or to adopt the self-regulation;

b) To have low administration cost;

c) To be democratic, based on the negotiation of conflicts and on the accountability of procedures and information;

d) to reconcile the lucrative activity with the widespread offer of good quality goods and services provided by State-owned or private companies.

So, a new arrangement was looked for, in which the State reduced its presence and is "rolling back" to its typical areas of actuation (health, education, Justice, etc.), while the private sector started to occupy larger spaces, introducing its logic, mostly the one of competition, in spheres previously occupied by the State, including the infrastructure and public services (utilities).

In those sectors, the intervention of the State was always particularly strong, mostly between the 30's and 50's, when it founded the roles of owner, operator, regulator and auditor. However, starting from the 70's, the bad performance of the State as entrepreneur, added to the general factors described above, opened space to a larger participation of the private sector, recovering, at the same time, the theme of regulation - now in terms in accordance with re-regulation as understood above.

Specifically treating of partnerships in the infrastructure sector, Moreira and Carneiro (1994) synthesize the diagnosis like this:

> "It is interesting to observe that the appearance of the modality of partnerships among the public and private sectors comes to assist the interests of both parts. Of the governments' point of view, starting from the verification of the (...) exhaustion of the financing model until then effective, the interest appears in counting with private capitals; under the private focus, in function of the few investment alternatives in the productive sector today existents, it increases the need to look for new spaces and segments for allocation of their capital". (pp. 29-30)

It's possible to find a precise meaning of re-regulation - or regulation in the current terms - in those sectors in IPEA (1996), Moreira and Carneiro (1994) and Prado (1996), although not formulated explicitly, and that will be adopted here:

> **" Regulation of public services, today, are the different political and institutional arrangements by the which the State transfers to the private sector, or shares with it, the administration of activities and services whose nature and traditional administration is public, preserving for itself the prerogatives of the planning, monitoring and evaluation according to the general interests of the society and of the State itself".**

So, the new "regulatory mark", refers to the group of rules, operational methods, features and objectives of the different institutional arrangements of regulation in the sectors in which it has been

applied or cogitated.

2. ECONOMIC THEORY OF THE REGULATION

2.1. MARKET FAILURES

An important theorem of the microeconomic theory states that, under certain conditions, a competitive market results in efficient allocation of resources in the Paretian sense. It is recognized, however, that the conditions required to reach this result don't prevail entirely, generating the so-called market failures. There are several of them, among these are the incomplete information, the public goods and the market power. The existence of these failures supplies the economical basis for the intervention of the State in the economy.

The incomplete information happens when economical agents don't have enough information on important variables for the decision to be taken. To this respect, some concepts have to be explored: asymmetric information, adverse selection, moral hazard and the problem of agent-principal.

Asymmetric information is present when economic agents that do a business with each other don't have the same set of information. The adverse selection exists when the asymmetric information results in the exit of the best goods and agents from the market. The moral hazard is an applied concept for markets or situations in that the economical agents are protected against some risk. If the agents alter the behavior after obtaining the insurance, in the sense of increasing the probability of the event object of the insurance occurring, it is said that there is a problem of moral hazard.

The problem of the agent-principal is present when a person's well-being (the principal) depends on the behavior of another (the agent), and neither one have the same objective and the principal doesn't get to monitor the agent.

Public good is that one with no-exclusiveness and no-rivalry features. The first one means that it’s not possible to avoid the free consumption of the good, since it is unfeasible to individualize the beneficiaries of that consumption. The second one means that is possible that two or more people enjoy simultaneously of the good without damage for either or any other.

The concept doesn't divide the goods clearly between pure private goods and pure public goods. The public services, for instance, are not framed in the two extremes, because although they are predominantly no-rivals, they can have the individualized consumption and, in fact, is for which reason that the fares are collected.

The presence of market power causes economical results not elapsed exclusively with the impersonal forces of the demand and the offer. With the market power, some agents get to manipulate the results to their own benefit, obtaining the so-called almost-incomes. The classic example is the monopolistic market, where there’s just one supplier. In these markets the price is larger and the offered amount is smaller than would prevail if the market was competitive.

The market power can elapse for several causes, among the ones are the price-elasticity of demand. The smaller the elasticity, the larger the market power. Another factor is the number of companies. The smaller the number, the larger the market power of each one. So, the companies try to eliminate competitors and to create barriers to the entrance of potential competitors, through, for instance, the adoption of predatory prices or implicit or explicit agreements for the formation of cartels. The basic objective of the regulation, in these cases, is to prevent that these anti-competitive practices are adopted.

A last factor is related with the so-called natural monopolies, very common in the field of the utilities. In this case, the competition is not possible and it is not desirable. This situation is due to the existence of the economies of scale, when the unitary costs are strongly decreasing in a wide scale of the production. In these sectors, evidently, the company can try to exercise its monopoly power but, in face of that, the solution is not to introduce the competition, which would be inefficient, but to regulate the conduct of the company.

2.2. FORMS OF REGULATION AND ITS PROBLEMS

A possible classification of the providences that a regulatory agency can adopt is the following: structural regulation and regulation of conduct. The first one determines which companies can exercise certain activities and the second one, how the companies can work in the chosen activities.

The exigency of quality in a rendered service is an example of regulation of conduct. There is a problem of information here, because the regulator does not always know which quality that can be offered inside the limits of the possible. The option would be to interfere in the productive process itself, but frequently the regulated entity knows more about this process than the regulator. Another alternative would be to require quality, but being permitted the rise in the price or in the fare. Theoretically, the own market itself could decide better the ideal relationship between price and quality, but does not always it happen easily.

Therefore, it should not be inferred that the regulation of quality is unnecessary. This procedure is advisable in the cases in that the consumer ignores the quality of the product, even after having bought it. Here, two possible solutions could be the license and the certificate. The first one determines a minimum standard for participation in the market; the second supplies

the consumers extra information about the quality of the product. There also exists the possibility of companies invest in its own reputation, what only happens if they have diversification of activities and high fixed costs and if there are learning speed and intense information interchange among the consumers.

Possibly, however, the more important regulation of conduct is the control of fares, usually adopted in the case of natural monopolies, especially if they are private companies. The control can be direct, determining the maximum value of the fare, or indirect, through the choice of a maximum limit of the return rate for the capital.

An interesting example of structural regulation is the functional separation, when the companies are forbidden of acting simultaneously in different activities. This providence, also named deverticalization (unbuilding), is only advisable if there are not significant economies of scope, because, otherwise, there would be waste. The most suitable situation to adopt it occurs when a company is a monopolist in an activity and it works in another associated activity in that there is competition. This company can use its market power in the first activity to eliminate the competitors on the second one, characterizing an anti-competitive practice.

In that case, there are also problems of information for the regulatory agency, because these practices are not easily observed and it is difficult to draw an appropriate regulation. The technological development has been eliminating the economies of scale of some activities, creating the need of separating them of associated areas that stay in the condition of natural monopoly.

Another important example of structural regulation is the barriers to the entrance to avoid competition in a market that is characterized as a natural monopoly. Noticed that these barriers can impede also the entrance of foreign companies. The difficulty sometimes is to know if the sector is in fact, still, a natural monopoly or if it’s not anymore as a consequence of the technological development. In this last case, the regulation can be, actually, protecting inefficient companies.

2.3. PRIVATE PRESENCE IN PUBLIC SERVICES AND REGULATION

As can be realized, the task of the regulation is not simple. Besides the deficiency of information, undesirable incentives arise, as those related to any method chosen for fare readjustment. To surpass this problem, worsened by the reduced dimension of the private sector, many countries opted for an arrangement centrally administered of public monopolies or government departments.

The experience was not very positive, having rose several performance problems: inadequate allocation of resources between maintenance and new investments and among the options of new investments, besides inadequate technical operation, causing wastefulness and disregard of the impacts on the environment and about the reduction of poverty.

This arrangement might have been responsible for the distortions since there was not concern about the users' needs, in particular, and the requirements of society, in general. Also it frustrated the competition and the appropriate administration by the introduction of the monopoly and the reduction of the direct managers' autonomy. Seemingly, arrangements that put, at same time, in the same agent, the functions of owner, regulator and operator are very inefficient.

Alternative arrangements, that would provide the services wanted by the society, can include the public property and the private operation or both can be private. Evidently, some factors have to be analyzed for the choice of the best option, such as development of the private sector, the government's administrative capacity to regulate the private producers, political consent, performance of the public companies, etc.

In the attempt of overcoming the above mentioned problems, relative to the state monopolies and to allow the private participation in the public services, some mechanisms have been making possible the introduction of several competition degrees in the markets characterized by natural monopoly, reducing, therefore, the need to regulate these failures of market. Besides the deverticalization possibility propitiated by the technological development, already commented previously, the so called "project financing" has been making possible the private financing of the infrastructure. Two other mechanisms commented on more detail in Part II, are the concession and the yardstick competition.

The concession consists of a contract of exploration of an activity during a certain period of time. The right can be given to the company, public or private, that appears capable of rendering the best service under given conditions. So, the competition affects the terms of the contract itself, supplying information about the reasonable price for the service, something that the regulator would not obtain easily.

Unhappily, the concession presents some serious problems. The competition can be affected by the existence of few enabled companies or collusion among interested. Another difficulty is that the possibility of the substitution of the concessionaire discourages it to invest in the implantation of the activity (sunk costs). This inconvenience can be surpassed being just granted the operation of the activity, which can be interesting for countries that look for a larger participation of the private sector in the infrastructure.

Other obstacles consists of the difficulty of specifying contracts of long duration in a context of fast technological and market changes. In this case, it is possible that the contract should be administered during all its useful life. Due its complexity, the concession, in this case, doesn't reduce the regulation significantly, serving much more to stimulate the competition.

The method denominated "yardstick competition" looks for to establish a competition through comparison among companies and the reduction of the access difficulties to the information by the regulator. A natural monopoly, for instance, can be divided in two parts, with a responsible company for each area. The authorized price for one of them is function of the medium cost of the other. So, each one has incentive to reduce its own costs, and the efficiency achieved by one of them becomes a parameter of the expected performance of the other. Here also reside some problems: it is possible that collusion exists among the companies and not always the demand and offer conditions in both areas are similar enough to allow such comparisons. Further on this mechanism will be discussed better.

Another systematic can be the incentive to the inter-sectorial competition among services, as gas and electricity in the energy sector and highways and railroads in the transportation sector.

3. PRINCIPAL AND AGENT: THE GENERAL INTERESTS AND THE REGULATORY AGENCIES

The State tries to get its objectives, supposedly the same of the public, reached through the regulation of the companies that are responsible for the decisions and they are better informed then the State itself. It is treated of a problem among "principal" and "agent" (State and company). In what dimension does the principal condition the agent's actions in the sense of achieving its objectives? One of the possible solutions is the direct production by the State, but it is doubtful that by this way the problem is solved: it will probably be put back just in another institutional context.

The difficulties are still larger when it is verified that, in practice, there are four interested involved in this subject: the public (voters), the government, the regulatory agency and the public or private company. Each one of these three last can have objectives different of the public (user/consumer/citizen), given its well-known low capacity of organization in face of smaller groups of interest as the bureaucracy and the main shareholders of the private companies. In this context, there’s a reasonable probability of the regulatory agency to be captured by these groups.

This process explains a fact that seems to be paradoxical, that it is the resistance to the adoption of a new regulation, at same time the companies hold on the old regulation. Along the time, the restrictive rules seem to be adjusted to assist to the interests of the regulated company, growing up, for instance, barriers to the entrance in the activity. With that, the competition is hindered at the users' expenses and resources are wasted in rent-seeking strategies.

The possibility of the occurrence of these distortions brings the need to discuss the political aspects and the appropriate institutional arrangements to defend the regulatory agency of the capture, at the same time in that don't turn it impermeable to the users' interests, as well as of the whole society.

3.1. INSTITUTIONAL ASPECTS: RELATIONSHIPS BETWEEN STATE AND REGULATORY AGENCY – THE REGULATORY MARK

The proposals to the organization and the institutional operation of the regulation in the utilities market have two central components. One is the concern with the existence of rules, guidelines, criteria or general priorities, linked to the strategic interests of the State and the society, to guide the activity of the regulatory agency. From this point of view, the State it is the "principal" and the regulatory agency, the "agent", being supposed that the State expresses the general interests of the society. Another is the proposition that the regulatory agency has a great legal and administrative autonomy to take its decisions. The relationships among the two components are sometimes of tension, and they request accurate attention in the drawing of the regulatory mark.

The importance of the guidelines and strategic roles of the State and the private actors in the regulation, trying to obtain a larger coordination in those transition processes for all the areas is present in the text of IPEA (op. cit., p. 6):

> "The definition of clear regulatory rules is also a demand of the private sector, investor and user of the services in process of liberalization or privatization. So, besides the institutionalization of the regulatory agencies in themselves, is essential the discussion concerning the regulatory mark for those areas; in other words, the basic guidelines of the organization and operation of the new markets ". (p. 74)

Then it should be defined, due to the peculiarities of the sectorial contracts, the general conditions of the regulation, its operation, its objectives, its accountability, mainly because it is treated now of a "regulation system that has as basic reference the market" (p. 75).

Silva and Silva (1994) describe the cases of concession and regulation of public services in France, England and the United States remarking the relationships between the autonomy of the regulatory agencies and the action of the central power. Based in those examples they establish conditions, that can be read as general requirements for a good regulation work, divided in three types:

a) General conditions:

- elaboration of an agenda of sectorial, macroeconomic and social perspectives of the society, to guide the private managerial agenda in its action in the public services;

- adaptation to the political environment, investments in technology and improvement of the relationships between capital and labor in the companies;
- rules to control the private monopolies in the public services;
- goals of efficiency, quality and satisfaction of the user/consumer, with planning and supervision by the public sector;
- determination of periods for the concessions, based in general criteria and accepted according to the strategic choices.

b) Specific conditions for the companies:

- clear knowledge about the demanded amount of the initial investment, the financing sources, the expected profitability of the investment and the maturation periods;
- Confidence about the risks and uncertainties linked to decisions of national politics, to market alterations, to judicial decisions, etc.

c) Minimum agenda:

- technical and administrative training of the regulatory agencies;
- definition of the users' rights, with commissions and instruments for supervision and fiscalization;
- priority for sectors of high profitability;
- warranty of maintenance of the fares in levels that allow an appropriate return for the invested capital;
- attribution of the economical risk for concessionaires and the political and social risks for the Government;
- establishment of rules and penalties for rescission, extinction and retaking of the contract;

In the same line of the conditions of general character, Moreira and Carneiro (op. cit.) consider that the introduction of the regulation in the partnerships in public services includes the "regulatory risk", which requires that all the involved actors have, "clarity and safety about the applicable regulation to the business, to the modifications eventually in course and the decision and appealing instances, aiming at to assure that won't happen changes in the rules of the game " (p. 37). Among the risk factors are the technological conditions, the impacts in the environment, the market characteristics, the attributions of government and the concessionaire, the controls of the abuse of the economical power and the warranties of defense of the users and consumers' rights.

Abranches considers that two groups of criteria should rule the modern regulation. The first one is the adoption of regulatory mechanisms guided to the market (competition, absence of controls, etc.), with the State being limited to the correction of failures; the second one is that the regulatory agency should be "regulated" by the users/consumers, which requires access to the decisions of the authority through very well defined procedures, stability of the rules and accountability and pluralism of the decisions. Finally, the agency is the consumer's agent that, at this time assumes the role of principal.

To assure the second group of criteria, Abranches proposes a, "wide publicity of the decisions," including the public audiences, the right of the parts of appeal and to ask revision of the decisions, the search of information in the market, and not just in the regulated sector, and collegiate decisions taken by qualified members.

Piquet Carneiro, in the same direction of Abranches, stresses the importance that has the juridical decisory autonomy of the regulatory agencies in the new model of "regulatory State" because it would represent the surpassing of the presupposition of the largest wisdom of the State that previously justified its intervention. The main objectives of the autonomy are "to restore the position of the user of public services as the addressee of those services and to assure the appropriate remuneration for the investments accomplished by the concessionaires of public services, in both cases, free from political interferences" (p. 7).

Another aspect of the autonomy proposed by Piquet Carneiro is linked to the relationships of the regulatory agencies and the government's general guidelines:

> "Concerning the supposed risk that the autonomy can come to commit the government's economical policies (as, for instance, for the exaggerating increase of fares of public services), this is a problem of ignorance about what is understood as autonomy. The decisory autonomy will never be absolute but, to opposite, limited in law. One of those limitations should be the observance of the objectives of the government's economical policies". (p. 7)

Melo (1996), however, when discussing those relationships, brings to debate the concept of "opportunism".

The term translates the discrepancy among ex-ante commitments in face of ex-post behaviors due to the asymmetry of information, from which situations of "moral risk" appear (discommited agencies) and "adverse selection" (disqualified

agencies): such discrepancy, existent in a classic way among citizens (principal) and their elect representatives (agents) appears in the relationship between State and bureaucracy, in the Weberian model. It appears also in the relationship between State and agencies, in the "post-bureaucratic model", however such regulatory agencies are decentralized and intended more "accountable". In this case that discrepancy means the possibility of divergent performances between the regulatory agencies and the government's general guidelines, including its objectives of economical policies.

4. DEFENSE, PARTICIPATION AND EVALUATION OF THE SERVICES BY THE USERS AND CITIZENS

Since there's a remarkable inequality in the distribution of existent income in developing countries (and, particularly, in Brazil), a considerable portion of its populations doesn't have access to the public services, as water and sanitation. In spite of this, they contribute with their taxes, mainly the indirect ones, which payment they can't avoid, for the financing of the investments in that infrastructure of which they don't enjoy the benefits. Therefore, the form of financing of public investments in these sectors has been contributing to worsen the negative profile of our distribution of income. So, the insert of the initiative private in the installment of these services relieves the populations that don't count with these benefits of the obligation of participating in its financing. The governments, when formulating the public policies, considering the statement of the universalism, should take into account this aspect, because, besides the consumers already included in the market, there is a significant population that hopes and waits for the chance of getting the same services.

Marques suggests that the first condition for the consumer to participate in the process of social control is his participation in the market itself, with access to the services in regular bases, based in technical and contractual conditions defined in law. For so much, it is necessary to enlarge the access to the services and regularize those that participate in the system in an irregular way. The participation can occur in three ways:

a) administrative, when the individual acts jointly with the concessionaire of the service, the authority or the regulatory agency through legal, judicial or administrative procedures;

b) political, when the citizen acts as member of civil association, class entity or political movement, seeking to press the State and impress the public opinion trying to obtain a specific goal;

c) by appraisals, when the individual offers his opinion about the quality of the public services in user's condition, using, for so much, the methods applied in consumption polls.

This last modality has essentially practical character, because it assimilates the degree of the consumer's satisfaction to consider him in the appraisal of the performance of the concessionaire. Starting from this evaluation, the regulatory agencies can determine sanctions to the concessionaires that are not following contractual rules. To the consumers' opinion it can join the independent specialists' analysis to obtain, resulting in a more balanced judgement of the performance of the concessionaire.

There's no doubt, the problem of the evaluation is a challenge difficult of being faced. It is imperative, therefore, to develop evaluation models that make possible an appropriate monitoring of the quality of the public services.

The regulation, viewed in both economical and social aspects, should be seen as a signaling system that the State, the society and the economy uses to compose the tripod in that leans the social action. In the Brazilian case the subject is particularly difficult due to the several asymmetries of information, participation and modernization that we noticed to exist in the Brazilian society (Marques, op.cit.).

PART II

5. PECULIAR ASPECTS OF THE REGULATION OF THE SECTOR OF WATER AND SANITATION

5.1. DEMAND FORECAST

The demand forecast has a fundamental role in the regulatory process, mainly when happens, as in the case of the services of water and sanitation:

- strong participation of the fixed costs (in other words, capital) in the total costs;
- indivisibility and long period of maturation of the investment;
- long time of construction;
- specific uses for the capital goods.

So, demand forecasts for long term also becomes necessary. The lack of knowledge about the demand and its determinant factors will result in inadequate estimates of its growth (with larger risks in the case of overestimation), could cause serious financial problems for the company that renders the service. These problems not easily are turned over just using the fares, because the abrupt elevation of this will cause a fall, still larger, of the demand.

In the case of the water and sewer, the demand will be affected by several factors as population, income, weather, technology, local economic structures, price and the existence, or not, of substitute or complementary goods.

Concerning the prices, in markets where the prevalent structure is the natural monopoly, as it happens with the services of water and sanitation, some fare regulation becomes necessary, trying, not only, to avoid abuses of the responsible company, but also to assure the sustainability of the service in appropriate standards of efficiency and fairness. In the case of the water, for the determination of the fares, the knowledge of its elasticity is essential in relation to the price. Although this number generally is low, close of zero, it can vary considerably in function of the use (and, consequently, of the usefulness) that is attributed to it.

The difficulty in the measurement of this elasticity is that it can only be accomplished if the data used are obtained by micro-measurement. The lack of measurement takes the consumers to use the water as a free good, with a consequent waste caused by many users. The Canadian experience demonstrates that the consumption (l/day/per capita) in the areas without measurement is about 30% larger than in those areas in that 100% of the residential consumption is measured. In Brazil, the consumption of the areas with 100% of measurement is only 1/3 of that verified in areas with only 20% of micro-measurement.

Relating to the other factors, is important to remark:

a. population - it depends of the number of houses and the average number of people in each house and also of the density of houses (important in the calculation of the losses) and the consumption patterns. The first aspect has importance related with the fixed costs (number of connections) and the last is linked with the variable costs (pumping, water and sewers treatment, etc.);

b. weather - seasonal variations, easily foreseeable, its influence on the demand and in the offer in a symmetrical way: in the periods of larger demand, it is when, in general, the offer is reduced;

c. income - it is verified that, among the poorest people, a small increase in the income provokes, quickly, an increase in the consumption in a direct way. In an indirect way, the growth of the

income brings an increase in the area of the residences, although it also comes with more efficient equipment that reduce the waste. These indirect effects are felt in a longer period;

d. technology - it is an important factor in the determination of the demand, mainly of the industrial consumers, because it makes possible the change in the ratio costs fixed/variable, besides conserving and recycling the used water. A more spread use of technologically advanced equipment will depend, among other factors, on the price of the water, the amount of the user's income and the effective interest rate;

e. economic structures - the several economical sectors present outstanding differences in its consumption of water and in its price-elasticity. Therefore, a change in the economical structure of an area can bring considerable alterations in the consumption of water and in the waste production. In general, it can be said that the industrial price-elasticity is substantially higher than the residential. This larger elasticity is also associated to the possibility of obtaining alternative sources of supply of water or of conservation or recycling of the served water. In some cases it is verified that this is a restrictive factor for the use of crossed subsidies in the services of water;

f. substitute or complementary goods - although it is difficult to speak in restricted terms in substitutes for the water, in some cases it can be considered, since that the treatment of some stock of available water, increasing the availability of its use, is, in a certain way, a substitute of a larger volume of water that would be used if that first amount had not been treated (as it happens in the swimming pools, for instance). Wells can also be dug and, in the case of the sewers, septic cesspits can be used.

5.2. MODALITIES OF FARE REGULATION

Concerning the regulation of the fares, two perspectives should be considered:

- the offer (company) - it should generate the necessary revenue to cover the global costs of operation and investments and to be reviewed periodically, in way to match the changes in its costs;

- the demand (consumers) - it determines the price of the service, and should show an economical sign of its scarceness. So, the user should be informed, not just of the absolute value of the charged fare, but also of the fare structure to realize the relation that links his consumption with his payment.

In any situation, the regulation of the fare is reflected in the profitability of the company, and it defines the degree of attractiveness of the sector. Therefore, when the fare is regulated, the regulator, actually, looks to regulate the profitability of the service. In general, there are two forms of drawing this regulation:

- by the direct calculation of the price of the service, based in its costs, including all the components accepted as reasonable. It is the most common method in the USA.

- in an indirect way, defining a maximum price for the service and allowing the company to appropriate of whole the profit that it can obtain, respected that price limit. This method arose in England.

5.2.1. REGULATION BY THE COST OF THE SERVICE

The regulation so-called "by the cost of service" requests the calculation of total costs of the company, with special attention for the amount of invested capital and its cost. The following step is the division of these costs among the several users of the company to calculate the corresponding fare to each group of users. In this fare system the restriction regulatory is as follows:

$$\frac{R - O\&M - D}{K - D} \leq \rho$$

where: R = revenues;

O&M = operation and maintenance costs;

D = depreciation;

K = capital;

ρ = capital cost of the company.

In other words, the return rate of the company considering the net invested capital (K - D) should be, at the most, equal to the cost of capital of the company. From the point of view of the company, if this return rate is lower than the capital cost, it loses the incentive to invest, unless if the revenue increase (and also the fares increase) and restores the return rate to a higher level.

The cost of capital of the company is considered the average between the cost of the debt of the company and its own capital (equity). These costs are calculated, not using data of the company itself, but from the finance and stock markets. However, the investors, before the decision of applying its capital in the company will consider the risks of:

- the company - the possibility of variation of costs for reasons out of control of the company;
- the market - the uncertainty degree about the final demand of the product;
- the country – the uncertainty about its economical and political conditions;
- the regulation - the risk that the regulatory mark imposes to the company.

The cost of the invested capital is evaluated in a quite subjective way. It can be calculated starting from its historical value (the original cost of the assets), based on the replacement cost (how much it would cost to implant those assets nowadays) or based on the market value (How money would be gotten if the assets were sold).

The operation and maintenance expenses refer to the costs that happen every year due to the operation of the company. They include personal, chemical products, energy, maintenance material, etc. In the determination of this parameter there is to be considered the foreseen demand level, the quality level wanted for the service and the efficiency level in the operation of the company.

The depreciation costs seek the creation of a provision of funds that allows the replacement of the assets meanwhile it deteriorates by the use. There are several ways to esteem these costs, always in relation to the invested capital:

- lineally - based in the useful life of the assets;
- economically - reflecting the form how the assets, along the time, lose economical value;
- legal - as it determines the legislation;
- regulatory - as defined by the regulatory authority

The calculation of the depreciation must be quite careful because it affects the allocation of the costs of service along the time, as well as the flow of resources.

The system of price regulation by the cost of service is applied for a defined period of time, and periodic revisions are foreseen whenever the cost of service is reduced. These revisions are said, endogenous since whenever the return rate diverges of the capital cost, it is proceeded the fare revision.

Another aspect to highlight in the system of cost of service is that the fares are calculated based in the data reports of the company and the regulator should calculate each one of the components of the fare structure.

Starting from the equation for the regulation of the fare based in the cost of service, it is possible to observe that although the fares are adjusted continually, reflecting the changes in the costs of the company, it has only one way of obtaining increases of the fares: increasing the capital expenses. So, it can be concluded that this is a system excessive investments are stimulated or, in other words, is an inefficient structure.

Since the limit of gains is based on the profitability of one of the production factors (the invested capital), there is an incentive to the use of this factor. This distortion is more visible in sectors in that the capital is used intensively, even in places as Brazil, where there are capital scarceness and high unemployment rates. At the same time, the risk assumed by the company is very low, because any change in its costs will be reflected in the fare.

5.2.2. REGULATION BY MAXIMUM PRICES

Another regulation form is known as "by maximum prices", whose regulatory restriction is given as:

$$P_t = P_{t-1} (1 + I - X + K)$$

where: P_t = current prices;

P_{t-1} = prices of the previous period;

I = net impact of the inflation;

X = average of a previously defined efficiency;

K = impact in the fare due to the financing of investments in quality improvement.

In this system the first step in the determination of the fare is the fixation of an initial value regarding the cost of service. To proceed, should be defined efficiency and investments factors that will guide the evolution of the prices along the time. Finally this profile of maximum prices is applied by a long period of time.

In the equation of the regulatory restriction, it can be seen that the current prices are based in the prices of the previous period, adjusted by a factor that reflects the net impact of the inflation, an efficiency improvement and the needs of new investments in the system. In the determination of price of the previous period, the following should be considered:

- the historical fare, if it was enough to recover the costs;
- the bidding process that granted the concession, because the participant companies esteemed its costs;
- the process of fare revision.

In the system of maximum prices the fare revisions are exogenous, happening unavoidably after certain number of years and just on these occasions.

It should be pointed out also the fact that the fare should be based on projections to esteem the future evolution of the costs and, in this system, the regulator just controls a price index.

The use of the inflation rate should be made based in public and trustworthy data. It should be considered, still, the specific inflation of the sector and, when it's relevant, the external price indexes. The use of this factor seeks to maintain the fare in real terms in what it's related with the costs out of control of the company and with the important costs for the activities of the sector.

The efficiency factor X forces the companies to reduce their costs to maintain it in the initial landing and, at the same time, it grants to the users the benefits of the efficiency measures. Its determination is based on indexes of historical productivity and in the growth of the expected productivity. It is a factor that favors the company in its search for efficiency, because the efficiency earnings that go superior to the expected ones will totally be appropriate by the company. In certain ways, this system simulates a competitive market, in which the price is given for the firm.

For these reasons, it is a system that stimulates the efficiency and, in practice, it is verified that the companies, in general, reduce their costs faster than the initially foreseen by the regulators. However, as the fare revisions are periodic, the consumers only benefit of these earnings in the following fare revision. Therefore, as larger are the periods among two revisions, larger the possibilities of the companies to obtain extraordinary profits. On the other hand, the companies are forced to absorb variations of costs during the whole period among two fare revisions. As the revisions are always prospective, not admitting retroactive compensations, the companies work with a higher risk.

However, the companies cannot be allowed to reduce costs reducing the quality of services. To avoid this situation it becomes necessary to establish minimum patterns that must be observed, an aspect that will be approached further on.

In the system of maximum prices, there are some variants as maximum prices for certain services or limits for individual increments of prices (the fare for a specific sector, for instance, cannot arise more than a certain percentile in a certain period).

The factor K can be determined *ex-ante* or *ex-post*. It reflects the premature fare impact for the financing of investments for quality improvement, but not for increase of capacity. These are financed by the sales of additional amounts of product.

The calculation *ex-ante* of the factor K is more frequent and it allows to incorporate into the fare the result of the investments. The system ex-post, however, allows adjusting the fares to the level of quality of the product in a slower way.

In a simplified way, it can be said that the regulation by maximum prices is preferable in cases in that the company is inefficient but the necessary investments are low, but the method of the cost of service is better when the company has a reasonable level of efficiency but the investments to accomplish in the system are high.

5.2.3. MIXED SYSTEMS

What it is tried, in practice, is to combine the two systems, using the positive characteristics of each one. Some of these methods are:

a. division of results – in this system the fares are reviewed only if the profits extrapolate a certain range, reasonably wide. In this method, the fares are reduced when the profits of the company are excessive or they are increased when the profits are below a reasonable minimum. Then,

gains or losses are distributed between companies and users, in the same way that the risks are divided. Under the political aspect, it can also be important to avoid exaggerating profits of the concessionaires.

However, this system presents as inconvenience the fact that out of the admitted range of profits, there are not incentives to the efficiency and the companies tend, always, to manipulate their costs trying to stay inside of the allowed range, avoiding reductions of the fare or provoking its increase, what demands a very close monitoring of the regulator.

a. transfer of costs - mechanism that allows variations in certain elements of the costs that will be reason for compensatory variations in the fares. These cases involve changes of the exchange rate, of the regulation process, of taxes and other aspects of costs not considered in the inflationary index used for the fare correction. They are always important costs in the composition of the total cost, but they are out of control of the company and have a high degree of unpredictability.

b. maximum revenues - method that establishes a limit, not for the unitary price, but for the total revenues of the service. It is a system that eliminates the demand-risk for the company, because if the demand grows a lot, the unitary price of the service falls. If the demand falls, the unitary price rises. Then, the user supports the demand-risk, because the revenue of the company is assured, while the user faces a variable fare in the time.

c. In the other hand, this system reduces the incentives that the company would have to stimulate the consumption of the service, which can, however, be interesting in areas with scarce resources. An advantage of this method is that, due to the fact of in the services of water most of the fixed costs happen in a short period, a fare that accompanied the growth of the demand would bring an excessive recovery of the invested capital. There is, therefore, in the method of maximum revenues, a larger coherence between fare and costs.

d. regulation by comparison - the fare, in this system, is based on the costs of other companies that operate in similar conditions. The largest difficulty in this method is the fact that it’s not easy to find companies in so similar situations that legitimate this comparison. A solution would be to use an estimate based on the average of the companies of the sector or just use some indicators or components of costs in the comparison.

In general terms, it’s possible to affirm, that, nowadays, most of the adopted systems are hybrid.

6. THE DRAWING OF THE FARE SYSTEM

6.1. REGULATION OF FIXED COSTS AND ASSETS

In the sector of water and sanitation the assets can be classified in three categories:

a) existent before the participation of the private sector - they are the accumulated assets in the past by the company. They are usually sold or transferred to the private company in the moment of privatization of the service;

b) existent after the private participation, resulting of its investments;

c) new assets- they are the programmed investments for the years corresponding to the next regulatory period. Its calculation is the most difficult, because it is based, obligatorily, in a projection.

There are some basic principles that should be observed in the regulation referring to the investments:

a) sustainability - the level of the fares should be high enough to allow the substitution of the assets at the end of its useful life;

b) feasibility - the level of the fares should be high enough to finance the necessary investments;

c) incentives - the regulation should stimulate the company to invest at the minimum possible economical cost;

d) fare stability - once the capital expenses are not frequent and, in general, in comparison to the operational costs, they are higher, if these expenditures had to be financed instantly, there would be great fare peaks. So, it is looked to build a fund that allows, over time, to collect the necessary amount to the investments, without harming the fare stability;

In a precise way, to guarantee the survival of the company, the obtained revenue with the fares should cover, not only the expenses with depreciation and the regulated return rate, but also the operational expenses.

The depreciation costs are calculated by the product of the depreciation rate times the accumulated gross inversions by the company. In practical terms, it is supposed that the assets wear away at a constant lineal rate along all its useful lifetime. So, the calculation is quite easy in the sector of water and sanitation. For the superficial assets, it simply becomes of the division of the gross value of the expenses by the number of years of assets' useful life. For the underground assets the treatment is a little different, because is supposed that these assets don't wear away entirely, but they need constant maintenance. In this sense, the expenses that impede the deterioration of the underground assets are considered as depreciation.

The situation in which the fare includes the expenses with depreciation is called prospective financing. In this case, the fares are more stable, although higher in a short period. There is a certain allocative efficiency since the consumers receive a sign, by the price, of the costs of the system. On the other hand, the company accumulates revenues, in some years, without any corresponding expenses in this period.

The regulator, however, can opt for so-called "opportune" financing, when the fares are collected meanwhile the expenses are accomplished, without a previous formation of the depreciation fund. In a short period, the fares are lower and the revenues are synchronized with the expenses, but this method increases the fare instability and the allocative efficiency of the system gets lost.

6.2. EVALUATION OF THE ASSETS

6.2.1. EXISTENT ASSETS

One of the basic points in the determination of the fare is the value of the existent assets, because they need to be remunerated and the depreciation also falls on them. In general, two methods can be used:

a) Accounting value, in three modalities:

- historical cost of acquisition of the assets;
- replacement cost – on the historical value is applied an index of updating of prices;
- equivalent modern asset - the cost is calculated from an adjusted system to an efficient configuration.

b) economic value in two versions

- market value - price of the company at the moment of the privatization;
- net present value - discounted cash flow generated by the assets.

Almost always it can be verified that there is a very big discrepancy among these numbers, obtained based in each one of the methods. Although, as general rules, it can be adopted:

a) the depreciation charges and the return rate of the new investments should be based in the accounting value of the replacement cost or of the equivalent modern assets;

b) depending on the circumstances, the return of the existent assets can be calculated based on the accounting or economical value.

Another aspect in the evaluation of the assets refers to so called "suspended assets". They are those elements of the infrastructure that no longer have any usefulness (for instance an aqueduct built to supply a great factory that failed). In a competitive market, the risk of one of its assets becoming suspended obviously is assumed by the company. However, in the case of a regulated company, there is no reason for the users to pay for a service that is not rendered to them. But, it seems fair to remunerate the investors that originally financed the assets that became suspended, because, among other reasons, it keeps open the opportunity for obtaining new investments.

If the suspended assets assisted a great industrial consumer, the water company should know about the risk of bankruptcy or this consumer's reallocation, but the company can’t foresee when it happens to an uptown. So, in the case of the suspended assets that initially assisted a residential area, it is fair that these assets continue to be remunerated. But to avoid this type of risk in the industrial sector, usually the consumers themselves finance the necessary investments to receive the service of the water company.

6.2.2. NEW ASSETS

Since these investments were not yet accomplished, it is necessary to esteem its probable cost. In precise terms, this is very difficult, because it depends on the conditions and the age of the structure of the existent grid. The fact of the biggest part of grid is settled in the underground makes this evaluation very difficult. In these conditions, usually the regulator just makes a simple comparative exercise and, using an external audit, monitors the costs alleged by the concessionaire.

Since it is very difficult to project the cost of an investment program, it’s common that in a short term a reasonable divergence appears among the projected and accomplished values. It occurs in reason of economical projections involving, mainly, the efficiencies, the periods of the investments, the costs estimated by the regulator and the quality of the accomplished investment. It should be also considered the factors out of control of the company.

Referring to the efficiencies, some partial adjustment in the fare can be made to preserve the incentive to the efficiency. So during a certain period of time, the company benefits from its larger efficiency or it suffers the consequences of its own inefficiency.

In other cases, the readjustment should be total, and depending on the case it could be done immediately, through an extraordinary fare revision, or in the next revision foreseen in the contract.

A situation to be pointed out occurs when the company has concession period shorter than the assets’ useful life. Supposing a 50 years useful life for the assets, the fare to be collected should be such that the company recovered its investment along 50 years. Although, if the concession period is only 30 years (as, in general, it happens in Brazil), this fare would not be able to recover all the expenditures of the company. In this case there are two possible solutions:

a) a compensation at the end of the concession;

b) a higher fare along the period of concession, to compensate the additional years.

The first option can be better in cases as the Brazilian, where the concession renewal is possible. If the concessionaire gets the renewal, time enough arises to recover the investment without any need to collect a higher fare or pay compensations.

6.3. EFFICIENCY AND REGULATION OF THE OPERATIONAL COSTS

One of the most significant points in a water and sanitation company is its operational cost. This includes wages, energy, chemical products and general maintenance of the plants. When the fare is being fixed, the regulator should decide if the accomplished operational expenses are being done in an efficient way or if some technical or managerial improvements should be implemented.

If the market is competitive, the companies, for survival need, must have a minimum efficiency standard. However, the water companies are monopolistic and the regulator needs to simulate a competition, which is made through the fare. It reflects an expected efficiency level for the company. Also in the competitive markets, the fare structure should assure that along the concession period the concessionaire wouldn’t get excessive profits. The efficiency can, in the regulatory context, be understood in three ways:

a) absolute - if the cost level of the company is the minimum feasible for a company acting under similar conditions;

b) relative or comparative - if, considering its conditions, its costs are lower than an another company, even if none is efficient in absolute terms;

c) dynamics - if the company maintains its position in the cost curve, even when a technological change alters the curve’s position.

There are also several ways to measure the efficiency of a company:

a) operational efficiency - obtained by comparison between the operational expenses of the company with another one that would be expected to be an efficient company. Here usually indexes like " employee by 1,000 connections " or the cost of the water by cubic meter. The physical indexes, in general, are not good, because there is always some possibility of substitution among the production factors. It should be preferred the indexes monetarily expressed;

b) efficiency at the distribution - it is obtained comparing the volumes of water produced by the company and received by the users;

c) commercial efficiency - calculated by the comparison between the collected revenue and the expected revenue, based on the volume of the water supplied.

6.3.1. RELATIVE EFFICIENCY

The use of the relative efficiency as a regulatory instrument is known as yardstick competition and the base of this system is the conception that efficiency can be stimulated if the fare of the company depends on the average cost of other companies. So, if the company has larger costs than the rest of the industry, and is charging a fare below its needs, for survival, it will be forced to reduce its costs. However, if the company is more efficient than the average, it can accumulate extraordinary profits, which stimulates it staying efficient. In terms of algebra, the method is expressed in the equation:

$$Pi = Ci = \left(\frac{1}{N-1}\right)\sum_{j=1}^{N} Cj,\ j \neq i$$

where: P = fare

C = cost

N = number of companies in the industry

However, the most common is that the companies operate in several different conditions, which reduces the usefulness of this instrument. In general lines, the most outstanding differences among the companies are,:

a) service quality - which affects the cost of the operation directly;

b) hydric and geographical conditions - they include topography, population density, distance, volume and quality of the sources, if the sources are superficial or underground, etc.;

c) conditions of the infrastructure – age, conservation, etc.

d) nature of the consumption - seasonality, maximum and minimum demands, users' mix (residential, industrial, etc.);

e) scale - in the industry of waters the scale earnings are very significant.

So, these differences should be considered in the moment of adapting the yardstick competition to the concrete cases. There are some models that try to facilitate this adaptation. They are detailed as follows.

6.3.1.1. MODEL COMPANY

In this method (used in Chile), through a detailed modeling, passing all the companies, one by one, is determined, individually, the efficient costs level. This modeling is done using the following procedure:

a) Some engineering studies are made, considering the existent structure, but looking for its optimization;

b) Based on the existent data of a sample of companies, an estimate of the cost functions is made. The essential functions in the company (direction, operation, commercial and technical-administrative support) and its respective costs are analyzed;

c) the values of the necessary inputs to operate the optimized structure are applied to the cost functions;

d) the obtained results are compared with the real results verified in the company and in the industry in general, to define the fare to be charged.

This system allows to reflect the heterogeneity of each company and it combines economical and technical aspects of engineering. However, it is a complicated process and demands a very close presence of the regulator, almost inside the businesses of the company.

6.3.1.2. COSTS FUNCTIONS

This is a methodology that esteems statistically a costs function, allowing evaluating the medium cost of each company, according to its dimension. It also allows considering the heterogeneity among the companies. Following its steps:

a) the data associated with each productive stage of the company are researched and separated in costs and exogenous factors (out of control of the company);

b) the correlation among these exogenous factors and the cost level of the companies is statistically calculated. A stochastic error is added to compensate influential factors that might have been omitted;

c) With the costs function, an average level of efficiency for each company is projected. The percentile difference among the total and projected costs will give a measure of the relative efficiency of the company.

This procedure allows to observe the costs structure of the company in a quite detailed way. However, all the differences between the projected and actual data are interpreted as inefficiencies of the company and it may not be true. Besides, the methodology demands a great volume of data, not always available. Also the obtained results are very sensitive to the costs functions and the used variables, what always involves a certain amount of discretion.

6.3.1.3. COSTS LIMITS

This methodology uses lineal programming and considers the size of each company to look in the cost function its most efficient position. For this purpose the data of the whole industry are used. Basically:

a) the inputs and the expected results connected with them are listed (volume of water supplied, hours of continuous service, etc.) and the referring important data are collected;

b) the methodology of lineal programming is applied, determining the border (the limits) of efficiency and allowing the coefficient of efficiency of each company to be calculated.

This methodology has the advantage of not needing data expressed in monetary units and is relatively simple to implement. However, the model doesn't allow a characterization of the function of costs and being a deterministic technique, it doesn't incorporate stochastic errors in the used data.

6.3.1.4. SIMPLIFIED YARDSTICK

Due to difficulty in defining accurately which companies are sufficiently similar to be compared, a weighed average between the costs of the company and the costs of the group of the industry can be made. The more uncertain the homogeneity among the companies, smaller the relative weight of the group of the industry in the calculation.

The process consists of containing the companies in subgroups (using criteria as size, urban or rural area, etc.) and to apply to each subgroup the equation of the yardstick competition method. Even with the simplification it is not possible to have enough confidence on the similarity of the companies. In practice, the method is more useful to detect the companies whose costs diverge too much from the others. In a second step, its operative efficiency is more deeply discussed.

Although the method has the attraction of simplicity, for using the existent data, it should be considered that the accounting norms that generate these data also should be compatible, because, otherwise, they can generate disparities still larger when they are used to accomplish comparisons.

6.3.2. DYNAMIC EFFICIENCY

Besides the static efficiency, the regulator should consider the establishment of goals of dynamic efficiency. This can be made by the determination of the growth or reduction rate in the operation and

maintenance expenses. In these rates the specific inflation of the sector and the sectorial productivity are included.

6.3.3. PRODUCTIVITY

Basically the growth rate of productivity is a ratio between the growth rate of the production and the growth rate of the inputs (or one them) expenditures. There are, however, difficulties of practical order, mainly when the amount of inputs and products vary over time. In the same way, if in some moment a considerable production increase occurs, becomes difficult to distinguish what would be fruit of the productivity increase or, simply, of economies of scale.

6.3.4. EFFICIENCY IN THE DISTRIBUTION

Efficiency in the distribution is a concept linked, basically, to physical losses. If it is considered that the reduction of losses implicates in reduction of costs also it should be considered the benefits obtained with the reduction of the losses.

The water has a private value, corresponding to the cost of obtaining of the treated water, and a social value, corresponding to the value of the gross water in its alternative uses.

The ideal point to be looked for in the reduction of the losses is that in which the marginal cost of the losses equals the social marginal benefit of the saved water, when it is positive. If the social value of the water is zero, there is not need of any action for reduction of the losses. Even if the social value is positive, nobody can wait that, spontaneously, the company controls its losses, because it just realizes the private benefits, but not the social ones. In these cases, the solution is to charge the company for the gross water in an equivalent value to the social value, to force the company to incorporate this value at its costs.

6.4. COMPOSITION OF THE FARE STRUCTURE

As fare structure it should be understood the whole group of charges the users' service affords. These charges include the rendered service or the connection of new users to the grid. The of amount revenue collected by the company it will depend, basic and directly, of the fare structure. Each one of the possible alternatives of fare structure will have different impacts in the consumption level and in proportion of the income that the user intends to dedicate to the consumption of water and services of sanitation.

A structure well drawn should reflect the structure of the social costs, meaning how the costs of the company vary in relation to the consumption decisions taken by the users. It should also incorporate the nature of the demand, in other words, how it varies in different groups of users and in which period of time. It should, still, motivate the allocative efficiency, meaning the optimum use of scarce resources and the social fairness, understood as an acceptable distributive incidence.

In relation to these last two aspects it is important to point out that the water can be considered under two points of view:

a) as a social good - in this case there is not special interest in using the micro-measurement thoroughly, and the fares are charged based on the users' socioeconomic characteristics, meaning according to their payment capacity. Even in the case of non-payment the consumers are not disconnected and the fares are, frequently, subsidized;

b) as an economic good - in this case there is emphasis in the use of meters and the disconnection is a sanction for the non-payment. At the same time, the level of the fares is corresponding to the cost of the service.

In most of countries, the existence of a mixed model can be observed, in which there are are micro-measurement and sanctions for the non payment, but also happens some subsidy.

The collection based on the consumed volume should provide:

a) allocative efficiency - giving to the users an economical sign that they should consume an optimum volume of the service. Under this aspect, the fare should be based on the marginal cost of the supplied water;

b) recovery of the costs - offering to the regulated companies the possibility to gain the necessary revenue for the financing of the operations. Under this point of view, the fares should have as base the medium cost of production.

Being the service of water and sewers a natural monopoly, it is impossible to satisfy, simultaneously the two criteria. It happens because in a grid industry (as the one of waters) the marginal cost falls with the growth of the demanded volume and, therefore, it is always smaller than the medium cost of production. So, a fare for the marginal cost doesn't allow the company to recover its costs.

Usually, the solution of this impasse is looked for in government subsidy. In practice, fiscal restrictions make difficult the application of this solution. In the same way, a technical reason, the reduction of the incentives to the efficiency of the company, also dissuades the use of such subsidies.

If it is not possible to use fares that match the marginal cost and the recovery of costs, the most appropriate solution would be the application of fares that vary according to the customer, in inverse proportion to its price-elasticity. However, a detailed knowledge of these elasticities would be necessary and, at the same time, to create an unfair differentiation of fares, which is problematic, under the political point of view. Due to these difficulties, the most known alternatives to assure the recovery of the costs are:

a) the collection of a fixed charge, in spite of the fact that it generates high fixed costs, even for the small users. This portion is that will guarantee the sustainability of the system;

b) the application of fares based on the medium cost, which can be uniform or differentiated.

The application of uniform fares, although very common, implicates in the existence of occult subsidies in the fare structure, because it can have significant variations in the costs of provisioning different groups of consumers. Such variations of costs can be of three types:

a) vertical differentiation - the services rendered to the several groups of consumers are different (p. former. drinking water or not drinkable);

b) horizontal differentiation - in function of the consumers' location (topography, distance, population density, etc.)

c) seasonal differentiation - it reflects the existence of hours or seasons with peaks in the consumption, which cart the need of a larger investment in the infrastructure.

6.4.1. SEWERS FARES

In general are used the same criteria considered in the definition of the fare of water. However, the determination of this fare has particularities that should be considered. The first of them is the impossibility of measurement and about this subject there are two points to be approached:

a) amount - the volume of consumed water is usually considered as a good estimate of the volume of water that comes back to the sewer system. It is an acceptable solution, except when there is an element of significantly important consumption (for instance, in a beverage factory);

b) quality - once the type of effluents will have importance in the treatment of the water, it can be important to measure the volume of some determined effluents. However, since this is a quite expensive procedure, it’s justified only when there are great volumes to be measured, it means, in case of great industrial users'.

Another difficulty arises when the sewer system is associated with the public system of drainage, because is very difficult to make the allocation of the costs of this last one.

6.4.2. FARES WHEN THE MEASUREMENT IS NOT UNIVERSAL

Even in places where the micro-measurement is the rule, this is not universal. So, the fare structure should consider a situation in which part of the consumption is measured and part is not. The collection of the users which consumption is not measured should consider the allocation of costs among the measured and not measured users, what is usually made according to the estimated consumption for each group. The larger difficulty in this procedure resides in the fact that nobody knows the medium consumption of the non-measured users or the amount of the losses.

6.4.3. NOT MEASURED CONSUMPTION

In a place where the consumption is not measured, it is verified that the user tends to use the water until the value attributed by him to the water is zero. In this case, the fare doesn’t consider the allocative efficiency and it is just based on the sustainability of the system. It is case is necessary to look for proxy variables that try to reflect the consumption and the payment capacity, in the attempt of introducing the criterion of fairness, collecting more of users that consume more or have larger payment capacity. Unhappily, however, not always the proxy variables reflect the situation as appropriately as would be necessary.

6.4.4. MEASURED CONSUMPTION

In the places where there is consumption measurement, several modalities of fares are possible, but is highly important that the fares are comprehensible for users.

6.4.4.1. LINEAL FARES

These fares are, basically, those in which there is an uniform payment for unit of consumption, without fixed charge. A variable responsibility equal to the marginal cost results in an efficient fare from the allocative point of view. However, since the marginal costs are lower than the average costs, a fare rule like this is not sustainable, because doesn’t generate the necessary resources to cover the whole service costs.

6.4.4.2. NON LINEAL FARES

It contains different charges for variable and fixed costs, in an attempt to solve the problem of the sustainability of the lineal fares and to reach efficiency and fairness objectives. However, it should be considered that if the fixed responsibility is very high, certainly, many consumers would be excluded of the market, causing a higher fixed duty for the consumers that remain connected.

The solution for this problem is the combination of the fare in two parts: high fixed duty with low variable charge or vice-versa, in way to differentiate different levels of consumption and reflect the costs function of the company.

6.4.4.3. INCREASING BLOCKS

If there is an objective of achieve a larger fairness in a way that a larger consumption is linked to a larger payment capacity, the fare can be drawn in increasing consumption blocks. It arises, however, the problems of the proxy variables, because it can be being overcharged multi-family residences, of

low income, but high consumption. Besides, as the unitary cost of the service decreases with a bigger supplied amount (increasing gains of scale), this modality is inefficient from the allocative point of view, in sense that it doesn't reflect the costs appropriately.

6.4.4.4. DECREASING BLOCKS

If the main objective is the allocative efficiency, the fare should decrease at the same ratio in which the amount consumed increases. However, this is not a fair systematic, because a larger consumption is usually associated with a larger payment capacity and, at the same time, this method stimulates the consumption of the water in uses of smaller importance.

6.4.4.5. PEAK LOAD PRICING

It is a fare model in which the variable time is included. There are different costs of installment of the service in different moments of the time, in the same way that happens with the elasticity of the demand. Since the size of the grid (and, therefore, the invested capital) is dimensioned for the maximum capacity of the system, each user's contribution to cover these investment costs should be proportional to its participation in the total maximum demand.

6.4.4.6. PRICES OF RAMSEY

This system is used when there are multiple products and services being offered. The base of the system is the collection of fares inversely proportional to the demand. It is a method that stimulates the allocative efficiency for minimizing the consumption variations, being collected more of those that have smaller elasticity and therefore, little reactions to variations in the prices.

However, it is a method that, in the case of the water, results in a very unfair system, because the more inelastic demand for the water refers to its consumption as drink (in other words, for the survival), and it would have the most expensive fare, while for less important uses its cost would be much cheaper.

6.4.5. THE WATER AS A SOCIAL GOOD AND SUBSIDIES

Since the idea of the water as a social good rarely disappears entirely, it becomes necessary to establish some parameter for the social policies that should be applied in the sector. Initially it should be tried to answer some questions:

a) which groups do need support?

b) which kind of support do they need?

- the subsidy should be to the connection or the consumption?
- the subsidy should be total or partial?
- what’s better, direct subsidy or through access to credit lines?

As any social politics, the services of water and sewer can only be financed in two ways: using the government's subsidy or through the fares paid by the not subsidized consumers.

In ideal terms, from the economical point of view, the best solution would be the government subsidizes the consumers' income and collect the fare based in its marginal cost. However, this solution has practical restrictions of fiscal character. Besides, the tax structure and the government's capacity of collection can make this solution an unfair way of financing the subsidies.

The crossed subsidy (by the fares) also has its limitations. The collection should be enough to finance this kind of system, which also has distributive impacts. It cannot also disrespect the behavior of the demand in face fare a higher then the economical cost of the product.

In the social perspective, there are several ways to approach the subject, depending on the policies that the government decides to adopt:

6.4.5.1. THE COST OF CONNECTION

First of all, if the connection rates are significant in relation to the consumers' income, while the ratio between expense consumption and income is reasonable, it would be more interesting to subsidize the connection to the grid of water and sewer. In the same way, if the purpose is to enlarge the access to the service, the best solution would be to adopt measures to contribute in reduction of the connection and other fixed costs.

However, this is one of the most difficult problems. Firstly it should be defined which costs should be allocated the consumers and for how long. Inside the costs to allocate, there are three components:

- connected tubes to each home;
- tubes that connect the community to the existent net;
- reinforcement to the existent net to assist the new consumers.

Usually what is done is just charge the first two components, dividing the third portion among all consumers, old and new. In this point a crossed subsidy already happens,, in sense that the old consumers contribute to the connection of the new ones although these have not contributed to finance the connection of the first ones.

Concerning to the period of collection, it can be affirmed that is not reasonable expect that the poorest communities could afford immediately the total cost of connection. The solution is to finance them for a variable period of time, by a collection, in separate, in the monthly invoice. The concessionaire itself can make this financing. However, although for the company is too much easier and cheap to obtain a credit and later to transfer it to its consumers, it increases a lot its risk rate. The other alternative is the government subsidy.

In general, the connection cost is a decisive factor, under the social aspect, and the more high it goes, more favorable it becomes to the great consumers' situation in relation to the small ones.

6.4.5.2. PRESERVING THE ACCESS TO THE SERVICE

To maintain connected the consumers of low income that they already linked to the net, there are basically two options: government subsidy or lower fares.

The traditional solution is the adoption of subsidies to the offer, allowing the company to maintain the totality of its fares below the economical cost of the service. However, the reduction of fares uses to be generalized, without gets to benefit the groups that are wanted. Besides, a guaranteed revenue amount for the company reduces its incentives to search the efficiency.

Another solution is the adoption of subsidies to the demand. In this system the company usually collects its fares and the government defines criteria to identify groups they should be benefited, transferring directly them the resources. This method can:

- reduce the total expenditures for subsidies;
- enlarge the support of the poorest social classes;

- motivate a more efficient use of the water in other social layers;
- maintain the incentives of the company in sense of looking for efficiency.

A third possibility is the adoption of crossed subsidies, what is verified when an user pays less than the direct variable cost of the installment of the service or other user pays more than the cost of providing in an alternative source of the service or product. These subsidies are usually justified for reasons of fairness in a context in which the direct subsidies would be more difficult.

In general, in sectors in which there is competition, the consumers that pay the subsidy tend to choose an alternative provider for the service, what turns this mechanism, where there is competition, unsustainable in a long term.

The implicit subsidies always happen in some way, because, otherwise it would be necessary to find a fare for each user, what is absolutely unfeasible. However, when the explicit system is adopted, it can be made in three ways:

- on the consumption level, with fares varying according to increasing blocks;
- on each user's characteristics, taking into account the income, the home, the economical activity, etc.;
- taking in consideration the place in that the service is rendered.

In this point, an important aspect to consider is the effectiveness of the subsidies. The largest difficulty in the assembly of a scheme of subsidies is to guarantee that the ones that should receive the subsidy, indeed receive it, while the ones that should not receive it actually don't receive it.

The adoption of the fares in blocks doesn't get to be immune to these problems. Since that the initial block of consumption is subsidized, supposing that the poorest layers consume less water, the richest also get, in some measure, being benefited. On the other hand, if the number of inhabitants of the home is elevated, the consumption of the residence will also be, causing that those people, although poor, lose part of the subsidy that they would be entitled. In practice, what is verified is that the poor families only get the real benefits when they have individual measurement, which not always happens.

Relating to the subsidies, in general, it can be said that:

- from the point of view of the economical efficiency, the direct subsidies are the best ones, although they demand higher taxes (which also bring systemic inefficiency);
- the system of direct subsidies has the highest administrative cost ;
- socially, since the system is well drawn, the direct subsidy is more effective, in the sense of reaching with larger precision the wanted groups;
- the direct subsidies are more visible, although the explicit subsidies can also be.

Still in the aspect of the maintenance of the low income user's connected to the net, it should be considered the possibility, or not, of non-payers be turned off of the service. To reduce the possibility of turning off, the regulator can impose that the concessionaire offers flexible options of payment.

Although the contractual relationship between consumer and company is not a direct business of the regulator, he can adopt measures to reduce these problems, establishing legal procedures to be followed. In general, the company tends to cooperate with these actions because it doesn't interest it the users' loss or either the forced collection that can be expensive and slow.

A last aspect to highlight in the conception of the water as a social good is the positive externalities that its supply brings, as the reduction of the medical expenses. On the other hand, in absence of treatment of sewers, an increase of the pollution will be a negative externality.

The fixed costs are very important in function of the sector be capital intensive. These costs are linked with the amortization of the investments and with part of the maintenance of the net. The variable charges depend directly on the supplied volume and they include electric power for pumping, chemical products, etc.

7. INFORMATION FOR THE REGULATION - ECONOMICAL ASPECTS

A basic requirement for assembling a good fare structure is an updated and reliable group of information. That is as important to the company as it is to the regulator. Its importance is still higher when the regulation will reach several companies and the competition mechanism will be used by comparison.

If the regulator had full knowledge of the activities of the regulated companies, its activity it would be quite easy. However, the knowledge about the business and the regulated company itself demands more details than the regulator can obtain. A problem of asymmetry of information arises, and the advantageous position stays with the company and not with the regulatory agency. This allows the company manipulates the information that it owns trying to:

a) look a larger cost of service than it really faces;

b) look a lower profitability than, actually, it obtains;

c) maximize the possible profit given the regulated fare.

In this sense, when the regulation is drawn for maximum prices, the regulated company has the incentive to reduce costs through the reduction in the quality of services. While in the regulation of the cost of services, the company has the tendency to increase the amount of invested capital, offering an excessive quality. The solution to be adopted in these cases is to implant an evaluation methodology for the quality of the service, accompanied aleatory verifications of the information rendered by the company.

Another form of manipulation of information is that involving the allocation of costs among the several activities of the company. By the manipulating the allocation of the costs in the time and among categories of expenses, the company can try to demonstrate results that are convenient for it. To avoid this attitude, rules of allocation of the expenditures should to be established.

Concerning to capital expenses, a private company will try to reduce the esteemed useful life time of assets, accelerating the accounting profile of depreciation, exaggerating the ex-ante replacement expenses of and reducing the ex-post replacement expenses. The regulator will need, then, to define the assets' useful life, the depreciation profile, the method of evaluation of assets and to establish a systematic of monitoring and replacement of these assets.

Relating to operational expenses, the company will tend to exaggerate the expenses out of its control, as well as the difficulty of its operations, besides the idiosyncratic factors of the company that supposedly could not be changed. This is one of the most difficult situations to overcome, demanding the development of a serious methodology of efficiency analysis.

In some cases it is possible to substitute operational expenses with capital expenses and vice-versa, stimulating the company to look for the its more advantageous alternative, even if it's not the most efficient one. To avoid this type of manipulation, the regulator can prolong the regulatory period, in which the fare remains fixed, or use parameters for comparison of costs.

Another situation happens when the regulated company is controlled for other, not regulated, that sells equipment or renders services to it at super-billed prices. In this situation, the water companies presents a profitability below the one which it would be expected. This type of practice can be avoided by the total prohibition of verticalization, as well as by market proofs, sales to other customers or, still, imposing discounts to the concessionaire, as if the water company was a wholesale buyer.

Also it happens a situation in which the regulated company acts at two different markets, with different elasticities, and on of those markets is competitive and the other monopolist. If the regulator doesn't establish the complete fare structure, but just defines the average fare, the company will tend to set up its own fare structure in way to maximize the revenue and reduce the competition. The regulator, in these cases, should act in the whole fare structure, establishing rules of allocation of costs among the several markets and fighting anti-competitive practices.

7.1. FEATURES OF THE INFORMATION FOR REGULATION

Since its importance, as base for regulation, the information that will be used should have some specific characteristics, under penalty of harming the whole regulatory work. Then, this information should be:

a) comprehensible, in the sense that they should be clear, without ambiguities;

b) compatible among the several regulated companies, in other words, they should resulted of the same collection methodology;

c) consistent along the time;

d) reliable, in sense of reflecting the truth of the facts.

The first three characteristics are very important in the accounting spreadsheets. They will base the accountancy rules that the regulator will determine to be adopted by the companies and, among other aspects, they should contain:

- the disaggregation level of the costs;
- the definition of each category of the costs;
- the forms of organization of the information;
- the methodologies of calculation of the most complex parameters.

Among the requirements for a good base of information, the last one has a fundamental importance in the moments that are made the audits that periodically happen in the companies. These audits, to be complete, they should evaluate technical, economical and accounting data, including operational data (both, technical and costs), capital expenses, the fare structures, besides information about quality of service and coverage. Its periodicity will vary based on the objective to which each information is collected.

8. REGULATION OF QUALITY AND COVERAGE

The quality and coverage goals are an important point in the regulatory work because they influence directly the program of investments that will be led by the concessionaire company. The need of regulating the coverage just arises when is not attractive for the companies water to accomplish connections in poor or outlying areas, whose connection cost is covered by crossed subsidies. The establishment of physical goals of new users' connection, basically, makes it. Concerning to the quality, the regulation need arises for three reasons:

a) the water and sewers market is basically monopolist, hindering the consumers (especially the smallest ones) the change of supplier, in case of dissatisfaction with the services of the concessionaire;

b) the consumer doesn't dispose, in general, of the necessary information to evaluate the quality of the product that is supplied. So, if the regulation doesn't get to guarantee the quality, at least it should be able of allowing the consumer to be informed about the quality of the supplied product;

c) in the case of a monopoly regulated for maximum price, the concessionaire tends to reduce the quality level of the supplied product, while in the regulation for cost of the service the quality tends to be super-valued.

The regulation of quality can be drawn, basically, in two ways. The first one would be with an integrated system, involving quality and fares. In this system it would be established a quality index that would be adjusted over time through the fare. It is not a very spread systematic, although, theoretically, it contains the whole group of necessary incentives for improvement of the quality of service or to avoid its decadence. The great difficulty of this method is the definition of an appropriate link between quality and fares. The other alternative regulation between quality and price is to do it separately, although the difficulty of coordination remains among the two variables.

The largest problem in creating of a quality index refers to ponderation, in other words, which value to attribute to each one of the necessary requirements for a service to be considered appropriate (drinkability, continuity, pressure, attendance to the user, etc.). A good way to reach this index could be the following:

a. to define goals – this is an action that involves political decision, in the sense that the goals reflect an option for offering an appropriate service to the poorest sectors of the society. It is also necessary a technical base for determination of standards, and for it, usually, the international experience is used as base.

   In this point it is important to consider that the goals should be put according to a hierarchy, and on top would be the well being of the population (that could be translated in reduction of the infant mortality, for instance). In a decreasing scale, goals would come as the amplification of the coverage, the set of necessary works to reach the superior goals and so on.

   It can be noticed, therefore, the need of a good technical knowledge to establish the chain of causes and effects that link the several goals and, at the same time, to coordinate them, because its execution can be under the responsibility of more than an entity.

   Also, the goals should be feasible and referred to appropriate periods for its execution, not forgetting that the period for its accomplishment has strong relationship with its cost. It should be pointed out that some works for improvement of the quality of service, could, in the short period, until worsening it.

   Besides the aspect of hierarchical importance of the goals, should be considered the certainty level associated to each goal. There are:

- indicative goals - those with high uncertainty degree on its execution, but that should be established among the general objectives that are being looked for;

- probabilistic goals - they are the most usual ones. Their establishment should take into account two points: if the goal, occasionally is not achieved, it doesn't cause great damages to the users and the exigency of a total certainty of execution of goal can be sensibly more expensive than the acceptance of a satisfaction level from 90 to 95%.

- guaranteed goals - they are the most rigid, whose execution is considered indispensable

Finally, some considerations of economical order which allow to incorporate the concept of value and the economical sign of the price to the process of fixation of goals should be done.

The economical evaluation is based on a trade-off among the costs and the benefits that flow of the desire of reaching a given objective. In economical language, the benefit of a certain goal is measured in terms of affected population's disposition in paying for a given increment in the quality. In this calculation, besides the costs and private benefits, should be considered the benefits and the social costs.

Another aspect to be incorporated is the evolution of the benefits and costs over time, because the technological progresses, frequently, are reflected in reduction of costs and larger social development, enlarging the disposition in paying of part of the population. So, the equilibrium is not static, but dynamic over the time.

Also it cannot be forgotten that in a public service as the water supply, the disposition in paying varies considerably among the several social classes, while the quality of service (in other words, its costs) cannot be very different for the several users (although the sewer service allows larger differentiation). It implicates in the need, when the quality standards are defined, of proceeding to consults very well elaborated involving the whole population reached by the service. Unhappily, however, in most of the cases, the fixation of these standards is made in an arbitrary way.

a. to monitor the performance - it is necessary a monitoring system which permits the company be verified if it really accomplishes the established goals. This can be made in three ways:

- the regulator checks if the company is accomplishing the necessary works to the achievement of the goals;

- the regulator verifies if the company is investing the necessary amount to accomplish the goals. However, this process removes the incentive to the company make the investments in the most efficient way;

- the regulator monitors the results, in quality terms and in which refers to the amplification of the coverage. It is the best method, but, however, it should be used in combination with the previous ones, to avoid surprising results in the long term.

The monitoring work can be accomplished by different agents, among the ones which the own regulated company. In this case, company assumes monitoring costs, but, evidently, the presented data have a serious problem concerning to its credibility. Other alternatives, not excluding to each other, would be:

- the monitoring for the regulator agent itself, which is what happens more frequently, although independent companies can also be contracted to execute this work;

- the indirect monitoring, done by users, based on the complaints presented to the regulator agent. It is a very cheap form and can be better explored.

a. to establish sanctions - the experience demonstrates that the concessionaires are only interested, truly, in accomplishing the goals, if there are forecast of sanctions for the disregarding of goals. However, there is many forms of punishing the companies and the penalties of financial character seem to be the most effective. This can be made in several ways:

- can be used adjustable prices, which adapt to a certain quality of the service. However, as previously was seen, it is very difficult, because is not easy the creation of an index that relates fare and quality;

- the company can be forced to accomplish compensatory payments to the users that receive a service of unsatisfactory quality. These payments are based on criteria previously established by the regulator. It is more common modality of financial penalty;

- the company can be forced to deposit a caution in the regulatory authority, and the applied fines are debited of this amount during the concession period.

  Theoretically, the level of the penalties should reflect the suffered upset by users in consequence of the bad service rendered by the responsible company. Besides, the fine should be compatible with the noncompliance of the established goals, or its meaning will be merely symbolic.

a. to create incentives - beside the penalties, it is convenient the existence of a competitive atmosphere among the regulated companies, to motivate its efficiency and the overcoming of the established quality goals.

   A simple and effective way to establish this atmosphere is the regular publication of several comparative parameters of the regulated companies. It serves, not just, for the users' information about the level of service of its local concessionaire in comparison to the others, but, mainly, to stimulate improvements in the companies, because nobody feels comfortable with his bad performance being published in a massive way.

   In these cases should also to be considered that the results of the companies depend, not only of their administration, but, a lot of times, of the operational conditions with each company has to work daily.

   Besides this indirect incentive of the threatening of the damage to the image of the company and its managers, it is convenient, whenever possible, the creation of financial incentives to the companies of better performance, which, however, in practical terms is quite difficult.

9. THE PRIVATE PARTICIPATION - TYPES OF CONTRACTS

When there is a participation of the private sector in the services like water and sewers, three points should be targets of the regulatory authority’s concerns:

a) which will be this participation;

b) how this participation will occur;

c) how will be the contract that will formalize and guarantee this participation in an appropriate way;

The first two questions can be answered jointly, in the Brazilian case. The Brazilian Constitution doesn't allow the installment of this type of public service in totally independent way. It must be, always, rendered directly by the State or by its concession. However, it doesn't mean that the private enterprises cannot participate in several ways in this sector:

a. Contracts of Service - these contracts assure the participation of the private sector in specific tasks and usually for short periods. In this type of contract, thoroughly used, the objective is to take advantage of the experience of private companies in the execution of technical tasks, while the responsibility of the management and coordination of the concessionaire companies and also the investments continue on duty of the public sector.

These contracts can include operation, installation and maintenance services, vehicles rent, consulting and engineering projects and civil works. However, due to its limited reach, they are not enough to overcome of neither public service's managerial problems nor its difficulty in attraction of resources.

b. Contracts of Administration – this modality is a little wider than the service contracts because they transfer the responsibility of the operation and maintenance to the private sector. The duration period is usually from three to five years and in them is tried to introduce larger incentives to the efficiency, defining performance objectives and basing the remuneration, or part of it, in the execution of these objectives. However, since the contracted doesn't assume commercial risks, it is not easy to find forms to motivate him to reduce costs and, in a broad sense, get better quality of the service.

   However, since the responsibility for the investments still stays with the public sector, these contracts are useful to increase the efficiency quickly in specific tasks or to prepare the way for a larger participation of the private companies in the sector. The government can use this instrument to gain time to overcome political resistances, correct the fare structure, solve defects in the regulatory mark or conquer the trust of the private sector for this kind of business.

c. Partial Concession - In this type of contract the private company purchase the rights of the earnings flow of the operations of the public service and assumes many of the commercial risks of these operations. Its profitability is also associated to its capacity to reduce costs. Since, however, the expenses with investments continue with the government, this type of contract is appropriate only when exists relatively great margins for gains of operative efficiency and a need of small investments.

d. Full Concession - in this contractual modality the private company takes the responsibility for the operation and maintenance of the assets, as well as for the accomplishment of the necessary investments in the system. However, the government retains the property of the assets and the rights on its use. These come back to the allowing authority (the Government) at the end of the time of concession, usually a long period, that varies from 25 to 35 years.

   The concessions, usually, are auctioned based on the price offered by the interested companies. The contracts tend to be detailed, including performance goals, agreements about capital investment, mechanisms for the adjustment of the fares and procedures for solution of the eventual controversies.

   The largest advantage of these contracts is that, for transferring all the operation and investments responsibilities to the private sector arises the incentive to the efficiency in the rendering of services. This is the best solution in cases in which great investments are necessary to improve of quality of the services and spread the coverage.

e. Concession Preceded by Public Work (Building - Operation - Transfer or BOT) - This type of contract is used, often, in new projects and, typically, it foresees a period of a certain number of years, at the end of which, the company gives up its rights in favor of the public sector. In the sector of water and sanitation, commonly they are related with the construction of new dams and stations of treatment of water

   This modality of contract also admits variants as the possibility of the assets remain indefinitely with the private company (BOO - Building - Operation - Ownership) or the division of responsibilities in the project and investments among the public and private sectors.

f. Sale - in this case the private sector takes total responsibility for the operation, maintenance and investments, just remaining to the government the task of the regulation, because the ownership of the assets is also transferred to the private company (this is not possible in Brazil, for

constitutional restriction). However, this contractual modality is very rare in the sector of water and sanitation, due to the strategic characteristics of this sector.

10. ECONOMIC ASPECTS OF THE CONTRACTS

The contracts of rendering services in this type of sector contain a relationship main-agent, in which the role of principal belongs to the State, while the private company plays the agent's role, whose incentives to the performance depend on the objectives established by the principal.

In practice, these contracts reflect a delegation of tasks or responsibilities of the public power and are so called "incomplete contracts" because they are structured in conditions of uncertainty and risk. The impossibility of foreseeing all the future contingencies brings the need to create mechanisms of treatment of the risks, as well as of the creation of incentives. Also payment procedures and of performance measurement are necessary, besides a systematic of minimization of costs of an occasional renegotiation, because the transaction costs are very high.

Particularly, the treatment of risks has great influence in the future performance of the company. In an extreme case, if the contract disposes that the whole risk is an agent’s responsibility, he will not accept easily to sign this contract and participate in the process. If he does, he will demand a very high remuneration and will have enormous incentives to reduce costs to enlarge his earnings and compensate the risk that he’s taking. In the other hand, if the risk belong completely to the principal, the agent will have great interest in participating in the process, but he won't have any incentive to look for a reduction of costs. It is essential, therefore, to find a point between these two extremes.

It is very common for governments to fear that a long and detailed preparation of recruiting a private company that will substitute it in rendering a service will cause the loss of opportunities of attracting the private enterprises to the sector of water and sanitation. In this case, if there’s a need of fast, or even urgent, actions, it is better to make a contract for a short period, with limited scope, while studies for a long period contract are accomplished.

The previous contractual evaluation is essential, not only to define the form and the moment of participation of the private sector, but also the regulatory regime which will support it. Without it, the risks can be excessive for the private sector or, in the other hand, the public sector can remain without the necessary instruments to guarantee the good service that is waited of the contracted company.

Besides, the investment in preparation of a good contract will avoid problems in the negotiations that will occur after the auction and it will give larger guarantee than the final contract will not be very different than it was wanted initially.

This previous analysis is usually accomplished in two stages. In the first of them the objectives for the sector are established and an evaluation about if the private participation is appropriate and financially feasible is made. At this time the possible fare changes and the eventual necessary subsidies are esteemed.

In a second stage, it is made an evaluation of the situation of the public company that renders the service until that moment, as well as of the existent regulatory structure and its possible compatibility with the performance of the private sector. In this point, the available information has a fundamental importance. Among the information that will be used in this phase they are:

a) the current revenue of the entrusted company, at the moment of the rendering of service;

b) the total current geographical area of the service and the foreseen future area;

c) a basic inventory of the assets and of its use condition;

d) the available human resources (quantity, quality, costs, work conditions, time for retirement, etc.;

e) the structure of fares, subsidies and penalties, as well as the possibility of maintenance of the subsidies;

f) the possibility of change in the factors that would turn the company not attractive for the private entrepreneurs;

g) the consumers' disposition of paying more for a better service;

h) an estimation of the costs of improvement of the services and possible efficiency earnings;

i) an identification of the areas where the information are not available or trustworthy.

Concerning to the adaptation between the regulatory mark and the private interests, it is necessary to keep in mind that, once the first contract with a company, based on a certain regulatory mark is signed, automatically, consequences appear on the contracts that will be proceeded. In other words, the available regulatory options are reduced as more and more contracts are celebrated. So, if the Government failures in the beginning, concerning the establishment of an appropriate regulatory mark, the cost and the time to correct it, in the future, will be very high. Then, although a very detailed regulatory mark is not demanded just in the beginning of the process of attraction of the private companies, it is essential to consider the regulatory needs and its costs at every moment, as well as the Government's own regulatory capacity.

Other points to be considered are: to keep opened to possibility of solving any problem that arises before auctioning the contract and the attempt of addressing the sector in the sense of turning it more appropriate to the regulation by competition. This suggestion is based in the experience, which suggests that as larger the competitive pressures, as smaller the regulation needs, what can be particularly useful in cases in which the regulatory authority has limited capacity of action.

In the sector of water and sewers, although, there is always some monopolist power, it is possible to establish the competition for bordering areas between two areas assisted for different concessionaires or to use the comparative competition.

Since it’s impossible to ignore the political influence in this process, the first step would be the identification of the key-agent of the political scene. In general, these agents are the political parties, the unions, the social organizations of several types (including consumers, environmentalists and entities of defense of poor populations) and the Government itself (in its several levels - federal, state and municipal - and divisions - ministries, departments, regulatory agencies and commissions related with the service). Since then, evaluations of political character are accomplished, including the eventual opposition of social sectors to the private participation in the sector of water and sewers and the guarantees that these sectors would demand to review its posture, as well as the costs of these guarantees. Also the risks of the business are analyzed, since they shall be distributed between the concessionaires and the government, in sense to make possible the entrance of private companies in the rendering of the service.

The guarantees that the opposition sectors usually demand can be classified, basically, in five groups:

a) protection to the work and the administration, here included themes as employment, wages, pensions, work conditions, etc.;

b) protection for the contracted ones and suppliers of the concessionaire, being guaranteed the competition in the subcontracts and supply;

c) protection for the customers, including mechanisms of complaint, fare structures and subsidies;

d) sanitary and environmental protection, with defined service standards and penalties for its noncompliance;

e) protection for other government agencies, in way to compensate them for the loss of the direct control of the service.

Since that these conditions are satisfied, it should be pointed out that all of them have a cost, and, even being paid by the company, this cost will rebound in the price that the company will be disposed to pay in the moment of the auction of the concession. In other words, this cost will be paid by the whole society.

From the evaluation of the costs it elapses the analysis of the division of the risks involved in the business. The first question to be answered regard the viability, or not, of the participation of the private enterprises. The answer the this question requires that other questions are previously answered:

a) what's the total cost of operation and maintenance of the service and what's the current fare?

b) what are the current consumption and the forecast for next 10 years?

c) what are the capital costs to accomplish the necessary improvements and what's the period of payment of this capital?

d) what are the annual operational cost and the net balance for efficiency gain that can be expected of the private operation?

e) will the private company recover the existent facilities and/or to spread the coverage and, in this case, how will it affect the fare?

f) considering the expected efficiency gains, does the current fare cover the costs?

g) is the fare in acceptable levels for the population? If not, can the government subsidize?

Since these and other perhaps existents inquiries are answered, if the conclusion is that the private participation in the sector is viable, it begins the evaluation of the risks properly said. The type of contract that will be sign will define the directions of this analysis, because each possible type of contract has its own group of risks.

a) Contract of Administration - in this case the most important risk is the operator not accomplish the expectations. To approach this problem, the regulatory authority should evaluate its own capacity to control the performance of the contracted and guarantee that the quality of the water and other aspects of the contract will actually be accomplished in an appropriate way.

b) Lease, Full Concession and BOT - the main risk resides in the possibility of, with some monopoly power, the contracted obtain excessive gains or reduce the quality of the rendered services. These risks are reduced with an appropriate regulation and monitoring system.

There is still a generic group of risks that can be minimized, previously, if satisfactory answers are gotten to questions like:

a) does the regulatory mark provide conditions to private sector assume the commercial risk? If not, is it easy to alter, to reduce or to simplify it?

b) does the key-agent give enough support or, at least, is neutral to the private participation? If not, is possible to reduce the political interference or these agents' restlessness?

c) are the available information enough good to get ready a long-term contract?

When these previous evaluations are completed, the process is ripe for the drawing and implementation of the private participation in the water and sanitation sector.

11. SETTING THE PRIVATE PARTICIPATION

The first objective in this point is the development of the best possible agreement, in the local circumstances, what presupposes an appropriate partner for this agreement (the company to be contracted) and the obtaining of this partner's best possible offer, understood as technically solid and financially consistent proposal. In other words, a proposal must be guided to the established goals and compatible with the existent regulatory mark and, at the same time, based in acceptable fares and in a package of subsidies fiscal and politically viable.

Ideally, this process should not be long excessively (saving costs) and it should be flexible enough to accommodate unexpected facts without straying of its main objectives. At the same time, the private entrepreneur needs to feel that the process is fair and accountable, in other words, there will be few risks of political and juridical problems in the future.

In search of the most appropriate partner, the most effective form of finding him seems to be to place the possible candidates to compete to each other. However, a good result in this sense will depend fundamentally of how the auction process is organized, the capacity of the government to find mechanisms that maintain the competitive pressures during the execution of the contract and the regulatory mark that will govern this contract.

In the attempt to find this partner, that will only appear after the auction, there is a series of actions to be developed, as the technical analysis of the area to be assisted in the wanted conditions and its correspondent financial analysis, as mentioned above. There is, still, a great work of juridical character, involving regulatory, contractual, labor, and all other relevant aspects in subjects like regulation of the water and sanitation sector. It is also necessary an action in the field of the public relations, seeking to clear and to obtain the support of the population to be assisted and the groups with direct or indirect interest in the service. Finally, it’s time to prepare the auction itself.

BIBLIOGRAPHY

1 ._____. Perspectiva de reestruturação financeira e institucional dos setores de infra-estrutura, projeto de pesquisa. Brasília:IPEA, 1996

2. Abranches, S., Reforma regulatória e reforma do Estado: conceitos, experiências e recomendações para o Brasil, texto para discussão no Conselho da Reforma do Estado, mimeo, s. d.

3. BRASIL, Constituição da República Federativa do Brasil, 1988.

4. Marques, Hamilton N., "O Consumidor em Face da Privatização dos Serviços Públicos Essenciais",in: A Economia Brasileira em Perspectiva 1996, Rio de Janeiro:IPEA, v. 1, 1996

5. Melo, M. A., "Governance e reforma do Estado: o paradigma agente x principal", Revista do Serviço Público, Brasília:ENAP, v. 120, n. 1., p. 67-82, jan-abr de 1996.

6. moreira, terezinha. "O Processo de Privatização Mundial: Tendências Recentes e Perspectivas para o Brasil." Revista do BNDES, Rio de Janeiro, v. 1, n. 1., p. 97-112, Jun. 1994.

7. Moreira, T. & Carneiro, M. F. C., "A parceria público-privada na infra-estrutura econômica", Revista do BNDES, Rio de Janeiro, v. 1, n. 2., p. 27-46, Dez. 1994.

8. oxford economic research associates ltd, curso de Regulação Econômica dos Serviços de Saneamento, Temas 2, 4, 6, 8, 9, 10, 13, Brasília, mimeo, Jun. 1998

9. Piquet Carneiro, J. G., O novo modelo de órgão regulador, mimeo, 1996a.

10. Prado, M., "Concessão pública: um empreendimento público comercial", Revista do BNDES, Rio de Janeiro, v. 3, n. 5, p.105-126, Jun. 1996.

11. silva, l. Eduardo da e SILVA, Ilton. Concessão de Serviços Públicos no Brasil - Considerações e Proposições de Mudanças ao Projeto Substitutivo nº 292/91 da Câmara dos Deputados. Convênio IBAM/IPEA/ENAP, Brasília, Out. 1994.

12. Stiglitz, J. E., Economics of the public sector , W. W. Norton & Company, New York, 1992., capítulos 3, 5 e 7.

13. World Development Report - 1994, Infrastructure for development, The World Bank, Washington D. C., 1995, Executive summary.