Urban Integration and Disintegration Forces: The habitants / users perception in an urban life quality model for the surroundings of La Plata, Buenos Aires, Argentina

In the 1990s, Argentina, and in particular, the principal urban areas were subjected to the neo-liberal socioeconomic policies that gave rise to the polarization of the integration and disintegration forces at economical, social and territorial levels.

Indeed, it was a challenge for designers who had a few tools to demonstrate scientifically to people what the situation was like.

In consequence, work was aimed at developing a new methodology and a model gathering different aspects that interact within the concept of quality of urban life. This fact led to the analysis of demands for basic services and urban infrastructure such as urban building systems and environmental conditions in response to project objectives such as: i. study on environmental urban life quality (ULQ) at local and regional level; ii. integrate knowledge on urban systems with the environmental consequences of their dynamics, taking into account the scheme services of energetic infrastructure, of all services, their cover, as well as the opinion of users; iii. elaborate indicators of quality and social equity.

Work was carried out on the basis of a multidimensional model which methodology has been presented at scientific and academic meetings (Rosenfeld E. et al.,2000), (Rosenfeld E. et al.,2001), (Rosenfeld E. et al.,2002), (Rosenfeld E. et al.,2005).

The present analysis corresponds to medium urban centers at different scales and consolidations, in particular, La Plata city, capital of Buenos Aires province which was chosen as a model.

This city has a consolidated urban central area, and a suburb of low dwelling density, and its population is over 650,000 habitants. This study was designed to go deeper into some operative and conceptual aspects with the aim of improving several components of the model, mainly the indicators of Quality Opinion on Urban Services and Facilities (ULQous). In brief, results show the survey done on satisfaction levels of needs and claims from different groups of the population associated with the zone. This work is part of projects developed by our research group (Discoli C. 2003) and (Pirez P., Rosenfeld E. 1997-2000).

Framework

These days, cities have become the target of changes in lifestyle since they exhibit contemporary culture, ranging from technological development to social process.

It is of great concern to evaluate people's welfare in these cities. This is not easy since different mechanisms, qualifying and quantifying ULQ must be devised. Every process of planning and management is aimed at improving lifestyle, and regional urban services (RUS) that fulfill socio-economical needs such as education, health, housing, entertainment, safety, and environment in order to live and work in harmony.

Concept of Urban Life Quality (ULQ)

Before dealing with the definition of ULQ model, several topics must be revised to better understand this investigation, promoting functional structures and procedures that will be useful for the evaluation of utility as well as discussion of public policies.

About the matter, Derek Parfirt (1996) defined life quality (LQ) as “something that makes life better”. This poses three questions, life who for, and in which context, and a better life concerning what. Yet, it is not easy to achieve an “objective” definition, either individual or collective due to its relativism.

This is a key point since any model is likely when it can be contrasted with reality, e.g. physical, human or psycho-social practical purpose.

In fact, we must not forget the multiple and complex dimensions utilized to evaluate and quantify this matter. As a summary, we can mention resource distribution way of life, life expectancy, health, sanitary and medical services, biological and physical welfare, education, availability, nature and quality, work and job conditions, primary properties, freedom, opportunities for development, etc.

This concept of life quality has changed in every society, mainly in the late 1950s in USA and Scandinavian countries. In the mid 60s a strong interest in welfare started due to the industrialization. Consequently, there was a growing need to measure and quantify life quality. Research process by means of social markers gave rise to the so-called “objective” methods. Then, social sciences became involved to develop different measures and markers related with social welfare, leading to the appraisal of “subjective” aspects. The 1970s and early 1980s were characterized by a strong crisis principally in USA and Europe; an attitude opposite to economy considerations appeared since “the economic growth is not the object in itself but a tool to achieve better life conditions”.

The division between social and economic markers and Life Quality arises. In 1992, Borthwich-Duffy defined a concept based on three judgments, later in 1995 Felce and Perry added another one:

1. Life quality based on life conditions of a person.
2. Life quality based on personal satisfaction within the universe of their life conditions.
3. The previous judgments merged into one including objective and subjective components.
4. LQ as a function of life conditions and personal satisfaction is mediated by principles, ambition and expectancy.
   This focusing placed the concept within an operational range, tending to build up markers and indexes related with : social aspects (work, health, education, dwelling, equipment, safety, etc.); ecological or environmental and socio-political aspects as well as those ones that play the role of perception factors for users. Thus, the concept of “principle” was produced in the technical environment as well as in the political and urban-regional ones. Such a concept of “principle” (Frondizi R.; 1998) was considered to be either essential for some people or trivial for some others.

This setting is centered on the supply and demand of services based on needs and satisfaction determined by Life Quality markers. About the matter, Guillermo Velásquez gave the definition:

“Life quality is an achievement in respect with an optimal standard of living established according with socio-economical and environmental factors in a society which may vary as required by historical progress” (Otero H.,2004).

This statement shows “an optimal standard of living” that is in agreement with the logic of the model considered as 100%, and taking into account several factors such as: i. supply of services; ii. point of view of quality; iii. evaluation of services; iv. environmental quality, the index of ULQ can be obtained.

ULQ comprises three components:

1. Demand consists of two groups that represent objective needs of people, houses or population sectors characterized within a cultural context, and the subjective needs represented by social preferences and personal wishes.
2. Supply comprises material and non-material resources that represent regional urban properties and services, objective needs and symbolic resources, targeting satisfaction.
3. Relationship between the above mentioned needs and supply (Lindenboim et al., 2000).

In each system, these needs may be fulfilled or not by different means which are not equally distributed either among social groups or spatial rank, leading to different degrees of ULQ. We need to strike a balance between the needs of the community and the satisfaction of individuals (M.T. Delgado de Bravo, 1998).

ULQ related with conglomerates, cities or specific urban groups must be analyzed from different points of view, including: i. technical system based on the study of fulfillment and quality of regional urban services that determine supply and demand of their networks and associated systems (RUS); ii. the associated territorial system (ATS) must work as physical support to produce a good flow between RUS and its area of influence; iii. the institutional political system (IPS) that combines territory and activities people carry out in urban metropolitan processes. On the other hand, requests and supplies for a certain ULQ are determined by processes of logic: production profit, and in cities, political logic as well as the logic of needs (Pérez P. et al.,2003).

We can conclude that LQ in urban centers should be thoroughly characterized, covering all aspects such as supply/demand, social, geographical-territorial components in order to evaluate needs, application and comparison with similar situations.

Model structure

The methodological development of the urban life quality model as described by Rosenfeld E. et al. (2000 and 2001) can be applied in cities and agglomerations at mid scale (see Fig. 1).

Urban Life Quality was defined on the basis of satisfaction fulfillment concerning needs and demand from different population groups, related with territory and sustained by the relationship among several factors. Supply was evaluated upon interactions of material and non-material resources as a function of objective needs, comprising urban services and equipment (ULQuse) at different management levels, either public or private, and on the national, provincial or municipal scale (1). On the other hand, the equilibrium between urban environmental factors (ULQuef) since they directly affect the concept of quality (2) must be taken into account (Ainstein L. et al., 2000). Rank levels (“n”) of integration were adopted; they differentiate information corresponding to: n1, infrastructure services; n2, sanitation service; n3, communication service; n4, social services; n5, urban environmental aspects; n6, environmental aspects.

To obtain the ULQ index, according to the different levels, each index is affected by a series of markers: i. urban consolidation; ii. cover of networks and services; iii. opinion of quality; iv. service evaluation; v. environmental quality; vi. scheme of quality; vii. use factor.

Quantification of ULQuse indexes is performed upon the interaction of different integration levels (n) where one or some of them may participate (n1, n2, n, n4, n1+n2, n1+n2+n3) as a function of features of the urban area under study, or some operational variables involved, as a function of direction and scope of the required analysis, or available information.

ULQuse = Urban Service and Equipment Quality.

$$ULQuse = \sum_{i=1}^{4} Ni = N1+N2+N3+N4$$

N1= Infrastructure Basic Service= { En, NGn, Eg, LNG, LF, Fi }
(where En= Electric network; NGn= Natural Gas network; Eg= Electric generator; LNG= Liquefied Natural Gas; LF= Liquefied Fuels; Fi= Firewood)

$$N1 = \sum_{x \in Infrastructure\_Services} Ev(x) * Cov(x) * Op(x) * Us(x)$$

N2= Sanitation Basic Services= { S, WM, C, WT, WEP, WMP }
(where S= Sewage; WM= Water main; C= Cesspit; WT= Wastewater to Trench; WEP= Water by Electric Pump; WMP= Water by Manual Pump)

$$N2 = \sum_{x \in Sanitation\_Services} Ev(x) * Cov(x) * Op(x) * Us(x)$$

N3= Communication Services= { APT, RPT, PET, HNR, PT, Cha, Rem, IA, PM, CT }
(where APT= Automotive Public Transport; RPT= Railway Public Transport; PET= Private Enterprises Transport; HNR= Hierarchic Network Road; PT= Public Telephony; Cha= Charter; Rem= Remises; IA= Internet Access; PM= Post Mail; CT= Cable Television)

$$N3 = \sum_{x \in Communication\_Services} Ev(x) * Cov(x) * Op(x)$$

N4= Social Services= {Sh, Se, Ss, Sfb, Gc, SDS, SL, Gs, Sw, Pt }
(where Sh= Health Service; Se= Education Service; Ss= Security Service; Sfb= Fire Brigade Service; Gc= Garbage Collection; SDS= Storm Drain System; SL= Street Lighting; Gs= Green Spaces; Sw= Sidewalks; Pt= Public Trees)

$$N4 = \sum_{x \in Aditional\_Basic\_Services} Ev(x) * Cov(x) * Op(x)$$

The evaluation of a service, its cover degree, its opinion and its use factor (use percentage /100) are denominated Ev(x), Cov(x), Op(x) y Us(x).

ULQuea = Urban-Environmental Aspects.

$$ULQuea = \sum_{i=5}^{6} Ni = N5+N6$$

N5= Urban Aspects = { We, PSE, SDS, FA, IIB, RUI, DPW, SB, VC, TRP }
(where We= Wastelands Existence; PSE= Precarious Settlement Existence; SDS= Storm Drain System; FA= Flood Areas; IIB= Inactive Industries or Buildings; RUI= Residential Use Incompatible; DPW= Dangerous and Pathological Waste; SB= Special Barriers; VC= Visual Comfort; TRP= Traffic Risk Points)

$$N5 = \sum_{x \in Urban\_Aspects} Ev(x) * AF(x) * ID(x)$$

N6= Environmental Aspects = { SP, AP, GP, WP }
(where SP= Sound Pollution; AP= Air Pollution; GP= Ground Pollution; WP= Water Pollution)

$$N6 = \sum_{x \in Environmental\_Aspects} Ev(x) * AF(x) * ID(x)$$

AF(x) and ID(x) means Affected Factor and Impact Degree. The Affected Factor is referred to the area affected and the Impact Degree is referred to the magnitude of the impact. Ev(x) is referred to the evaluation of the aspect.

Figure.1

Variables are considered in the following way: evaluation of each service (EVs) is done through qualified technicians for each network/service. Characteristics of services such as degree of necessity, risks, practical features, cost, transport, handling, bother, continuity, pollution, vector energetic efficiency, are studied. Then it is contrasted by mathematical procedures using diffuse logic (they have been so far developed to evaluate relevant areas). It is affected by: i. a cover factors (CF) that is the spatial cover at each "n" level (networks/services); ii. a use factor (UF) which is used when mixed situation exist in the use of a determine source (use percentage / 100) and iii. an opinion quality factor (OQF) that means satisfaction of individuals through opinion of quality (scientific technical evaluation, either potential or real, or subjective concerning social construction of cultural nature). The CF, as well as the UF and the OQF range from 0 to 1.

Basic service evaluation is expressed within a rank where optimal values to be achieved may vary in the 0-10 range. Best services would be distributed by means of networks (electricity, gas). Concerning substitute services (gas cylinders, liquid or solid fuel) which quality may be affected by various factors involved.

The design of the UQL model may be carried out by appropriate plans concerning geographical matrices with alpha-numerical data, using indexes of partial quality (for each network or service) and total quality (rank levels of the various networks and services), as well as formulation and conformation of territorial schemes.

In order to determine *OQF*, information was collected by means of an "ad-hoc" survey, and then

processed using the statistical analysis (SPSS.13 version for windows), a method of geographical data (GIS) (Arc View 9), as well as partial processing of crucial networks (Barbero D., Díscoli C., 2002).

To get an insight into this model, in particular the opinion quality factor, methodology, techniques, tools and variables, are described.

Analysis of opinion quality markers

To paint a complete picture of the methods employed, it is important not only to know certain infrastructure services, but also to evaluate their quality. For this reason, the Factor of Opinion on Quality (Fop) was quantified using the opinion of users.

In this area under study, a survey was carried out, including the following items: opinion on the "accessibility and evaluation of urban services", and "technological innovation" of infrastructure service networks. The range of evaluation will be from 0 to 1. Statistical aspects describing the opinion, as well as geographical spaces, were studied. Thematic maps of opinion arise from the poll and appraisal of people's opinion, taking into account its location, bringing about an area of influence based on the concept of Thiessen's polygons where the limits of each area reflect the equidistance from different opinions, leading to homogeneous areas of opinion.

Polygons represent those areas of influence at each point, considering that they reach the bisectrix existing in the segment between each pair of points (F. Javier Moldes, 1999).

When information was scarce, partial processes were carried out using crucial networks, as described by Barbero D. and Discoli C. (2002). This allowed us to get data on the basis of the generalization criterion of results for each network of services involved. The information obtained from the survey is divided into four sections:

a) Perception of the urban environment in housing and its surroundings. It deals with essential themes related with environmental quality such as: i. flooding areas; ii. sewage water; iii. air pollution; iv. noise pollution; v. nearby industry pollution; vi. wastelands; vii. industrial wasteland; viii. idle housing; ix. permanent activities not compatible with housing; x. rubbish dumps at less than 300m. The evaluation is: Evident, perceptible and imperceptible, as well as re-coded to be fitted with the thematic model of ULQ : 1, 0.5 and 0, respectively. Here, the opinion poll and perception of the surveyor were evaluated.

b) Social equipment of the neighborhood. It is based on proximity and service evaluation, mainly health and education, either at state or private management. Existence, type of infra-structure and services rendered, were analyzed. The evaluation is: Very good, Good, Regular, Bad and Very Bad; and re-coded as: 1; 0.75; 0.5; 0.25 and 0.1, respectively. Data are presented as already described.

c) Access, perception, evaluation and substitution of urban services. Sixteen types of urban services in infra-structure and communication were evaluated, starting from home, or near surroundings, and their quality: street lighting, water main, sewage, drainage channels, pavement, sidewalks, gas supply, electricity supply, home telephones, public phone or phone booth, cable satellite television, public transport, garbage trucks, rental cars, security. The evaluation is: Very good, Good, Regular, Bad and Very Bad, also re-coded as: 1; 0.75; 0.5; 0.25 and 0.1, respectively. Using these data, Thiessen polygon maps were made to know users' opinion of each urban service. Concerning electricity and gas supply, the evaluation is, on average, "Good" and "Very good" in several central areas of La Plata city; "Regular" in Berisso and Ensenada (gas), and in City Bell and Villa Elisa (electricity).These maps display a global evaluation of users' opinion on the urban services.

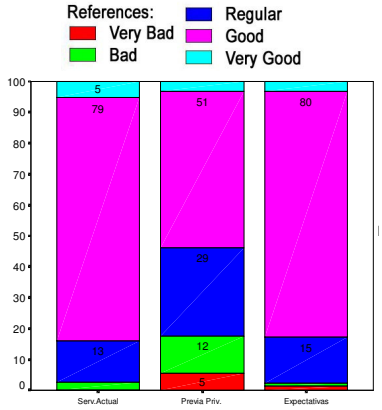


Figure 2. Supply opinion (Tension)

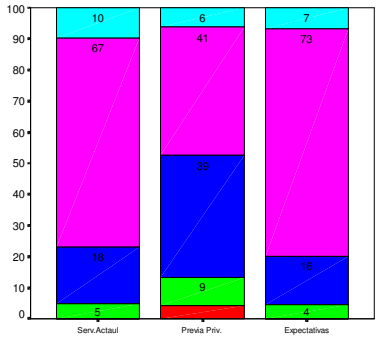


Figure 3. Supply opinion (En Cut-off frequency)

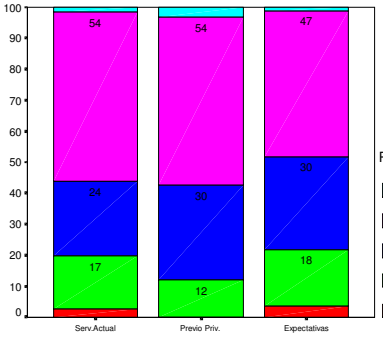


Figure 4. Prices Opinion. (En prices levels).

d) Perception on technological improvement of networks in home infrastructural services. Results obtained were deeply analyzed in order to identify perception from each variable. Thus, users' opinion was carefully taken into account to evaluate the service of gas and electricity supply as well as water main related with two scenes, first under government control and then managed by big companies. Opinion was grouped into: installation, supply, repairing, customer assistance and costs. Evaluation corresponds to: Very Bad, Bad, Regular, Good and Very Good that are re-coded: 1,2,3,4,5, respectively.

Opinion results

If we analyze electricity supply, technical performance of these companies (tension, stability and frequency of cut off) is more favorable than that of customer assistance (accessible offices, customer assistance, waiting times, formalities and information to users) and also better than prices.

Concerning supply by private companies, split up into tension, cut-off frequency and tension stability, presents a favorable opinion. On the contrary, government management is considered as "Very Bad", "Bad" and "Regular" (prior to privatization). Cut-off frequency, particularly, is increasingly considered as "Regular"; item that presents serious difficulties. With respect to customer assistance, the evaluation ranges between "Regular" and "Good", and a significant number of bad opinions. It must be pointed out that prior to privatization; this area shows a marked customer discontent. Yet, private management shows strong disagreement in other areas of services since they were expected to be better.

Concerning prices, the service is "Very Good" and "Good" to "Regular", "Bad" and "Very Bad".

Concerning "Very good" and "Good" opinions seem to favor government management whereas those ones namely "Regular" and "Bad" appear in both managements. The "Bad" opinion was only found in Private management. In brief, users seem to have a regular and bad opinion when compared to that about other topics. Figures 2, 3 and 4 show people's opinion in relation to tension, cut-off frequency and prices. The geographical distribution of general opinion about this service is displayed in Fig. 8.

In conclusion, users prefer private management to that of government's, though it does not come up to their expectations. However, technical aspects (tension, stability and cut-off frequency) are considered to be better than those of customer assistance (accessible offices, customer assistance, waiting times, formalities and information to users, and also better than prices).

Concerning gas supply, the technical performance of private services is better than that of the State, but worse than users had expected to be.

However, a few opinions about private services are worse than those supplied by the State. It is likely that these specific cases may account for issues of accessibility or long distances, etc. As regards prices, there is a slight difference between both groups, though private services are a bit favored (good and regular).

Extreme appraisals (Very good and Bad), favor State services prior to privatization. The gap existing between this service in relation to expectations is smaller than that of electricity supply. Aspects related to customer assistance are varied. In general, private services are in a favored position concerning accessibility to offices, when compared with negative evaluations (Regular/bad), namely customer assistance, waiting times, formalities and information to users.

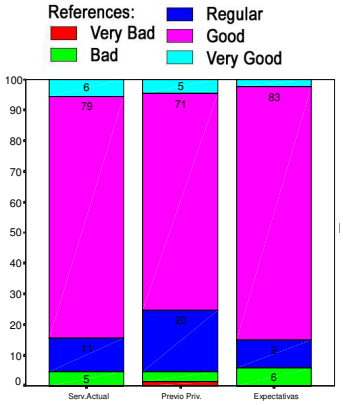


Figure 5. Supply Opinion. (NGn Pressure)

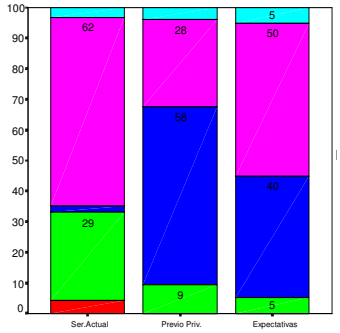


Figure 6. Customer Assistance Opinion

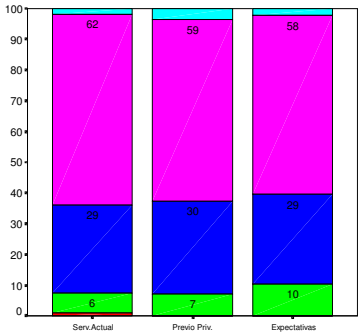


Figure 7. Prices Opinion. (NGn prices levels).

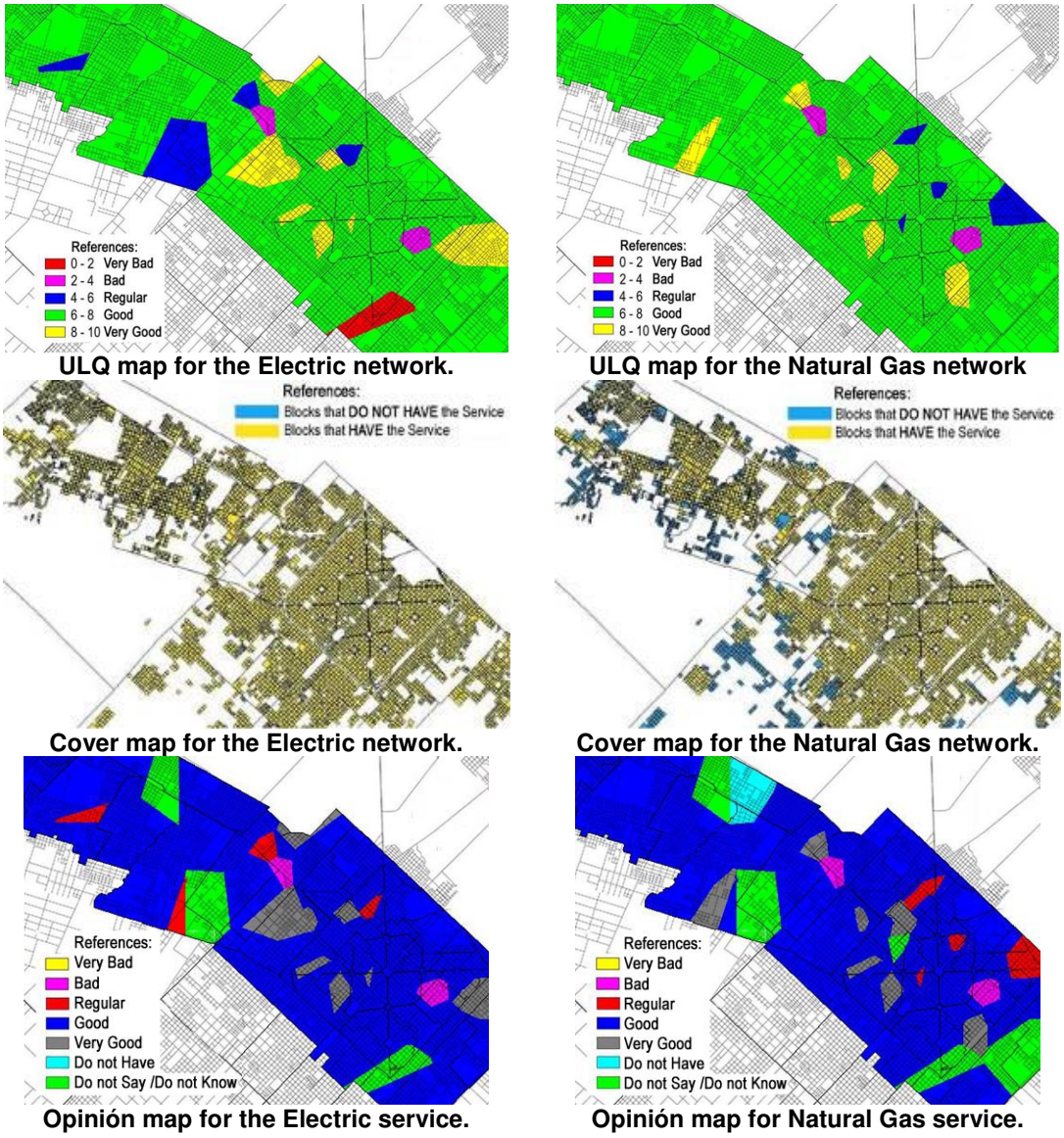
As to the last topics mentioned, good appraisal is less favored than the low one (with the exception of the topic “formalities” in private services). These topics are still strongly criticized and claimed on.

Anyway, private services are thought to be better than those of the State despite the fact that expectations remain unfulfilled.

Figures 5, 6 and 7 show some of their features.

Application of the opinion in the ULQ model

Throughout the development of the present work, each service was characterized to determine unfulfilled needs stated on maps showing the lowest levels of ULQ, and also the model components (evaluation, cover, use and opinion) in order to know the origin of dissatisfaction. In both cases, this model provides specific information by means of up-dated maps. Figure 8 shows the trends in ULQ levels for basic services of infra-structure (N1). ULQ maps were calculated in detail for those services such as electricity and gas supply, cover and perception of users. It can be observed that the ULQ levels for electricity supply display certain differences based on the opinion/perception component of the model. If cover maps are analyzed, an optimal factor of such component is obtained. Consequently, differences can be found mainly in the service quality. If we observe those maps of opinion and get the information about the origin of specific date, it can be established that differences are principally due to issues in the users’ assistance in regard to waiting times, accessibility to office buildings, assistance, information and prices. Thus, surveyed homes showed dissatisfaction ranging from Regular, bad and Very Bad.



ULQ map for the Electric network. **ULQ map for the Natural Gas network**

Cover map for the Electric network. **Cover map for the Natural Gas network.**

Opinión map for the Electric service. **Opinión map for Natural Gas service.**

Figure 8. ULQ Tendency maps of Electric and Natural Gas network desintegrated by cover and quality perception.

Concerning gas supply, the lowest ULQ values were found, they coincide with the least consolidated areas, in particular, houses in the suburbs. There are isolated areas with great consolidation where results were varied with regard to customer assistance and cut-off frequency. We also analyzed additional basic services (N2) such as drinking water pipes and sewage; their levels of ULQ are shown in Fig.9.

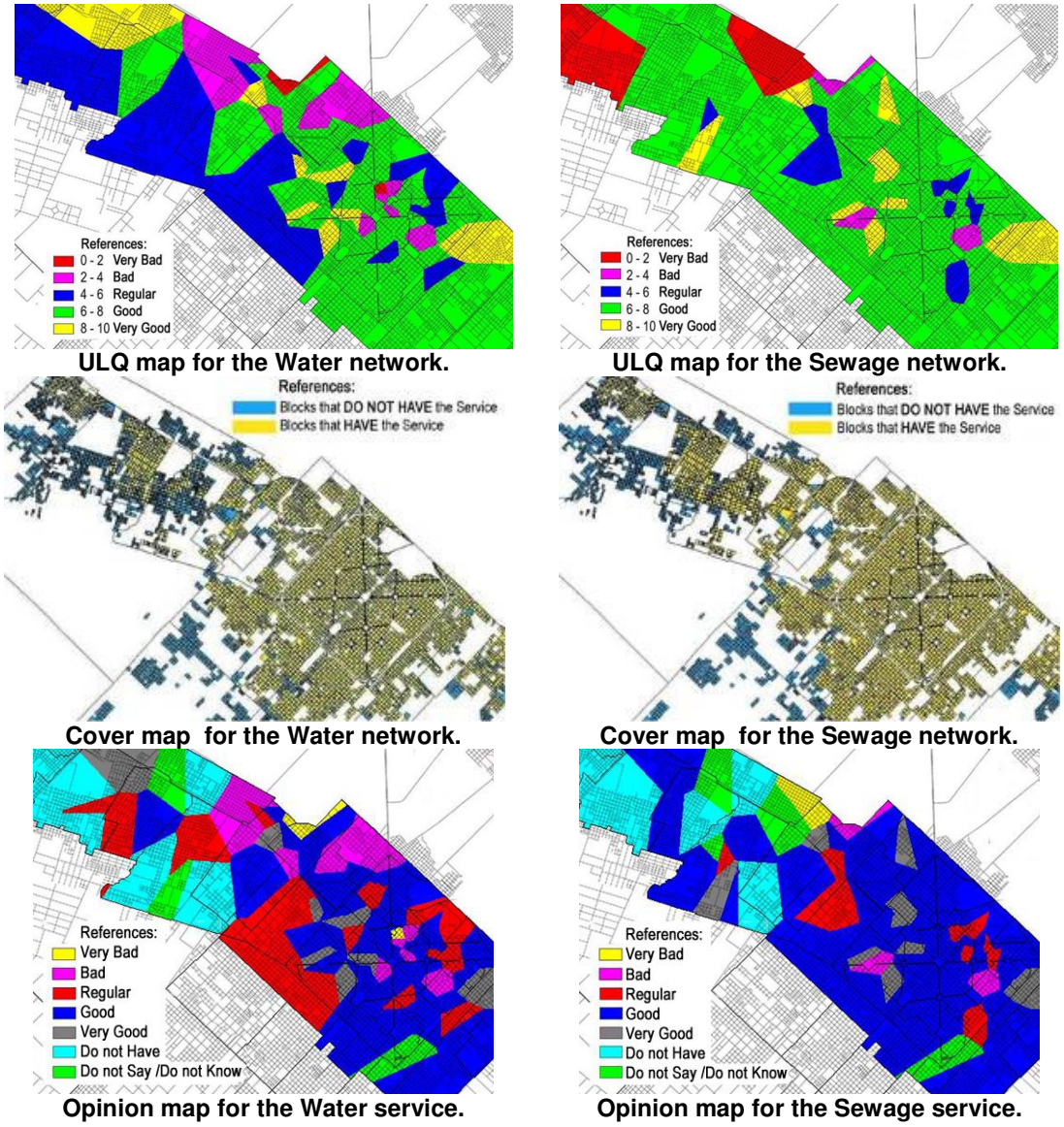


Figure 9. ULQ Tendency maps of Water and Sewage desintegrated by cover and quality perception.

It is evident that sewage service is better that that of water, mainly in less consolidated northern areas (municipal branches in Gonnet – City Bell). As to drinking water, the ULQ levels show homogeneous scattered areas, giving rise to marked differences concerning consolidation. In the central urban area of La Plata city (high and medium consolidation), though in general the service is better, there are fragmented areas of very low ULQ. This map gives a warning about drinking water supply in the region. A detailed analysis shows technical failures (pressure, quality and cuts) and also regarding customer assistance (accessible offices, waiting times and information). In regard to sewage, a greater homogeneity can be observed in the ULQ maps. It must be noted that lower levels appear in those areas of low consolidation. This service presents minor difficulties compared to that of drinking water, but greater unfairness arises related to different urban consolidations (downtown/suburb). The effect of integration and disintegration forces can be envisaged on present results.

Conclusions

The application of the ULQ thematic model with geo-referenced projection led us to draw good quality maps at a global (region) and small scale (urban area), pointing out those areas with different integration processes that involve urban services. In accordance with results, it is likely to obtain accurate markers by their analysis (n) and integral, in this case the ULQous. The visual display of homogeneous and heterogeneous areas defines typical urban profiles. The accuracy of the report depends on reliance, variety and selection of the available information.

It must be noted that results show a trend in each area evaluated at different ULQ levels, and limits are set on the basis of accuracy and localization of primacy data. Then, localization and geographical distribution regarding cover and opinion of users become of great importance for the algorithm of the model.

Urban Life Quality indexes with geographical localization at a global and detailed scale allow the quantitative evaluation of basic needs and quantify the effects of the integration and disintegration forces at an urban and regional scale.

The factor of opinion on quality of services is, in fact, a good tool for evaluation: data are obtained, processed and evaluated, though we must go on working to get more consistent information.

Further controlled knowledge is required to provide more objectivity since as already stated these facts depend on the individual opinion, social status and good progress. The present model unlike the usual ones has incorporated energetic and environmental variables involved in the city functioning and efficiency of the urban-regional services. A new dimension including relevant aspects of daily and future life of a city should be incorporated to this model in order to analyze different situations and key points as well as to devise future strategies.

Based on gained experience, the following considerations are under study:

1- Get accurate data upon urban aspects, identification and evaluation of their qualities. Different modeling instruments will be assayed to get more representative evaluations.
2- Re-define the term “cover” for the different urban aspects since its quantification may be established by means of tangible physical limits (e.g. gas supply network, elevation against flooding); concept variation in relation with dynamics and needs of people (health, education). In terms of environmental aspects, the area of pathological influence may be changed as a function of climate, different elements and people perception. Thus, we expect to agree upon different criteria of this model component.
3- Concerning opinion/perception as it is primarily a subjective component, the opinion of users and technicians will be discussed to achieve statistical results.

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