A TOOL TO DEVELOP BASIC URBAN INFRASTRUCTURE

In many cities around the world there are people living in makeshift dwellings, located in settlements without electricity, drinking water, and sewage, where pavement, schools and healthcare centres are not existent and where a better living is just a dream.

In most of the cases, as experience shows, these people is eager to improve their standard of living, but they just do not have the means or the political power to push for the most elemental basic infrastructure: electricity, water and sewage, let alone for other benefits that are usually readily available in other areas of a city.

In is understood that they need help, but we are not discussing here about assistance from the municipal or the national government, as a sort of a grant or a gift to the poorest sector of the society. We are talking of a loan, financed perhaps for international lending institutions, guaranteed by their central government, and considering the dwellers willingness and ability to pay.

From that point of view there are in many countries hundreds, if not thousands, of irregular settlements, usually located in the periphery of the cities, albeit sometimes they are situated near the richer areas of town.

Consequently, and provided that the government can get funds from its own resources or from international lending institutions, it is imperative to establish a plan in order to appropriate these funds in such a way to optimise their use. As a result, these cities need a plan to allocate them, and this is the objective of our presentation.

In essence, our system answers a simple question:

How do we allocate scarce funding amongst the different settlements, in a transparent and equitable way, in order to make the best use of the money, and/or to improve the quality of life of the greatest quantity of people?

We have developed a methodology called SIMUS (**S**equential **I**nteractive **M**odel for **U**rban **S**ustainability), which incorporates four steps:

- Step A: Detection of actual problems in social, economic, and environmental issues, with citizens participation;
- Step B: Solutions found to ameliorate or correct said problems in a short term and/or in a long term commitment, with citizens participation;
- Step C: A model to find the best mix of solutions;
- Step D: A procedure to monitor progress of adopted solutions, with citizens participation.

Step A involves the analysis of the living conditions in each settlement, and of course, includes not only the lack of basic infrastructure, but too the analysis of the social situation, health conditions, and many other issues, such as the environment.

This step is usually done in most cities, i.e. the cities know what the problems are, so from this point of view SIMUS does not incorporate anything new, but only a procedure to get ideas from the people, how to convey them to the authorities, and finally the discussion about the execution of feasible solutions.

In step B the cities should analyse the different available solutions to ameliorate the problems detected. For instance, in many cities a primary and difficult problem is the existence of slums, and sometimes it is thought to be solved just by creating a new housing development located in other part of the city, and then transplanting the dwellers to the new site.

This may look a good solution, however it is usually not.

Why?

Because people find themselves in a new environment, perhaps farthest away from schools and health centres that before, away from their friends in other settlements, away from the places of work, with social links severed, and segregated from the rest of the city.

We think that there are better ideas, such as those that have been extensively tested in Rio de Janeiro, in a program called “Favela-Bairro”, where the IDB has contributed with US$ 600 million.

Another example where the same approach was used is in the gigantic settlement of Netzahualcóyotl, in the outskirts of Mexico City.

In these two places, the idea is not to bulldoze the existing settlements but to incorporate them to the urban fabric, and as a part of the city, by means of their upgrading by supplying the basic infrastructure services of electricity, water and sewage, by the elimination of highly contaminated sectors, such as creeks, usually employed as sewer and landfill for garbage, by the construction of some defences for landslides, etc.

As an example, the World Bank has done a remarkable job in this aspect in Ghana.

In this country, the Bank, together with Ghana’s federal government started a program in 1985, and so far it has improved the living conditions of more than 500,000 people.

So, the system works and works fine, albeit one main problem to be solved is the selection of settlements to be upgraded, in order to have an equitable share of the available scarce resources.

In some of the plans, the World Bank selected communities on the basis of infrastructure deficiency, but we think that this is not enough.

Besides infrastructure deficiency, there are many other issues which make difficult the selection of the settlements to be upgraded, since it is imperative to get the maximum benefit from the available funds and/or to maximise the number of people benefited.

These issues are, for each settlement:

- **Cost of upgrading per hectare**, which normally varies from one settlement to another. Usually, for reasons of topographic and soil considerations, the cost for basic infrastructure can vary from US$ 16,000 to US$ 27,000. (World Bank figures for Ghana).

- **Maximum number of hectares to be upgraded.**
  This is important in order to establish some fairness between all the areas to be upgraded. Since funds are limited, money spent in one area is in detriment of another area

- **Minimum hectares to be upgraded.**
  From this point of view a minimum size of development has to be considered because economies of scale, otherwise, a certain upgrading can be very expensive when only benefits a few people.

- **Extent of services**
  We are here talking of basic infrastructure. It involves electricity to each house and the construction of water supply points and communal pit latrines. It has to be decided how many faucets and how many latrines we are going to install. How much water are we going to provide, and so on.

- **Human density**
  This is a key factor to be considered, because from the social point of view we should establish a limit to a maximum number of people per dwelling, as recognised by international standards.

- **Total settlement population**
  The population size of the settlement is related with both, the number of hectares and the density, however, we can probably modify the density and the number of hectares to be upgraded, but we cannot normally change the population size.

- **Maximum total investment for each settlement.**
  As mentioned before, and for equity reasons, we should put a limit to the amount of money to be spent in each settlement. To do this we can establish a cost-per hectare limit.

  However, in this case, there are matters that must be considered, as for instance, the relative importance of the city or the settlement in the local economy. As a consequence, sometimes, it could be necessary to establish some sort of hierarchy for a set of urban settlements.

- **Ability to pay.**
  Not all the dwellers in different settlements have the same ability to pay. This is related with the local economy, and should as well be taken into account.

- **Willingness to pay**
  This is also a very important point, since many people could assume that they have the right to receive benefits without paying for them.

- **Cost per capita.**
  Of course, this aspect is of paramount importance to the community. We cannot expect the people to repay the loan when we already know that they can't, and this matter is subject to a series of social and economic conditions. However, experience from the World Bank in Ghana shows that planning considering, "per hectare cost limits" is more meaningful that planning to "per capital limits".

  Fom SIMUS point of view, it does not matter which approach is adopted, but we think that the Bank's experience must be considered.

- **Annual interest rate:**
  Even when the lending institutions are willing to loan money at reduced rates, these have to be compatible with the economy of each settlement, and can vary from one settlement to another.

- **Period of repayment**
  Same as above.

- **Utilities considerations**
  We need to consider the necessary infrastructure - not only piping and wiring -, to provide these services, such as obtaining water and its purification, the treatment of sewage, the disposal of domestic garbage, the generation of electricity, etc.

- **Land use**
  In many cases, villages extent alongside rivers because it facilitates easy water supply and local transportation.
  However, it is necessary to put a limit to the sprawl of this kind of linear settlements and explore the advantages of a more rational layout. This is essential to lessen upgrading costs, to decrease the loss of agricultural land to housing, and for people transportation. As a consequence we should consider some sort of a plan to limit this sprawling, and into a higher density and no-lineal community.

As it can be seen the problem is far from simple, and when all of these considerations are extended to may be 20 or 30 different settlements in a country or even within a large city, it becomes a very complex problem.

However, all this information can be inputed in spreadsheet format, and then we solve the problem of finding the optimum mix of settlements in step C, where we apply the core of the SIMUS methodology.

SIMUS looks at as many settlements as we want, considering all of the above issues for each of them, and then selects the settlements to be upgraded, together with the extent of each upgrade, and according to the available funding.

This is what we have done for Ghana, taking information from the World Bank publication "Urban Notes" - Thematical Group on Services to the Urban Poor - Number 1, April 2000.
"Towards a National Community Infrastructure Upgrading Program for Ghana", by Chris Banes, Rumana Huque and Melanie Zipperer.

We took five areas in the following cities:

Area 1: Accra
Area 2: Sekondi-Takoradi
Area 3: Kumasi
Area 4: Tema
Area 5: Tamale

We have used some hypothetical figures for interest rate and for period of repayment, and also worked with a cash flow investment of each year, developing for every city a net present value of the investment.

The result, shows:

- The number of hectares to be developed in each settlement;
- The total number of people who benefit from these upgradings;
- A ratio showing the land efficiency (number of hectares available vs. number of hectares assigned)
- Amount recovered by the lending institution and its profit.

Our approach starts writing all the data in a spreadsheet such as Excel, and then finding the best solution through a mathematical routine incorporated into Excel.

The procedure can be run by municipal or government officers, after a short training course of three days.

In step D, we collect the results of this study and discuss it with stakeholders and dwellers, and modify it if necessary. In this way we encourage people participation.

Final comments:

It is interesting to mention that the World Bank, and the end of the above mentioned publication, under “Drawing on lessons to design a large scale upgrading program for Ghana”, states that:

> “The lowest cost options should be actively sought to allow greater coverage with limited resources”
>
> and also adds that:
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> “ Greater efforts to increase local government revenues and recover costs of upgrading should be built into a program”

And this exactly what SIMUS does.