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USING SOFT SYSTEMS METHODOLOGY TO ANALYZE QUALITY OF LIFE AND CONTINUOUS URBAN DEVELOPMENT[1]

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USING SOFT SYSTEMS METHODOLOGY TO ANALYZE QUALITY OF LIFE AND CONTINUOUS URBAN DEVELOPMENT

ABSTRACT

The population pressure over municipal administrations has increase in most cities in the world stimulated by citizen's wishes for better quality of life. People seem to have improved their standards and demands with respect to quality of life when compared to the past. Citizens begin to understand the economic and social benefits of preserving their cultural heritage and, consequently, try to slow down the politicians' enthusiasm to refurbish and frantically spread the cities.

The culture background, the problems, and the potentialities are different from city to city. Consequently, the needs and wishes also are widely different. Trying to find out which variables are the most important for strategic analysis is a different task for each different place. This paper describes a possible application of Soft Systems Methodology (SSM) to analyze quality of life and continuous urban development.

KEY WORDS

Soft systems, quality of life, urban development.

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URBAN PROBLEMS OVERVIEW

Decisions apparently take longer when they depend of consensus or negotiations, but if they result from a systematic methodological approach, the solution to a specific problem loses importance, if compared to the benefits generated by the systemic learning process. The population, city councillors and developers can take advantage of this learning process. Prospective actions and preventive solutions are crucial tasks to promote continuous city development, increasing the quality of life (QOL) of local citizens.

Good decision relies on good information, and decision-support models are not going to enhance the quality of poor data. So, if there is no good data/information, there will be no good decision. To understand the local problem is one of the first steps to guide the analysis of good, useful, trustful and feasible data/information. Rosenhead and Mingers (2001) criticise the old saying that "a well put problem is half solved" arguing that this is much too obvious, the difficulty is exactly to enunciate the problem accordingly.

The follow-up of performance indicators in municipalities and their comparison with benchmarks, over the years, may enable improved forecasts of future demands in many areas, but it doesn’t help much to find out the constantly changing population’s wishes/needs. The use of indicators makes it possible to monitor the return on investments, the assessment of efficiency and the control of the system’s efficacy, but the system still needs to be effective. The effectiveness in municipal administration can be guaranteed through the development of

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long-term sustainable strategies. However, urgent requirements also need to be met in the short to medium term, to keep the system working.

The monitoring of social and economic development of municipalities by means of indicators makes it possible to carry out correlation analyses that better indicate suitable courses of action, regarding demands from various interest groups. In order for municipal administrators and strategists to take advantage of region potentialities, data must be translated into pieces of information that enable actions to be prioritised and strategies to be set. The turning of data into pieces of information is not an easily accomplished task, since urban problems may have different and unclear causes, thus requiring the use of constructivist decision aid models. These models get much more complex and subject to mistakes the more they attempt to represent Human Activity Systems (HAS), e.g. subjective dynamic population wishes.

Few years ago, politicians would consider the population wishes/needs as included in the technical data information they had. They wouldn't ask the citizens' wishes for their cities. They would assume that they represented them and their needs. Maybe this behaviour was inherited from old times, when cities lacked so many basic things that the politicians didn't need to ask what to do first. In smaller cities, they didn't need to have a formal way of collecting data because they were much closer to population and could, therefore, depict people's wishes, needs and problems much more easily.

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SYSTEMS STUDIES RETROSPECT

Systems studies emerged from the investigation of well-defined "hard" system problems, also called Systems Engineering (SE). The first concepts of Systems Thinking arose late in the 19th century, from biology studies of natural wholes. During the Industrial Revolution, Operation Research (OR) models became really important to optimise production and processes. During Word War II, the American army tried to use prescribed techniques for complex messy strategic problems and had some unsuccessful results. An interesting situation happened when an air force top officer asked some army meteorologists and statisticians to forecast the weather one month in advance. The team of meteorologists and statisticians concluded and communicated the commanders that a long-term forecast wouldn't be better than mere raffle numbers. The commanders insisted on obtaining the information, answering that they were aware that the data prediction quality wouldn't be good, but they still needed it for planning reasons (Bernstein, 1996).

The need for methodologies to help solving messy and ill-structured problems led researchers to seek for flexible models. In their point of view, "softer" models would better represent different and subjective points of view, helping them to solve real-world messy problems.

Late in the 1940's, Ludowig von Bertalanffy proposed the idea that Systems Thinking could be applied to any kind of system, but in the 1950's and 1960's many practical hard systems applications were still been used to solve complex and messy business problems. Prescriptive systems can lead to faster results than constructivist ones and can give optimal answers for

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well-defined problems. However, when they are used indiscriminately for any kind of problem, they can lead to completely absurd solutions.

During the 1970's, Checkland proposed a "soft" approach to solve non-structured messy system problems, which was called Soft Systems Methodology (SSM). At the same time, computers technology got more and more accessible to researchers and the population, in general. The idea that computers could quickly process enormous amounts of information and easily solve complex mathematical problems attracted and still attracts decision-makers and researchers to the use of "hard" systems models. The extraordinary computer's technology development from the 1980's to our days added to people's expectations that powerful computer hardware and software could solve all their problems, considering they had been well formulated. Most people still don't realize that the difficult and most important part of messy problem's analysis is exactly to find what the real problem is and how to enunciate it properly. After this, the need for a perfect decision model isn't so important anymore and a simple approach can be applied.

SOFT SYSTEMS REPRESENTATION

According to Bellinger (2002), a system is an entity that maintains its existence through the interaction of its parts; a model is a simplified representation of the real system; and a simulation is the manipulation of a model in such a way to compress it, enabling one to perceive the interactions that would hardly be systemically visible. Since models are simplifications of the reality, there should always be a low complexity and high accuracy pondering solution. If too little details are included in the model, there is the risk relevant

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interactions are missed and the resultant model doesn't represent the real situation properly. If there is too much detail in the model, it may become overly complicated, tricking the understanding.

A reductionist approach is valid for systematic models as it breaks the system down into its constituent parts to make the problem manageable. But, in complex messy systemic models, reductionism leads to the loss of the sense of wholeness. The repetition of events is also only adequate for systematic models; it is not acceptable for uncertain, messy, and mixed up systems. Problems don't exist by themselves, so they can't be isolated in systemic models. Problems are always different, and solutions are temporary and unique.

Well-defined problems can use systematic methodologies; they are more suitable for that. On the other hand, uncertain, messy and mixed up problems - as political decisions - should use systemic approaches.

Soft Systems Methodology (SSM) applies the concept of whole entity and it is a learning process methodology. It helps decision-makers understand the messy real-world problematic situations by comparing people's perception with constructed theoretical models. The basic concepts of SSM help to: define clear system's purpose; check connectivity between activities; create measures of performance and mechanisms to collect/monitor/control activities; establish decision-making procedures; define the system boundaries; establish control resources; clarify system and sub-system hierarchies; and guaranty continuity property. Practical sequence steps of SSM are showed in Figure 1.

1. Define a problematic or undesired situation;
2. Express the situation (top mapping, rich picture, etc);
3. Select relevant concepts that may be helpful in learning and transformation process (root definition - RD);
4. Assemble concepts named in the RD into an intellectual structure (conceptual model - CM);
5. Compare CM with the expressed real world problematic situation;
6. Debate and define feasible and desirable changes;
7. Implement changes to improve the problematic situation (action).

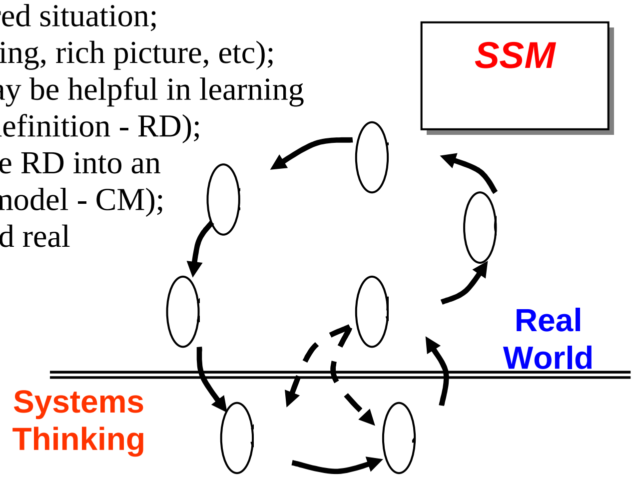

Figure 1 - The seven-stage Soft System Methodology model.

On this first stage - to define the problematic situation - it has to be asked: What is the undesired situation? The answer for that question - in the urban planning context - could be for instance, "the population's low level of quality of life".

A transformation process representation of an Urban Planning issue could be made to express and generate discussion about inputs, outputs, internal/external environmental constraints, people's involvement (humanware), lost capacities, production recycle/rejection, among other issues.

In any transformation process, input resources have to be transformed into desired output, but some concepts have to be followed to guaranty coherence and usefulness of this representation and the good Root Definition (RD) formulation. The first condition is: abstract inputs have to yield abstract outputs; as well as concrete inputs have to yield concrete outputs. The second condition is: resources that get into a system by an input side have to get out by an output side. Rosenhead, and Mingers (2001) say that the common confusion about input and transformation resources leads to a misunderstanding system concept.

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Following these assumptions, a clear input and output can be established for the desired transformation process. And then a problem question can be generated: WHAT should be done to transform the status quo into the desired situation? In this case study it was proposed that "challenging the existing city planning process and finding improvements" would lead from a "low level of QOL" into a "high level of QOL". Figure 2 shows the transformation process proposed and the 3Es test (effectiveness, efficiency, and efficacy). The efficiency of the transformation process should be checked to guaranty the desired output. Two other questions should be generated: WHY should it happen? And HOW to implement it? The question "WHY" would investigate the consistence of the transformation process with the main strategic sustainable objective (effectiveness). The question "HOW" would check the quality of the proposed process (efficiency).

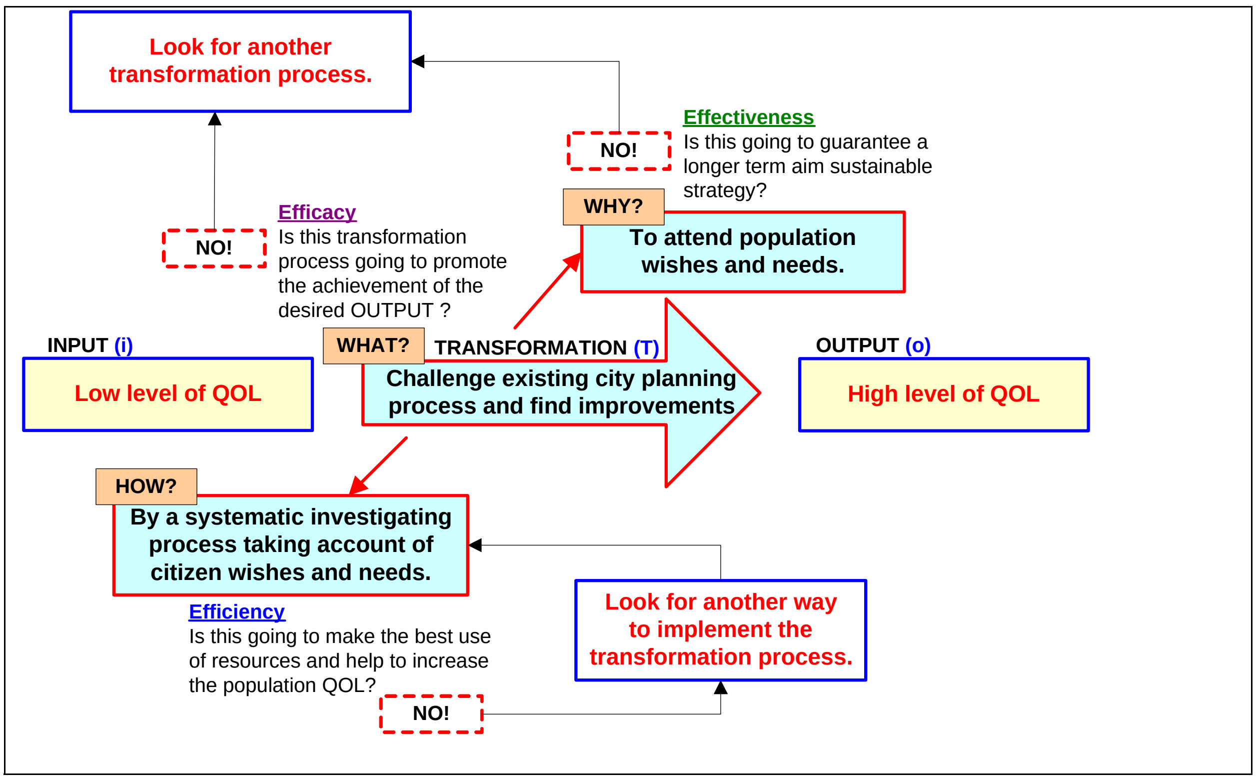

Figure 2 - Transformation process and the 3Es test.

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The second stage of SSM application suggests the use of a draw or a schematic picture to represent the undesired situation. It helps to clarify missed links between parts and the better understanding of the sense wholeness.

To help formulate the Root Definition (RD) - the third step of SSM - Checkland and Scholes (1999) suggest the use of the CATWOE mnemonic (C - Customers, A - Actors, T - Transformation process, W - World View, O - Owner, E - Environmental Constraints). The CATWOE elements help decision makers to remember who should do the activities (Actors) and who could stop them (Owners). Actors and Owners were two commonly forgotten elements in conceptual system thinking models. The actors are the ones who know best the technical skills and requirements. The owners are the decision-makers; they have to think more strategically and less technically. Affected people, or the beneficiaries of the purposed activities, pull or push the transformation process; they are the Customers. The transformation process is the activity that can change the *status quo* into a desired state. Environmental Constraints are the external forces that act over the whole transformation process and can change the world's view. The World View is a representation of how the system is perceived and defined from a particular point of view.

The CATWOE mnemonic tests if the established root definition (RD) was well formulated. Through the CATWOE analysis, a local planning group (LPG) of citizens, for instance, could be defined as the owner (O) of the problematic situation; the local population could represents the customers (C); members of local planning group (LPG) would also be the actors (A) in this case; the environmental constraints (E) could be cost/benefit constraints, difficulty to access to population's wishes, and the lack of ability to challenge existing city planning; the world-view (W) systematic process would help the owners to identify and challenge major planning issues

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by a model to question the real world; and the transformation process (T) would be challenge existing city planning process and find improvements.

The CATWOE mnemonic would help to derive the following Root Definition as:

> The Local Planning Group (O) believes that under cost/benefit constraints, difficulty to access to population, and the lack of ability to challenge existing city planning (E), the LPG members (A) could still challenge existing city planning process and find improvements (T) to transform the low level of QOL (i) into a high level of QOL (o) that benefits the local population (C). The assumption that a systematic process would help LPG to identify and challenge major planning issues by a model to question the real world (W) was made.

Wilson's (2001) representation shows how Root Definition formulation should be supported by the CATWOE test and how the Conceptual Model should be supported by Formal Systems Models (see Figure 3). The looping in these two stages help to improve and adapt the model to the constant real world changes.

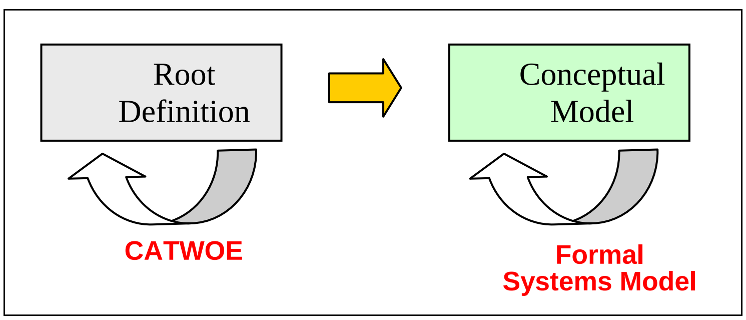

Figure 3 - The defensible intellectual relationship (Wilson, 2001).

From the Root Definition, a Conceptual Model was constructed to compare the Real-world problematic situation with the desired System Thinking transformation process. The Conceptual Model - made for challenge the existing process and find improvements - shows a sequence of steps to guide implementation actions from the identification of population wishes/needs to

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debate/challenge existing city plan (see Figure 4). After the sevenths step the cycle begins again and it can be reinforced by a cyclical loop of improvement. This cyclical loop can guaranty the sustainable development of the transformation process.

There are three different possible levels of system failure: strategic, tactic and operational. The strategic level is related to the effectiveness of the project/plan; the tactical level deals with the efficacy of the system; and the operational level deals with the system's efficiency. From these concepts we can deduce that even when things work as designed (with efficacy) and are productive using the minimum resources (with efficiency) things still may not work well for long-term aims (with effectiveness). Efficacy, efficiency, and effectiveness check help the SSM model to monitor and control the process (see Figure 4).

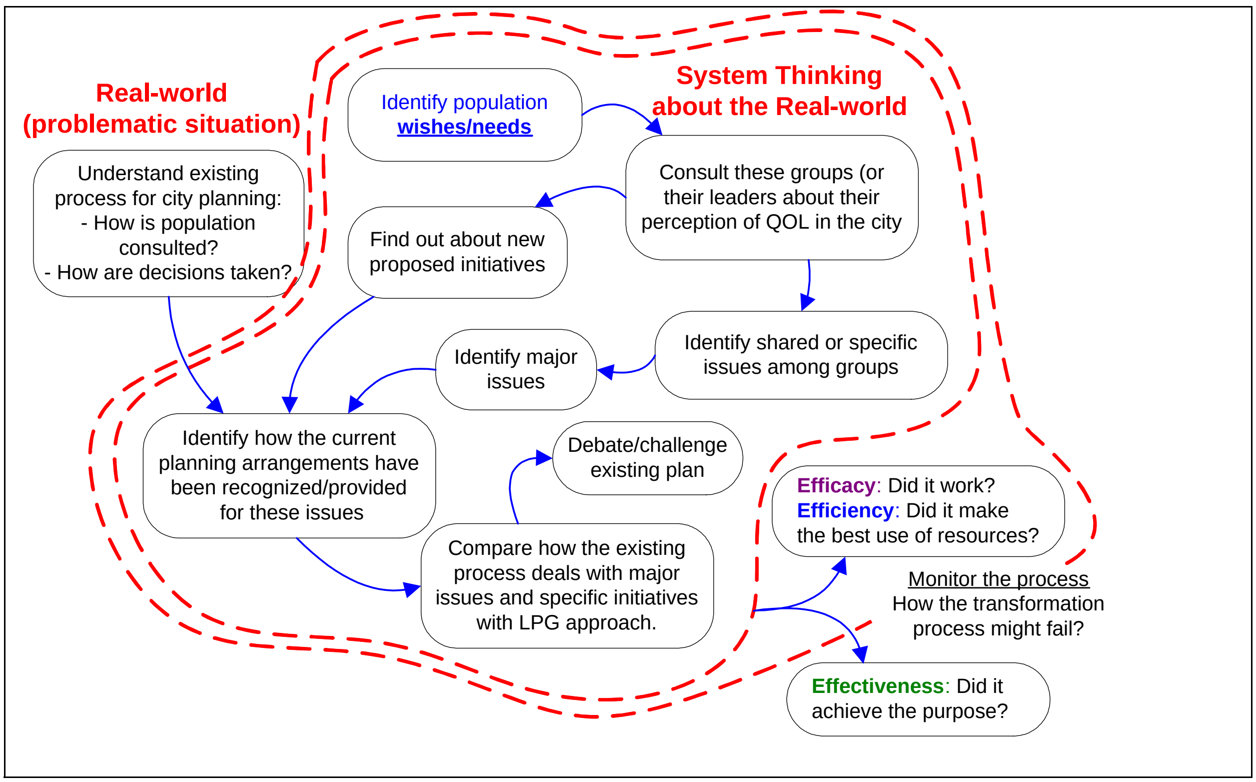

Figure 4 - Conceptual Model for challenge existing process and find improvements.

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CONCLUSIONS

The objective of this paper was to show how Soft Systems Methodology could support urban planning decisions in different situations and different realities and how to implement the methodology in a urban planning strategic situation. Urban problems overview and the system studies retrospect sections supported the idea that flexible/soft systems would and could be a better approach to deal with human activity systems than hard systems models.

Population's satisfaction and desirable quality of life are issues in constant change; they will never be achieved, but have to be continuously sought. The whole SSM application was presented, but not implemented on this paper. It would be hard and confusing to go ahead from step 4 of SSM, comparing the constructed Conceptual Model with a "supposed" and unknown Real World problematic situation (SSM step 5). From step 5 to step 7 of the SSM, it would be necessary to make assumptions of different realities and compare them toassumptions made before. A real application of the SSM should be implemented running the whole cycle - couple times to check the effectiveness of the proposed transformation process. Anyhow, the efficiency and efficacy of the transformation process could be checked on the first cycle of the SSM implementation. The never-ending SSM cycle improvement could lead to, but not guaranty, the effective and sustainable development on a urban development case.

Constructivist methodologies are usually difficult to implement, at first, because most people want and need to see fast results, in order to get stimulated and involved. But, in a second stage (which is not related to the SSM stages), involved people begin to get more engaged and interested on listening and participating of constructivist discussions. At the end, people realize

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the advantages of using a constructivist methodology; this is useful for the commitment of participative administrations, so in vogue in the politicians speech.

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