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## *QUALITY TOOLS APPLIED TO TERRITORIAL INTELLIGENCE*

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### **Abstract:**

Territorial intelligence is useful and helps the regional actors to project, define, encourage, and evaluate policies and actions for sustainable territorial development.

This article has been structured into three sections: the first section focus on a description of Territorial Intelligence; the second one contains the description of the "Six Sigma" process as an improvement method project, which unlike other quality initiatives generates participation and aims to significantly reduce or eliminate the detected defects in an existing process in the field of organizations; and lastly, the description of some of the quality tools used by the Six Sigma project.

Territorial intelligence, through action research, achieves that the involved actors gain more information and local knowledge, enabling them to apply methods and projects designed to solve regional problems. However, once the process is finalized, how can we evaluate the plan of actions or measures implemented within the territory?, how can we check the level at which the problem has disappeared?, and which actions do we have to take based on the results observed in the assessment?.

The "Six Sigma" method, deal with this question using a set of quality tools, can we use those same tools to measure the success of the process applied in the territory?

**Keywords:** Territorial Intelligence, Six Sigma Project and Quality Tools.

# Quality tools applied to territorial intelligence

## **I TERRITORIAL INTELLIGENCE: Concept and elements.**

In recent times, major changes are occurring in societies, where the keys are knowledge, information and new technologies. These keys factors boost the creation of a new concept of society, the so-called "knowledge society."

The knowledge society<sup>1</sup> could be defined as the place where the society discovers the strategic value of knowledge, use it as a key element of their competitiveness and welfare, and consequently, dedicates efforts to create new knowledge and find ways to use them. It is characterized by being highly dynamic and working with the aim to produce exchange and transform knowledge. This knowledge is formed by a set of information, ideas, skills, experiences, values, etc., all of which can be found everywhere; however, the people are who posses skills, abilities and, specific and concrete knowledge.

Knowledge and people are at the territory, place or active entity where all dynamics - economic, social, physical, cultural, ecological, global, and local – cross, guided by the actors, who, through their interaction, give rise to a particular model of regional development. Therefore, quality of life, human development and sustainability must be addressed from a regional and multidisciplinary approach, with agencies that coordinate the development of all knowledge.

Currently, territorial aspects have become a reference point for socio-economic processes, hence the slogan: "think globally, act locally". This way, and based on the sense of globalization, we reach the territorial analysis.

Territorial Intelligence emerges to ensure that human knowledge and scientific technological development offer improved quality of life on people, creating models of economic, and environmental development, sustainable and socially balanced, which channels the potential of a knowledge society, to try to solve people's and most vulnerable areas problems.

"The territorial intelligence is a means for researchers, actors and regional communities to

gain a better knowledge of the territory; but also to better control their development. The appropriation of information and communication technologies, as well as information is a necessary step for the players to enter a learning process that allows them to act in a relevant and efficient way.

Territorial intelligence is useful particularly to help regional actors to plan, define, encourage and evaluate policies and actions for sustainable territorial development. "

The main elements of the Territorial Intelligence are: knowledge of the territory, territorial engineering tools, territorial governance, participation and participatory research.

Territorial governance is a new way to define the action of government and involves the creation of a new model of participation and coordination among all actors operating in making decisions on strategies and policies with a strong impact on the area.

Participation is reflected in the creation of territorial development partnerships, tools that facilitate the involvement of actors, two or more public and private, in order to collaborate and work together voluntarily to achieve the goals set or to solve existing problems, always working jointly through participation and coordination of all involved.

Participatory research is the main element of territorial intelligence, which is now called action research. This process requires the knowledge of everyone involved, as well as knowledge of the territories, creating a learning process through which it is transferred: techniques learned and applied, living experiences, history, sharing and expressed experience, attitudes, motivations, and, most importantly, it creates an environment that makes possible sharing and facilitating research, action and participation. In order to understand the issues and concerns of the people, and to get their involvement, it is necessary the diffusion and socialization of knowledge, and the creation of proposals that have a repercussion on the territory.

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<sup>1</sup> DAVID, P.A. y FORAY, D.

### **Characteristics of Research - Action:**

1. Relevant Facts: diagnosis of a problem in a specific context, trying to solve it.
2. Collaborative: collaborating and practical teams often work together.
3. Participatory: team members take part in improving the research.
4. Self - Evaluative: the changes are evaluated continuously, with the ultimate goal to improve practice.
5. Action - Reflection: reflecting on the research process, and accumulating empirical evidence (action) from various data sources. Also, accumulate different interpretations that enrich the vision of the problem for your best solution.
6. Process step by step: successive steps are giving, where each is the result of the above steps.
7. Interactive process: it will cause a growth of knowledge (theories) and an immediate improvement of concrete reality.
8. Continuous feedback: from which modifications are overrides, etc.
9. Molar: a variable is not isolated, but examines the whole context.
10. Immediate application: the findings are applied immediately.

With this type of research, researchers will have more information and more varied points of view and they could compare their results in a more direct way. However, the biggest contribution will fall on the actors, which will have information and knowledge on the territory, obtaining an apprenticeship, which will allow them to directly apply methods and tools on regional projects.

## **II SIX SIGMA PROJECT.**

The term Six Sigma is formed of the word "Sigma", letter of the Greek alphabet which corresponds with the letter "s", used in statistics to represent standard deviation; and "Six", a number that refers to the bandwidth a normal distribution.

Six Sigma can be understood as a methodology that combines the use of statistical tools with a disciplined approach to solving problems. However it can be a working philosophy, a business strategy or a management philosophy, which aims to improve the effectiveness and efficiency throughout a systematic, scientific and practical use of statistical tools. In other words, it is a data-based method, which aims to promote a cultural change in the organization and to

prepare employees to use a new methodology to improve quality levels. It is applied for the first time in the 80s at the Motorola Company, as a business strategy different for previous methods to improve the existing quality. In these cases, the role of managers was scarce.

Nowadays before applying the tactics of Six Sigma, it is necessary an external support, and to establish and to train all project personnel involved. The first step starts with the executives who have an active participation, and are responsible for recognizing strategic business objectives and identifying the processes by measuring their performance in terms of efficiency and effectiveness which determine the lowest-performing and worst performing in order to implement the tactics of Six Sigma.

The second step is the selection of "black belts", which will be formed to lead improvement projects. The black belt work focuses on leadership, planning, train and provides personalized support for computer components. Above all it will be in charge of detecting and identifying opportunities for the organization, stimulating the thought of doing things in a new way to show that new applications will succeed, and researching and implementing new tools to create innovative strategies. They are professionals that in addition to being able to perform several tasks, they must meet the management and leadership skills, decision making, communication, team building and negotiation, planning, programming and performance, prioritizing and interpersonal interaction. They also have to be responsible for coordinating and balance of powers in nine areas:

- Limitation of costs.
- Time management.
- Defining the scope of the project.
- Quality of product development.
- Internal and external communication.
- Human Resources.
- Level of commitment.
- Management and office supplies.
- Risk management.

Along with the black belts, there are the "champions" and green belts. In some organizations we can find another group of agents called yellow belts, made up of workers with less degree of involvement that the green belts. Once the problem has been defined, and the staff has been selected, the next step would be to apply the charter.

The methodology known as DMAIC (acronym in English) consists of the application, project to project, of a structured process of five phases: to define, to measure, to analyze, to improve and to control.

1. Define: at this stage, it is done the problem statement, project scope, goals and objectives to be achieved, and the division of responsibilities among team members.
2. Measure: this step creates the data collection plan and its implementation. Determining, what measure, types of measurement, data type, specifications, data collection forms and sample.
3. Analyze: in this stage the team analyzes the data and the process itself, which will determine causes of the current functioning or reasoning. For the analysis, there are applied tools such as Pareto chart, the pie chart, etc.
4. Improve: in this step, the team generates a series of solutions designed to improve performance, and then it recommends which of them should be applied based on the objectives, either individually or in groups.
5. Control: here the team sets off a series of tools and techniques to improved process control and to create a response plan.

Prior to conclude a Six Sigma project, it is necessary to get approval from senior management for further implementation. This will carry out a series of meetings leading up to the end with a logical presentation which will be accompanied by supporting graphics. Ultimately, the aim is “to sell the solution to the leadership.”

In short, Six Sigma methodology, or six steps method, it starts with a set of problems that request a wakeup call. The black belt will designate the specific problem and clarify the determining factors that affect, determining a hypothesis. The hypothesis is tested in one study, the improvements are identified and the solution implemented.



“A disciplined methodology for process improvement”

### III QUALITY TOOLS

According to the Royal Academy Dictionary, the word *quality* is defined as: "property or set of inherent properties of a thing that allows appreciate as it, for better or worse than others of its kind."

The technical concept of quality considers quality a form of management that introduces the notion of continuous improvement in any organization at all levels, and it affects all people and all processes.

We find two types of quality:

- External quality: to satisfy customers.
- Internal quality: to improve internal processes.

The goal of quality is to satisfy the customer by providing what he asks but using controlled processes, and at the same time ensuring that this improvement does not translate into higher costs for the organization. To achieve these goals it is necessary to work with real and objective facts. It is also necessary to apply a set of statistical tools by following a systematic procedure (to determine the problem, make decisions, evaluate the decisions and act on the results.)

There are seven basic tools that have been widely used in all actions to improve the quality and applied in the analysis and solution of problems. They are:

1. Check Sheet (Sheet data collection)
2. Histogram
3. Pareto diagram
4. Cause and effect diagram
5. Stratification (stratification Analysis)
6. SCADTA diagram (scatter plot)
7. Control Chart

In the Six Sigma projects two types of tools are used: one the techniques known to some extent coincide with the 7 Quality tools, listed above, and some other more specific like, process capability studies, failure mode analysis and effects (FMEA), correlation analysis, analysis of variance (ANOVA), hypothesis testing and experimental design. Others are the so-called "soft."

Referring first to the technical tools, almost all authors agree on the implementation of the next ten tools:

1. The critic tree of quality, in which the team identifies the needs and requirements.
2. The process diagram, a graphical representation of the current steps of the selected process to be improved. Providers, inputs, process steps, products and customers as part of it, are represented.
3. The histogram is also a graphical representation of the number of times that a particular event occurs in a series of observations.
4. The Pareto diagram divides the data into two groups, including some that are vital and many that are useful. It is based on the rule 20-80.
5. The process analysis sheet, with this tool what is done is to divide the steps of the process in two types: those that add value and those that do not add any value, such as transfers, delays, failures, etc.
6. The cause and effect diagram (Ishikawa spine) is a brainstorming tool that serves for the actors to identify factors that are causing poor performance.
7. The scatter plot allows establishing a relationship between a particular factor and the response that the team is trying to improve.
8. The affinity diagram is a tool used by the computer to generate and collect ideas for improvement.
9. The movement diagram, it follows the fluctuations of a value as a function over time. Variations of a value should be considered in function of the displacement value, trends and unusual patterns.
10. The control chart shows the expected level of variation for a process, and allows the team to determine when the process ceases to be constant, predictable and repetitive.

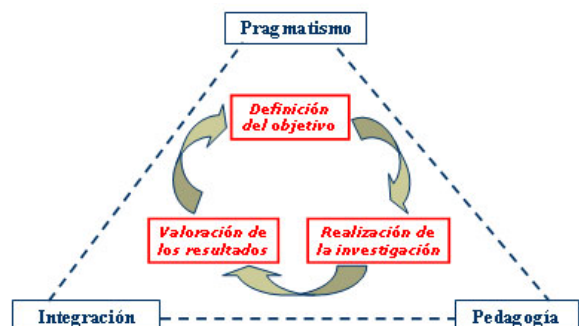
As for the so-called "soft", they are those that will be applied in many cases directly on people; so that they should be apply carefully, and tactfully. They are divided in two groups:

### 1. The acceptance of solutions:

- a. Analysis table of stakeholder: individuals who are affected by the solution of a project team or any person who is required to implement the solution of such equipment. An identification of the key one is done, and then it is showed the level of support of the solutions and the team to be successful.
- b. Planning board to influence: it indicates the origin of the resistance that shows an interested and what strategy should be used to move it towards the desired level of support.
- c. The array of threat and opportunity: it represents what would happen if the solutions are carried out (opportunities) and what would happen if they are rejected (threats).
- d. The payoff matrix: it is a tool used to prioritize among the solutions presented by the team to determine which would be easier to implement and which would have greater impact on business.
- e. Declaration provided solutions: it will help determine the new behaviours that will result once the solution is implemented.

### 2. Team dynamics:

- a. The team's agenda: this includes the agenda for each meeting.
- b. Basic rules: it describes how to do the work during a meeting to avoid creating maladaptive behaviours.
- c. The park: where deviation from the agenda are collected, i.e. when a member of the team wants to discuss an issue which is not on the agenda.
- d. Assessment of advantages and weaknesses of each meeting.
- e. Activity reports: there are techniques that the teams have to monitor how they perform their work, responsibility, start and end dates and comments, and thus the team will always be focused on the job and meet their goals.



## CONCLUSIONS

Could we use quality tools applied by the method of "Six Sigma" to measure the success of the process used in a territory? In other words, could we check the level at which the problem has disappeared and what actions could take based on the results observed in the evaluation?

First, when we try to analyze an area, we need a set of tools that will enable us to know its resources, its people, and especially what their needs or existing problems are, with the eventual aim of improving them.

Among the main tools use, we have observation and participation. Through participation, the aim is to involve all actors in that territory, public and private institutions and citizens. Observation devices, meanwhile, will be responsible for developing collaborative tools and participatory assessment tools, being here where cooperation between research and action takes place. Action research is positive, both for researchers and for non scientists' actors, providing knowledge and data. However, these processes are faced with many difficulties; the results are not automatic or short-term. The culture of participation is not very well established, and the urgency of the area's needs does not allow the use of time and resources in research.

And from the link between research and territory the territorial intelligence comes out, which focuses on combining the resources and technologies to generate knowledge and tools that are subsequently used by the actors, who are part of the territory, with the intention to improve the development and quality of life.

Once the territory and the actors are determinate, the tools, and performance measures to improve its development are generated, how it determines the quality of the process? Making an analysis of some of the quality tools applied in the Six Sigma methodology, which of them could be used? The Six Sigma methodology is applicable to non-technical and technical processes. The technical processes are not subject to description in this analysis. A non-technical process is very difficult to determine. They may be administrative, services, transactions, etc.... In these processes, neither the inputs, not the outputs could be concrete. But these are certainly processes and treat them as systems, allow us to better understand and determine their characteristics, optimizing, control and eliminate the possibility of errors and mistakes.

Participatory research techniques will fit well with the use of continuous improvement techniques in a team, because these techniques can help to promote the participation of other regional players that want to engage in the study.

The fundamental concept of Six Sigma is that every process has variation. It is associated with variability and this variability has a number of causes from which we must work. The information and data are therefore the keys. Unlike Territorial Intelligence, information and knowledge transfer is from top to bottom, so that the information and data may be biased, but the teams are formed by different types of workers, the error of the data and processes would be minimal.

The aim of this study, would be to start checking the probability of applying the tools used in Six Sigma, not Six Sigma methodology, as it applies to "improve the process and find solutions that are unknown in principle", whereas Territorial Intelligence and in particular, taking as an starting point the actions carried out through action research, it would measure the effectiveness of actions already taken and applied to the territory.

At last, among all the tools used by Six Sigma, in my opinion, I think that it might be useful and easily applied to determine the quality level of the actions carried out in a territory, the followings:

The cause and effect diagram (Ishikawa spine): with it we could identify a problem, diagnose it, help with its resolution and then focus on the process of improvement. By using the spine of Ishikawa in the territory, we first identify the problem, then by brainstorming we will list all causes arising from policies, procedures, people and resources. Third, the team classifies the causes, and ultimately to every case an action to take it is related.

Pareto diagram: this allows us to sort the items according to the degree of importance, separating the vital problems from the trivial. It is based on the principle 20-80, 20% of cases originate 80% of the problems so if we act on that twenty percent, and we will improved eighty percent the process.

Process Map: this is intended to linearity in the time the solutions proposed to undertake a continuous cycle of improvement of the problem. In short, it aims to mitigate the problems by taking certain actions in the passage of time to

help us achieve the goal. It represents the properly sequenced set of activities and valued.

Flowchart: it represents a sequence of logical steps to take to produce a certain result. It could be used to design a project (in terms of a need identified in the country) and then to analyze if it is implemented and if it is fully applied in the place where it was implemented. (For example, a health centres in a suburb).

Graph Process: in five columns we could represent the factors involved, (Supplier, Input, Process, Output, Customer), (SIPOC). In the supplier column we will detail who provide us with something to process. In the input column, we will include all the entries that intervene in the process. In the process column, we will detail the different stages that take place, and the outputs are the outputs / waste / waste generated during the process and ultimately the customer or end user.

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