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Using Lean Six Sigma Method to Determine the Relationship Between Implementing Development Projects in a Top-Down Way and Their Sustainability

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***Abstract*— This study aims to show that development project results sustainability depends on the way the project is set up. Indeed, insufficient attention to the conception phase of creating ties between different sectors can be caused by the fact that the project was done in a top-down way.**
Lean Six Sigma is the engineering method used. It allowed to identify this relationship along with the use of linear regression on graphical representation.
As a conclusion it can be said that top down development projects results are not sustainable.

Keywords*— *Development Project; Sustainability; ; Lean Six Sigma; top down

I. INTRODUCTION

Development projects are currently one of the processes used by donors in general and more particularly rich countries to help a developing country. Projects may be led by a non-governmental or governmental organization. But in any case, they have a well defined purpose and aim: to meet the needs of the population targeted by the project which will have to be sustainable.

But often, development projects are found to be not sustainable. So was observed in Madagascar as well. Indeed, projects that were supposed to bring pro-poor socio-economic growth did not achieve the desired quality outcomes. Worse, the project's life cycle ended up with the donors withdrawal, which marks the very end of the project.

Sustainability issues are displayed through several facets. Six causes have been identified, among which insufficient priority to promote community participation, lack of cooperation and non collective decision making, top-down way of conducting projects, conflict of interests around the project or conflicts arising over the project's resources, unfair sharing of the project's benefits, poor improvement of living conditions of under-privileged social groups such as women and children, and decreasing local participation.

But in this research, we will focus on the fact that the top-down way to conduct a project is the cause of its non-sustainability, demonstrated by the use of Lean Six Sigma method.

The detected research problem is: "insufficient attention given to the project document conception phase and in developing ties between various sectors".

How does the top-down way made project affect the conception phase and the link tying between various sectors, which means the project results sustainability?

II. METHODOLOGY

- Lean is a qualifier given by a team of MIT researchers to the Toyota production system created in the 1970s by Sakichi Toyoda and Taiichi Ono. [15]-[16]-[17]
- Lean's philosophy is focused on achieving performance in terms of productivity, quality, time, and cost, through continuous improvement and in eliminating waste.

Six Sigma is a Motorola's registered trademark designating a management structured method (DMAIC) aiming at process quality and efficiency improvement which was born in 1986.

It is an approach based on customer's voice along with measurable and reliable data.

It aims at reducing process variability so as to improve the overall quality of products and services.

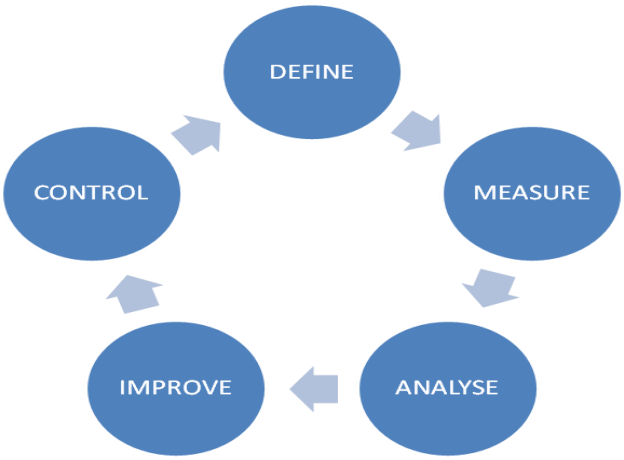

Figure 1: Six Sigma approach

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1. Define (D) the business opportunity: what is important for our customers?

During this phase, the project team defines what process is to be improved and sets the limits and the means to implement the project. It is meant to identify the project's purpose (the Terms of Reference) and the involved actors. The working team is also set and the management rules, individual's task and expected deliverables are defined.

2. Measure (M) the current state of the process: how do we perform in our customer's view?

This is a fact observation phase. Quantitative data are measured and qualitative data gathered. In other words, data are collected to be interpreted while ensuring of observation's reliability.

There are different steps in this phase. The first one is to define the data collection plan. Then comes the collection step itself. At last, a quantitative and qualitative statistical processing is conducted to achieve a primary statistical analysis.

3. Analyze (A), define the root causes: why do not we meet the needs of our customers?

The analysis phase is for setting the diagnosis. It's about identifying the sources of variability and understanding why failures occur.

It is closely related to the Measuring phase because the analysis is based on the data collected during that phase in order to establish a factual diagnosis summarized in an Ishikawa diagram.

The steps are first to closely review the process and visually inspect the data. Then, to brainstorm about the potential causes of the problem and to check them. At the end, the project charter is updated.

4. Improve (I), eliminate waste and variation: what can we do to increase customer's satisfaction?

Following the existing situation diagnosis during Analyze phase, Innovate phase is devoted to improving or redesigning the process.

There are two ways to proceed during this phase:

a) A traditional way that brings together at its end all work from solutions conception to their detailed deployment project (C phase will then be devoted to effective deployment and its follow-up and monitoring).

b) The transactional way is more focused on research and solution choosing. It is mostly used when the solutions deployment exceeds the Lean Six Sigma project lifespan. In such case, I and C phases are combined.

5. Control (C), maintain gains over time: how can we meet customer's needs in a constant and sustained manner?

The proposals drawn up on I Phase are deployed in this project stage. Their implementation is completed by a follow-up, after which the results are monitored to ensure the improved process is running properly.

If the I phase used the transactional way, the C phase presents all the solutions and their deployments.

LEAN Coupled With SIX SIGMA

• The two methods when combined provide a more comprehensive approach to process improvement resulting in superior quality (fewer defects), little or no variation, continuous product flow, little or no waste (time, material, movement), added value at each process step, and a controlled and well-functioning process.

• Risks associated with individual use of approaches are reduced:

- Lean focuses on the entire value chain, which avoids under-optimization and improvement of non-value-added stages.

Six sigma, thanks to its rigorous DMAIC method, its statistical tools and its emphasis on eliminating variation, prevents "efficient production of defects".

III. RESULTS

The results are obtained from the second step: Six Sigma MEASURING process.

A. Graphical representation of the two variables V1 and V3.

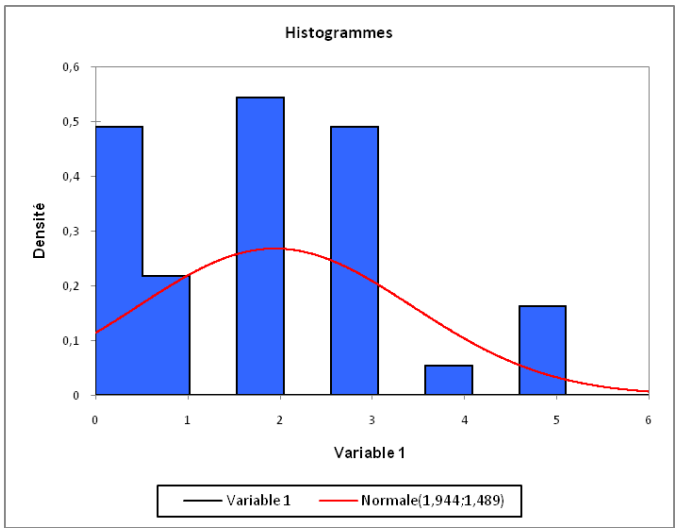

Figure 2: Graphical representation of V1variable

This figure shows that V1variable follows the normal distribution as the graphical representation of a curve following the six sigma.

V1 : $N(\mu = 1{,}944;\ \sigma = 1{,}489)$

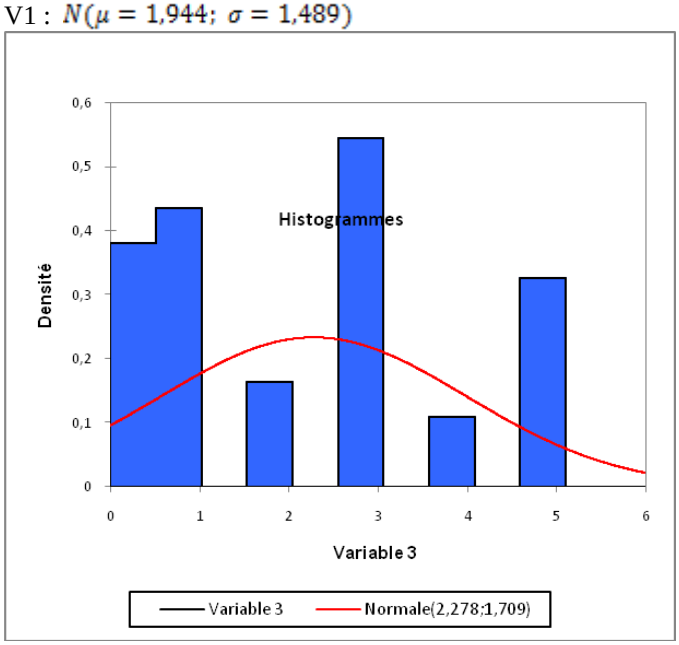

Figure 3: Graphical representation of V3 variable

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This figure shows that V3 variable follows the normal distribution as the graphical representation of a curve following the six sigma.
V3 : $N(\mu = 2{,}278;\ \sigma = 1{,}709)$

B. Comparison of V1 and V3 variables

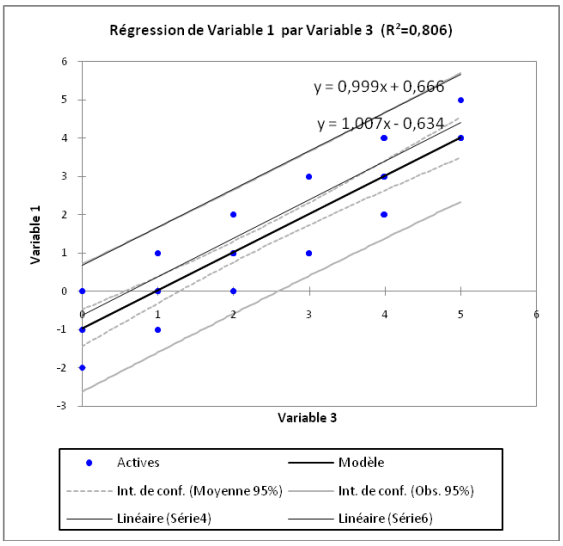

Figure 4: Comparison of the two variables V1 and V3

The figure shows two graphs representing variable 1's function "insufficient attention given to the project document conception phase and in developing ties between various sectors" and variable 3's "top-down conducted project".
We note here that V1 line's behavior follows a linear line of y = 0.999x + 0.666 equation. The line starts from point 0.80 and progresses until point 6.
V5 variable also follows a linear line of y = 1,007x - 0.634 equation. It starts from point -1 and goes to point 5.
The two lines are parallel which means that the two variables have relationship.
They are quite strongly related because the $R^2 = 0.8$ coefficient is greater than 0.5.

IV. DISCUSSION

Top-down project making is one of the reasons why project results are non-sustainable.
[1] Very often, the appropriation supposes:
- over time (not endless) management,
- not to go too fast (there is a risk to believe that you must go fast to be quickly credible),
- an individual dimension: chance and alliance.
Working projects are ones resulting from a meeting. We need relays, a good network, time to meet the right person on whom the project's autonomy will later depend. This share of chance and success of an alliance is based on value exchange, shared empathy, lucidity on each one's interests, mutual requirement,… and not just on money in facing poverty. What unites transcends cultural differences.
Sustainability is the result of managing relationships.
The major sustainability challenge is the project's ownership by local populations and stakeholders. The "excludability" of a primary idea must be measured in a global and multidimensional way: technical but also political, cultural, social, and economic. Context and power relations must be understood. Not all social groups have the same interests.

Two dangers emerge:
- Partner's expectation is "a good project is a project that meets needs". This is not true: you do not ask what you do not know. You ask what you think you can get. It is quite reductive to work on a demand, an opinion harvest. But we can enrich the actors viewpoint by looking beyond achievements: it takes time to be able to co-construct projects but it allows to go further than listening to the primary need. It is not so easy to listen.
- Coming with the solutions before knowing the problems: to have built-up opinions before listening. Technicians are like saying: "Do you have problems, because we have solutions!". There must a time for diagnosis. "To help people you do not know is ill-mannered." You must work with people in the long term.

Diagnosis and listening precede action: Who are the actors? Who wants what? Who has the power? What is the women's place? The children's? And the elected officials? Who is lever of change?
This diagnosis can evolve throughout the project.
The project can be participatory provided the approach is effectively coherent from the project's preliminary phase. This participatory approach is not systematically required for a project to be successful (example of a microfinance project in Cambodia by GRET).[1]

Writing a project file (for Europe, Regional Council,) requires a study of the issues, risks, problems, and success conditions. It must remain critical and not be a sales pitch. The approach or the project's coherence matters most. Convincing requires taking a step back.
You create the project for yourself and not for the donor.
The center of gravity should be the South; but the Copernican revolution is finally rare or slow. Evolution only happens if we want it. The South claims it from time to time.
Excludability is also managing cultural difference and unequal relationship. An equal partnership means to be able to say no.
To well manage a partnership, one must be lucid, aware of one's own interests, one's power, be demanding of the other. When the bilateral situation is difficult, it is sometimes useful to call on a third party. Lucid people manage partnership well. A reference to Eugène Labiche's "Trip to Monsieur Perichon": "People who help us take us down lower than earth".
IPDCI (Initiative sur le Partage des Connaissances et le Développement des Compétences) made the following assumptions:
Writings about management change and project management emphasize the importance of thinking about the sustainability of a project from the moment of its conception. Indeed, the way a project is planned and implemented will affect its potential for integration into the organization's operations and routines.

Questions to ask when deciding on a project's sustainability.
Before deciding on a project's sustainability, it is important to assess whether the project's performance is up to expectations.

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What is your assessment of your project's performance? Does it achieve the anticipated results? Does it have a positive impact on the organization's performance? Does it meet the population's targeted needs? Is the project perceived as a significant solution to the problems faced by the organization? Based on your assessment, what are the elements of your project that are efficient enough to be sustainable?
Factors to achieve sustainability according to IFAD
The review (as well as the reviewed case studies) identified a range of factors that can significantly improve the likelihood of achieving sustainable results and the impact of IFAD-supported projects in the region.

Effective links between project components
A key element in sustainable project results is a holistic approach-based conception, examining livelihood systems, needs and opportunities. Narrow, sector-focused interventions can be a risk for sustainability in various ways. For example, gains realized in household food security can easily be lost due to disease outbreaks or adult mortality.
Similarly, economic improvement can be compromised by shocks - natural or human - that deplete or destroy household and community properties. In short, if households and communities lack resilience to natural, social or economic shocks, project impacts can quickly be lost.

Specific examples of effective links identified in field visits include:
• Broad mix of interventions, as a whole, responded well to the observation and needs expressed by the communities (NERCORMP).
• Projects in India and the Lao People's Democratic Republic clearly link infrastructure development with the expansion of cash crop production.
NERCORMP connects more of the two to the market activity.
• Women's groups in India, formed around income-generating activities, expanded to include an awareness forum on health and hygiene and community mobilization efforts that address education and social issues.
• OCISP has forged strong links between credit and agricultural / livestock training, and to a lesser degree, commercialization.

Community participation
While many development programs include participatory measures in the design project, programs that achieve sustainable results take serious commitment and practice sound concepts, focused dedication, careful monitoring, and appropriate accommodation if necessary. Successful programs use the "bottom-up" style of planning to prioritize and then reflect community needs in project design. Designs with promising results in sustainability include plans for communities, managing internal and external resources, which in turn promotes a greater sense of ownership. The following are specific examples of successful community participation noted during field visits:
Community priorities were assessed in the design of OCISP activities through participatory approaches. At the time of the case study, community members expressed the view that the project still meets the needs of key households and the community.
Designed as a community-led development project, DPRPR has taken another dimension by integrating the decentralization process.

V. CONCLUSION

The project, in order to accomplish specific objectives, is often set up to change the beneficiaries daily lives. But the issue we raised during our research is the negative finding that often the donors withdrawal marks the end of the project and its impacts on beneficiaries.
It's from perceived effects by beneficiaries that a project can be seen as a success or a failure. It is successful if its effects last even after funding ceases.
Our study revealed that there is a relationship between the attention given to the conception of the links between the different sectors and the top-down conducted project. To conclude, the latter is the cause of results non-sustainability of a development project.

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