

# Utilizing Six Sigma Method to Sustain Development Project: some case studies

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## ABSTRACT

This study aims to show the critical success factor relative to a development project. A development project is a project whose goal is to improve targeted people's everyday life. But the problem is that when the funding comes to an end, the impacts of the project results also stop. This research tries to resolve this question which is often seen in some developing countries. The Six Sigma was the engineering method used. It was used to improve the quality of the result of development project and to make it sustainable.

It can be concluded that the use of the Six Sigma tools to satisfy the clients (beneficiaries) and to reduce the lack of quality are some of its possible applications. In addition, this method helps to lead and manage change by providing practical guidance on situation assessment and conflict resolution.

**Keywords:** *Development project, sustainability, Six Sigma, DMAIC*

## 1. INTRODUCTION

Development projects are currently one of the processes used by the rich countries and donors to contribute to the development of developing countries. Projects can be controlled by a non-government or government agency. But in all cases, they have a goal and a clear purpose: that is to meet the expectations of the population targeted by the project and assure sustainability.

But the common problem is that in general, those development projects are not sustainable in some countries. It is the case of Madagascar. Indeed, the projects supposed to bring pro-poor socio-economic growth have not produced the expected results in terms of quality. Moreover, the life cycle of a project ends with the withdrawal of the donors.

The sustainability problem manifests itself in several facets, for instance in the transfer of jurisdiction from the technicians to the

beneficiaries. Concerning the quality of the expected results, the Skinner settings (time-cost-quality-flexibility) were poorly defined and did not allow beneficiaries to directly see the impacts of the project in their daily lives. This has not favoured a participatory and inclusive approach among beneficiaries.

But why do the quality of the result of development project is not achieve and why do development project not sustainable?

We state in this study that development project which does not use Six Sigma method is not sustainable.

## 2. LITERATURE REVIEW

According to Murray (Murray 2001), when the failure of a technology project information, it is important to "measure" the degree of responsibility of all stakeholders of the project. Moreover, Thite (Thite 1999) and Warne (Warne 1996) adds that in order to progress in improving the delivery of goods

made technology projects of information, it is important to be clear about the responsibility level of everyone involved in a project that failed. The causes of failure of information technology projects are not sought in technology. Human and organizational factors are increasingly seen as a source of the causes of failure.

Turner (Turner 1988) said that projects are characterized by: creating changes in the organization and in society, with goals and objectives, their uniqueness, scope, and involve a variety of resources. As in many developing countries, the Government remains the main investor in capital and many projects implementing agency projects, particularly public infrastructure, such as schools, hospitals and health centers, roads and bridges, public buildings, airports and ports.

Projects undertaken by the government are often designed to achieve political objectives such as the re-election. This leads to a situation in which project management processes have not deliberately followed in order to speed up the project. Therefore, very often the result of the project does not meet the objectives, budget overrun occurs and specifications (if any) are not met. The most important concern in these circumstances is the implementation of timely projects.

According to Pinto (Pinto 1996), understanding of project management is the cornerstone of effective and efficient use of resources (human and financial) and can lead to increased productivity. The same author says that to try to assess the errors and their causes, two important lessons can be learned, namely independently of the degree of care, an organization will continue to make mistakes,

and where there is failure, there is learning potential.

Current theories according to Pedrito and Marie Louise (Pedrito et Marie-Louise 2008), tell that success is a broad concept that encompasses different meanings. The success or failure of a project is subjective and, as such, is perceived in different ways, depending on the objectives. In addition, Smith-Doerr (Smith-Doerr 2004) reinforces that projects can fail in terms of delay, performance and budget, but can still be considered a success in terms of value of the project or customer satisfaction (beneficiary). Therefore, according to the same author, the success of the project depends on the criteria used, and on the fact that the final product will satisfy the customer, to the point of acceptance. Moreover, success depends on the type of project.

There are several factors that affect the success of a project, known as the critical success factors (CSF). These factors may vary during the life cycle of a project. Many authors, including Belassi (Belassi 1996), Belout (Belout 2004), Fortune (Fortune 2006) agree that the following are critical factors in an entire project lifecycle: project mission, management support, project schedule, plans, client consultation, personnel, selection and appointment of competent teams, technical, client acceptance, monitoring and feedback, communication, troubleshooting, the characteristics of the project team, power and politics, environmental effects and urgency.

Pedrito and Marie-Louise (Pedrito et Marie-Louise 2008) say that the success of the project management is not synonymous with project success. It has been argued by Baccarini (Baccarini 1999), Jha (Jha 2006), Lehtonen (Lehtonen 2007), Zwikaël (Zwikaël

2006) and other authors that successful project management can influence the success of the project but it is unlikely to prevent project failure. Also according to these authors, project management is essentially intended to achieve three objectives; complete the project within the budget, within the deadlines and within the specifications. Moreover, Cookies-Davies (Cookies-Davies 2002) and Baccarini (Baccarini 1999) add that the success of a project depends on the effect of final deliverables.

In addition, according to Pedrito and Marie-Louise (Pedrito et Marie-Louise 2008), the theory claims that the project is a success if it achieves organizational goals, satisfies customers/users, satisfies internal and external stakeholders and meets the technical specifications.

According to Herman (Herman 2008), Total Quality Management (TQM), aims to improve the efficiency and competitiveness of the organization. Six Sigma movement that began in the 1980s provides a more structured approach TQM.

According to Herman Steyn (Herman 2008), it is important to note that quality activities should be an integral and integrated part of the overall project plan. They are implemented by all of the project management team and not only by the staff of a quality division. As for the quality planning, it contributes to the continuous improvement of the project or the company, Herman (Herman 2008).

The same author adds that the lessons learned during the closure of a project should contribute to changes in the company scales in terms of project management policies and procedures. Similarly, lessons learned about the successes and failures should be analyzed

and documented. Compliance reports are important means to ensure that the expected quality requirements have been met. The reports also serve as guidelines for future projects and contribute to continuous improvement, so the success of a project in terms of qualitative achievement of results.

### **3. METHODOLOGY**

The six sigma method is a project-driven management approach to improve the organization's products, services, and processes by continually reducing defects in the organization. It is a business strategy that focuses on improving customer requirements understanding, business systems, productivity, and financial performance. Dating back to the mid 1980s, applications of the six sigma methods allowed many organizations to sustain their competitive advantage by integrating their knowledge of the process with statistics, engineering, and project management (Anbari, 2002). Numerous books and articles provide the basic concepts and benefits of the six sigma method (Harry and Schroeder, 2000) (Hoerl, 1998, 2001). The challenges and realities in implementing the six sigma method successfully are immense. However, the benefits of applying the six sigma method to technology-driven, project-driven organizations are equally great.

#### **3.1. Two perspectives of six sigma processes**

##### **3.1.1. Statistical viewpoint**

Kwak and Anbari (Kwak., Anbari. T, 2004) :Six sigma method has two major perspectives. The origin of six sigma comes from statistics and statisticians. Hahn et al. (1999), Hoerl and Snee (2002), and Montgomery (2001) discuss the six sigma method from a statistical, probabilistic, and quantitative point of view.

From the statistical point of view, the term six sigma is defined as having less than 3.4 defects per million opportunities or a success rate of 99.9997% where sigma is a term used to represent the variation about the process average (Antony and Banuelas, 2002). If an organization is operating at three sigma level for quality control, this is interpreted as achieving a success rate of 93% or 66,800 defects per million opportunities. Therefore, the six sigma method is a very rigorous quality control concept here many organizations still performs at three sigma level (McClusky, 2000).

### **3.1.2. Business viewpoint**

In the business world, six sigma is defined as a 'business strategy used to improve business profitability, to improve the effectiveness and efficiency of all operations to meet or exceed customer's needs and expectations (Antony and Banuelas, 2001). The six sigma approach was first applied in manufacturing operations and rapidly expanded to different functional areas such as marketing, engineering, purchasing, servicing, and administrative support, once organizations realized the benefits. Particularly, the widespread applications of six sigma were possible due to the fact that organizations were able to articulate the benefits of six sigma presented in financial returns by linking process improvement with cost savings.

## **3.2. Understanding six sigma**

### **3.2.1. Six sigma strategies, tools, techniques, and principles**

Six sigma is a systematic, data-driven approach using the define, measure, analysis,

improve, and control (DMAIC) process and utilizing design for six sigma method (DFSS) (GE 2004). The fundamental principle of six sigma is to 'take an organization to an improved level of sigma capability through the rigorous application of statistical tools and techniques' (Antony et al., 2003). It generally applies to problems common to production.

### **3.2. Six sigma strategies, tools, techniques, and principles**

Anbari (2002) pointed out that six sigma is more comprehensive than prior quality initiatives such as Total Quality Management (TQM) and Continuous Quality Improvement (CQI). The six sigma method includes measured and reported financial results, uses additional, more advanced data analysis tools, focuses on customer concerns, and uses project management tools and methodology. He summarized the six sigma management method as follows:

### **3.3. DMAIC process**

#### **3.3.1. DMAIC—Road Map to Improving Results**

Harry Rever (Institute for Learning, Inc.): The Six Sigma road map to improving business results is DMAIC (define, measure, analyze, improve, and control), a proven set of steps that can be applied to any process in any industry. The five DMAIC steps are easy to understand, make total sense, and match up well with the established project phases, as depicted in the outside circle in figure 1.

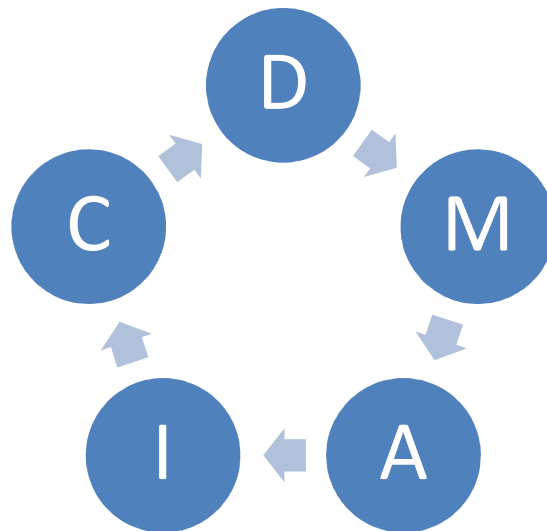


Figure 1: DMAIC process.

## 4. RESULTS

### 4.1. Implementation of the project with and without Six Sigma.

#### 4.1.1. Case study of a Good Governance project in Antananarivo Madagascar.

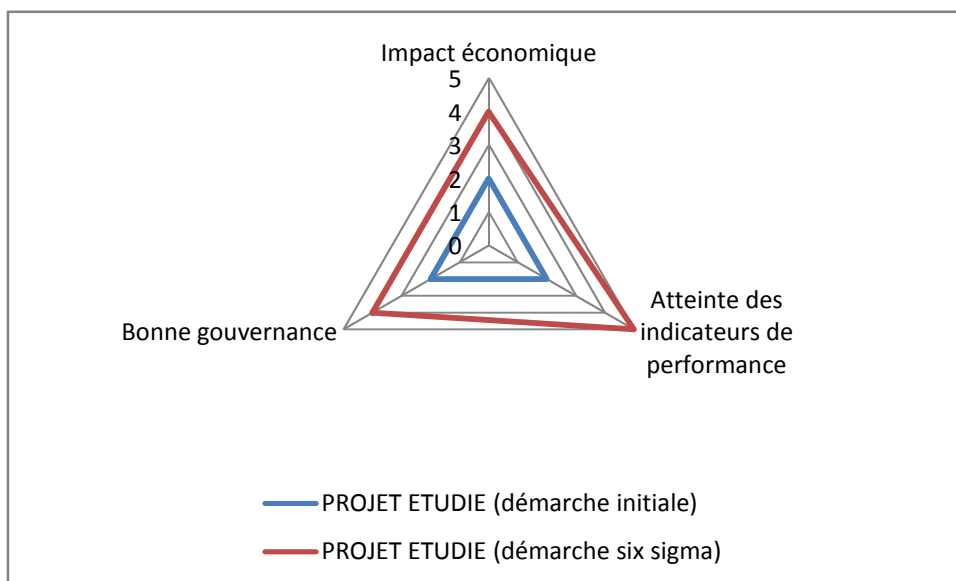
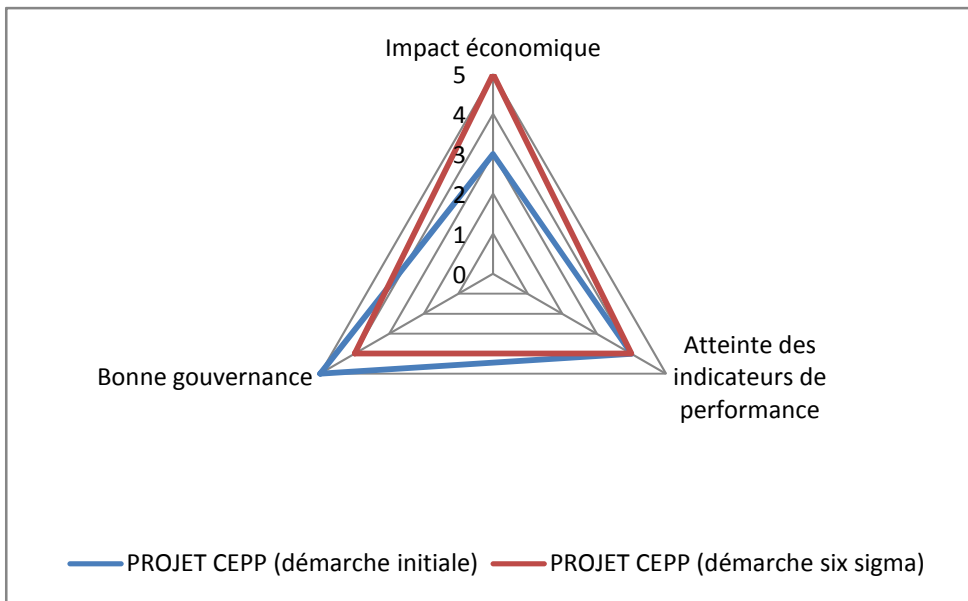


Figure 2: Good governance project implemented without and with Six Sigma.

The good governance project recorded 2 points and 4 points respectively on the economic impact in the initial approach and Six Sigma approach. On the achievement of performance indicators, the initial approach has recorded 2 points and six sigma approach

5 points. And finally, good governance, the initial approach scored 2 points while the six sigma approach scored 4. When Six Sigma was applied, the results have doubled. The Advanced chart shows that finding by the ratio between the two profiles.

**4.1.2. Case study of a project on Pro Poor Economic Growth in Antsirabe Madagascar.**

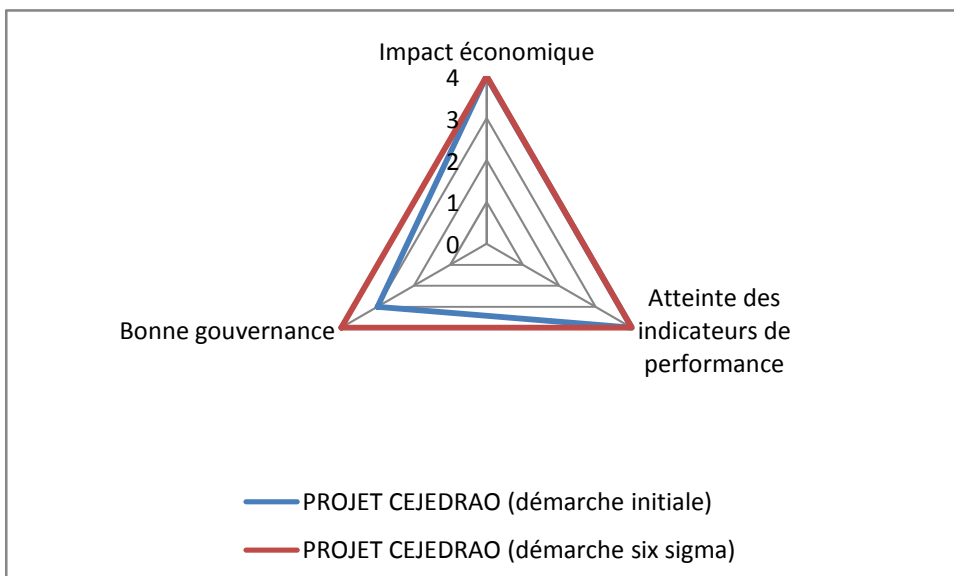


**Figure 3: Pro Poor Growth project using quality approach and methodology Six Sigma**

For the achievement of performance indicators, the two approaches have got the same points 4. Concerning the economic impact, the Six Sigma approach was a gain of 2 points from the initial approach. But on good governance, the initial approach was ahead by 1 point that based on six sigma.

**4.1.3. Case study of a project on Strengthening Employment Skills Youth and Rural Development in West Africa.**

As for CEJEDRAO project, its Advanced diagram is as follows.



**Figure 4: Skills Building Project for Youth Employment and Rural Development in West Africa.**

Both approaches have got the same points, 5 in economic impact and achievement of performance indicators. As for good governance, the Six Sigma approach gained 1 point compared to the initial approach. The first was an overall gain compared to the second.

## 5. DISCUSSION

Kerzner (Kerzner, 1989) states that "the major factor for the successful implementation of project management is the project manager and the team, so human factors, becomes the focal point of the integration responsibility." This suggests that the focus of success in both spheres should rest with the project management team. This would tend to exclude the customer, a special beneficiary of any role in the success of the project. This contradicts the previous statement that the decisions made at the beginning of the project dictate the decision of success. The beneficiary is responsible for its decisions and has an important role in determining success.

The realization of a project requires inclusive participation of a variety of groups, including the beneficiary is the end user, the project team, the funder. Each party has a role in defining and determining the success. They all have specific tasks and responsibilities they must fulfill to achieve and sustain success (Kumar 1989). According to Kumar (Kumar 1989) the beneficiary is the main stakeholder involved in the successful long-term project.

Moreover, the project comes with an obligation to meet an initial beneficiary needs. This initial need to be kept in mind of all those involved in the project. And Pinto and Prescott (Pinto and Prescott 1988) say that the critical success factor of the project varies depending on the life cycle of the project. They also concluded that not enough

of the relationship between organizational context and the success of a project. However, communication and consultation of beneficiaries are the organizational factors that impact the success of a project from Hyväri (Hyväri 2006).

Communication among project team is considered important in larger than in smaller organizations.

The "end users" factor is strongly linked to the experience of the project manager. And this leads to the factor "commitment". The more the manager has a lot of experience; it is committed to end users.

The main measures, if they were established correctly reflect the ability of the underlying process, Rever (Rever 2006) To improve a key measure, then it only makes sense to improve the process underlying Rever (Rever 2006 ). This confirms the concept that says Edwards Deming (Deming 2001 E. W.): "If you can not describe this process you do, you do not control what you do. "A strategy that focuses on key measures that describe the process is an effective way to improve results, Rever (Rever 2006)

But to achieve results qualitatively formulated these critical success factors Six Sigma has been implemented in a good governance project. Three metrics were chosen: good governance, economic impact and achievement of performance indicators. It has been noticed significant results when we adopted the Six Sigma process with its critical factors in successful implementation matter. Weiner (Weiner 2004); Feo and Bar-EI (Feo and Bar-EI. 2002); Antony and Banuelas (Antony and Banuelas 2001) Buss and Ivey (Buss and Ivey 2001) McClusky (McClusky 2000) found the same results in the case of a manufacturing project that did not consider the metric good governance . Our project governance and project

manufacturing recorded profits in economic impact and performance.

Six Sigma is a method that leads any project, including project governance, to improve the quality and zero defects by reducing losses and errors (Desai and Shrivastava 2008).

Voelkel, J.G (Voelkel 2002) adds that Six Sigma mixture proper management of financial and methodological elements to improve the processes and products to outperform other approaches and sustain the impact or outcome. This confirms that the implementation of Six Sigma, a quality approach, to achieve and sustain results.

Six sigma is a strategic initiative to boost profitability, increase market share and sustainably improve customer satisfaction through statistical tools that can lead to gains in quality (Desai and Shrivastava 2008). This confirms the second time that Six Sigma quality produces sustainability after project closure. Mike Harry (Harry and Schroeder 2000) adds that Six Sigma is the new paradigm of innovation management of surviving companies in the 21st century and contains three concepts: statistical measurement, strategic management and quality culture. The quality culture is the key concept to sustain the achievements during implementation. The case studies in Madagascar and shown in Figures 2, 2 and 18 justify the assumptions of the authors on the use of Six Sigma. Indeed, in all cases studied from 2011 to 2013 in Madagascar, the project using Six Sigma knows high performance in achieving material results whatever the type of observed activity, and the duration of activities. Harry Rever (Rever 2006) points out that Six Sigma is the only discipline that deals with process improvement to achieve and sustain good performance. He also said that

project management and Six Sigma is not only similar but complementary.

#### PERFORMANCE IN SIX SIGMA PROJECT MANAGEMENT

- The process of Six Sigma helps sustain the achievements of the project
- The Six Sigma process ensures the quality of the project results
- Management and Six Sigma are complementary and helps sustain project results
- The Six Sigma process is used to impregnate the quality approach in project stakeholders

#### FORCES OF THE PROCESS KNOWN SIX SIGMA

- Participatory approach
- Convergent Approach
- Multidisciplinary Approach
- Quality approach
- Approach taking account of lessons learned

## 6. CONCLUSION

A project is often set up to change the daily life of beneficiaries. But the problem we raised during our research is the negative finding that often, the withdrawal of donors marks the end of the project and its impact on the beneficiaries.

We can say that the project is a success or a failure according to what the beneficiaries feel. It is judged a success if its effects last, even after the termination of the funding.

We said that the quality approach using the Six Sigma method is the only method that could solve this problem project performance. As said Rever (Rever 2006) Six sigma is the only discipline that deals with process improvement to achieve and sustain good performance. He also said that project management and Six Sigma is not only similar but complementary.

Our study revealed the importance in the application of engineering Six Sigma in solving



the development project sustainability problem after the withdrawal of donors, and we gave our viewpoint on the issue.

The use of Six Sigma in the project process that is to say, from its development and throughout its execution, is mainly that everyone touched in any way by the proposed change of mentality and how to act so that the quality approach instilled by the Six Sigma culture is mostly inked in recipient. And that is what makes the project run by the Six Sigma (DMAIC) is always a success.

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