PROJECT PORTFOLIO MANAGEMENT BASED ON RISK ASSESSMENT: A VERACEL PULP MILL CASE STUDY

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ABSTRACT

Traditional methodologies for prioritizing projects are based on financial returns, such as IRR, ROI or present value that define measurable evaluation criteria. However, the majority of industrial project demands in the pulp and paper market aim to ensure operational stability of the plant and production budget, and the above-mentioned indices may not be the best way of representing them. These project demands come from different areas and comply with different strategic goals, such as safety, environmental, legal requirements and operational sustainability, causing subjectiveness during project selection and decision-making process in steering committees, and making project prioritization one of the greatest challenges in portfolio management. In order to reduce this subjectiveness, the article proposes a methodology that integrates all different indices, from diverse project categories, selecting and prioritizing projects on an integrated-assessment basis, based on what each candidate project contributes to the plant, called "the risk of not doing", according to the company's risk tolerance. As a result, the article will show the gains of having an integrated method for Capex evaluation, reducing subjectiveness, ensuring better use of financial resources, allowing for more-accurate long-term planning of the project portfolio, complying with the company's strategic plan.

Keywords: Project Portfolio Management, Portfolio, Methods, Risk, Pulp Mill

INTRODUCTION

Decision-making with maturity is a major challenge for all organizations since their origin. Thus, as discussed by Simon (1980), the perspective of limited rationality defines the impossibility of deciding with full knowledge of all information about the question/problem. As Simon teaches, the decision-maker's inability to master the complexity of the world, to understand all information, to master time, as well as the cognitive side do not enable conscious decisions (SIMON, 1980). Therefore, decision-making more aligned with the organization's strategy is not possible only with personal choices.

And the idea that the decision can be the product of rationality. Rationality understood as the ability to use reason to learn, judge and elaborate thoughts and explanations, enabling man to choose between alternatives, to judge the risks arising from its consequences and to make conscious or deliberate choices in association with the consideration about which it is not the decision-making process to have data, information and knowledge available, but these are usually dispersed, fragmented and stored in the heads of individuals and suffer interference from their mental models (PEREIRA E FONSECA, 1997). Thus, this paper proposes presenting a methodology to assist in decision making, specifically in the selection and prioritization of investments for pulp and paper mills.

This methodology is based on the reduction of operational risks. According to Douglas, the term risk that is currently known arises with the constitution of modern Western societies. From its origin to the present day, it brings with it the assumption of the possibility of predicting certain situations or events through knowledge - or, at least, possibility of knowledge - of the parameters of a probability distribution of future events, which can be computed through mathematical expectations (Douglas, 1987; Freitas et al., 1997; Giddens, 2000). Since its origins, the term risk, which has as its complementary antithesis the term uncertainty, assumed that we would be able to regulate the future, standardize it and submit it to our domain (Giddens, 2000).

According to Oliveira (1977) "even in situations initially characterized as decision-making under certainty, some complex problems can unfold in issues about which doubts

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remain, turning into risk situations". The main justification for the development of this work is to minimize the situation described by Oliveira (1977), and also associate the concepts of Risk Management established in the PMBOK/PMI Guide, 6th Edition, 2017 with the possible problems that may affect the management of organizations.

To answer this question, the objectives proposed for the article are: To identify the demands or operational risks and proposals of a method for prioritization and selection by assembling the analytical structure of these aspects/risks to assist in decision making, thus generating a tool that seeks to minimize the limitation of rationality in the decision-making process, making intangible or not-understood aspects into aspects that are tangible and treatable by the proposed methodology.

METHODS

Selection and risk management criteria

As emphasized by ANTUNOVICH et al. (1999), risk management is fundamental for modern organizations because it reduces the volatility of results. Thus, the proposed method aims to reduce operational risks, maintain high operational availability, increase performance and the continuity of high levels of quality for selecting projects.

Based on the above premises is how Veracel's investment portfolio is managed and developed. According to Batavia (2001), the FEL (Front End Loading) of the IPA (Independent Project Analysis) can be considered a method for assessing, analyzing and developing projects. Based on the innovation methodology created by Clark and Wheelwright (1993)) a funnel is used for prioritizing, selecting and building project portfolios.

The flow begins with the capture process, which consists in identifying investment opportunities and assessing the adherence of these investments to the company's strategic and operational objectives. Investments already identified in previous years as well as new demands presented in the current cycle are evaluated. For identifying and evaluating opportunities the following criteria are used:

- Safety issues
- Legal demands
- Environment aspects
- Operational stability
- Mill housekeeping

The next step is evaluation and categorization, where demands are validated according to the company's strategy and categorized according to investment category. Thus, with the categorization, it is possible to evaluate, prioritize and balance the amounts of resources allocated to each category, in accordance with Veracel's strategic guidelines. The categories currently used by Veracel are:

Safety: This category includes projects the benefits of which directly and positively impact the health and safety aspects of direct and indirect employees, such as the mitigation of accident risks, ergonomic risks, improvement of health and safety aspects, etc.

Environmental: This category includes projects the benefits of which impact environmental indicators or systems,

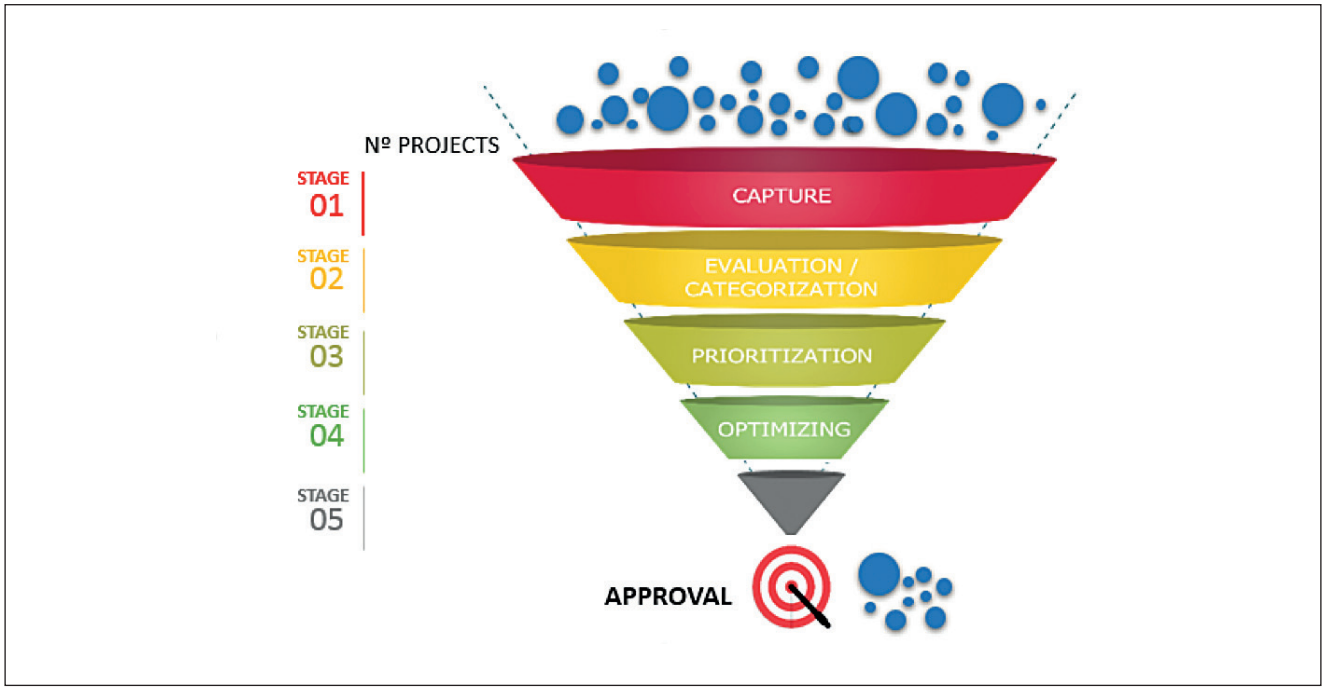

Figure 1. Projects Funnel

such as projects that aim to reduce pollution (air, water, etc.), reduce the consumption of inputs (energy, raw materials) or reutilize materials.

Legal requirements: Projects in this category must deliver benefits undertaken to ensure compliance with changes or updates in legislation, at the insurer's discretion or shareholder demands.

Sustaining: In Sustaining, projects are categorized that aim to prevent operational or strategic risks.

Return on Investment: In this category are projects which benefits are predominantly financial return, measured through the indicators like IRR, NPV and Payback.

The prioritization process using the GUT tool will is detailed in item 2.2 of this paper, based on the selection of projects that present the lowest risk for Veracel's operation

Optimization of the project portfolio consists of a continuous portfolio-evaluation cycle and its performance in face of the client's business environment, its variables, new demands and changes in strategic context. Therefore, portfolio optimization involves including, deferring, deleting, or changing investments to ensure:

- The balance of deadlines, costs and resources of the portfolio;
- Alignment with strategic and operational objectives;
- Focus on benefits and expected return;
- Balancing of portfolio risks.
- Balancing the portfolio's impact on the organization

Risk Map and GUT Method

According to Schuyler (2001), 'risk' is the cumulative effect of the probability of uncertainty that is likely to affect the project positively (opportunity) or negatively (threaten). Instead of seeking answers to the question "What is a good risk analysis?", Galway (2004) sought to answer what project users expect from risk management. The answer was obvious: precision (qualitative analysis - probability) and aid in the decision-making process.

So, to develop the prioritization method based on risk described in item 2.1, we used the GUT matrix since, according to Damasio (1998), the GUT technique is used to prevent the mixing of problems from generating confusion, that is, when problems are various and related to each other. Marshall et al. (2006) corroborates, stating that use of the GUT matrix serves to prioritize problems and analyze risks.

Therefore, the prioritization of projects is carried out using the GUT methodology (Gravity, Urgency and Tendency):

- The Urgency and Tendency criteria are standardized for all investment categories as they allow parameterization over time.
- The Gravity criteria depends on technical aspects specific to each category for its definition.

The method of calculating and applying these criteria is detailed below:

The Urgency and Tendency criteria are detailed in the tables below. Time estimates are according to Mill Shutdowns, which occur every fifteen months.

Gravity	Classification				
	Sustaining	Return on Investment	HSE / Legal Demand		
			Health and Safety	Environment	Legal Demand
Level 1	No production loss	Not applicable	No risk	No risk	No impact
Level 2	Up to 0.5 day of annual PTP	ROI > 30 months	Simple ambulatory care	Impact restricted to equipment	Possible impact
Level 3	Above 0.5 day to 2 days annual PTP	15 < ROI <= 30 months	Lost time accident (LTA)	Impact restricted to Veracel facilities	Legal impact
Level 4	2 days annual PTP or higher	ROI <= 15 months	Lost time injury (LTI)	Impact on neighbors and communities area	Serious legal impact

Figure 2. Gravity Criteria

URGENCY:

Urgency	Description	Time reference
1 - Can wait	Remote chance that the event will occur	t > 60 months
2 - Low urgency	It is more likely that the event does not occur than occu	30 < t <= 60 months
3 - As soon as possible	The event is more likely to occur that does not occur	15 < t <= 30 months
4 - Urgent	It is almost certain that the event will occur	t <= 15 months

Figure 3. Urgency Criteria

TENDENCY:

Tendency	Description	Time reference
1 - Stable	It will not change	t > 60 months
2 - Low	It will get worse in the long run	30 < t <= 60 months
3 - Medium	It will get worse in soon	15 < t <= 30 months
4 - High	Will get worse quickly	t <= 15 months

Figure 4. Tendency Criteria

Thus, it is possible to create the GUT matrix or the Risk, Urgency and Impact matrix (Urgency x Tendency):

According to region of the matrix, we can prioritize projects as:

Critical: Projects that present imminent risk to the company. (Legal demands, major risks and critical demands).

Mandatory: Projects that need to be executed and can become critical projects in the short term (Lower impact legal demands, potential risks and relevant demands).

Medium risk: Projects that can wait another cycle to be executed.

Low risk: Projects that should be monitored to avoid getting worse, but can be postponed indefinitely. (Lower impact risks, low-maturity projects).

RESULTS AND DISCUSSION

Through this methodology it is possible to identify and analyze the best investment opportunities for the mill, because in a visual way the risk analysis and diagnosis of the plant is provided, and the results are shown in the risk matrix. Plotting the Impact (Gravity x Tendency) and Urgency, the value of the investment is the size of the bubble.

Although it is not the only reason, this method is helping the company improve already very-high indicators compared to other plants in the sector, such as mill viability and drying machine availability.

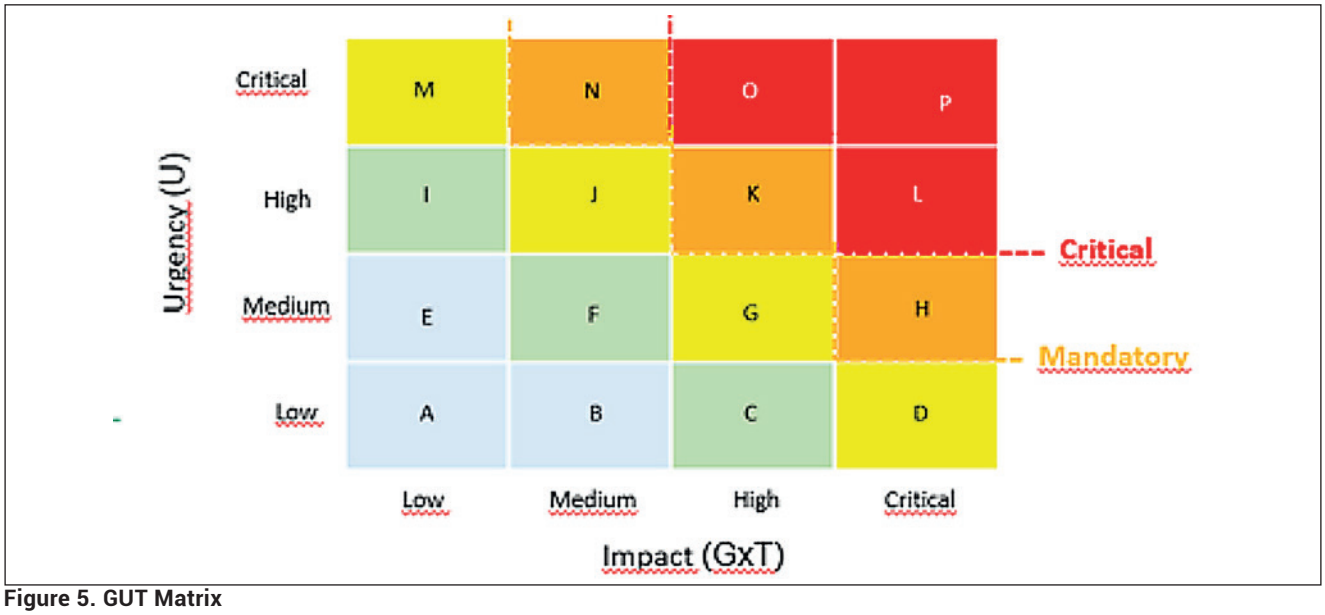

Figure 5. GUT Matrix

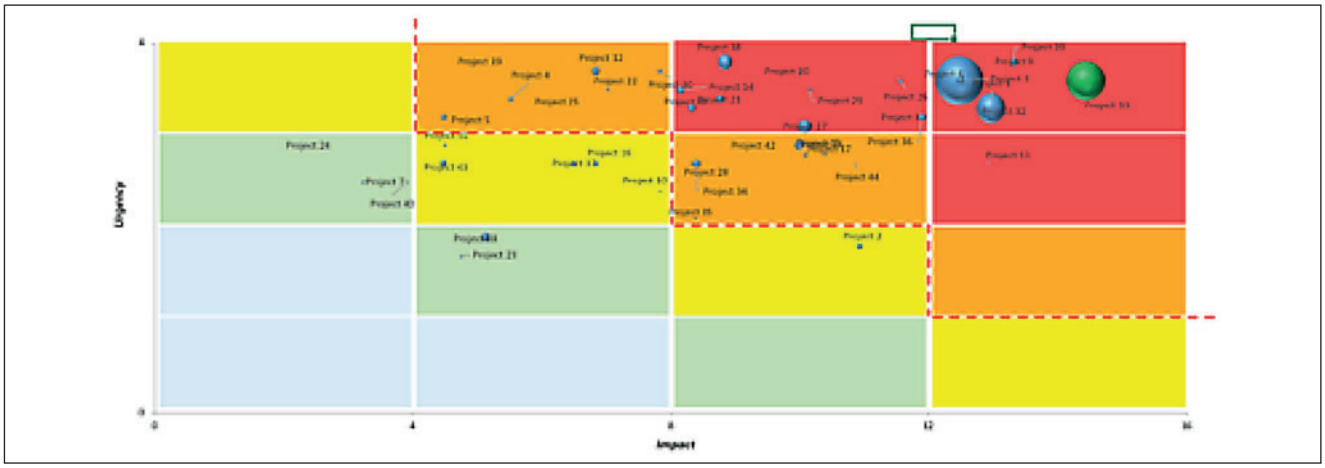

Figure 6. Risk Matriz

In comparing the 2012 and 2016 operational availability average, there was an increase of 0.5% in 2017, 1.6% in 2018 and 0.8% in 2019.

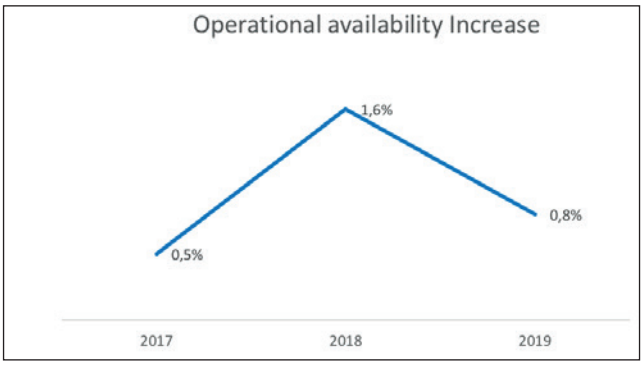

Figure 7. Operational availability increase

And for the 2012-2017 drying-machine availability average, there was an increase of 0.3% in 2017, 0.6% in 2018 and 0.9% in 2019.

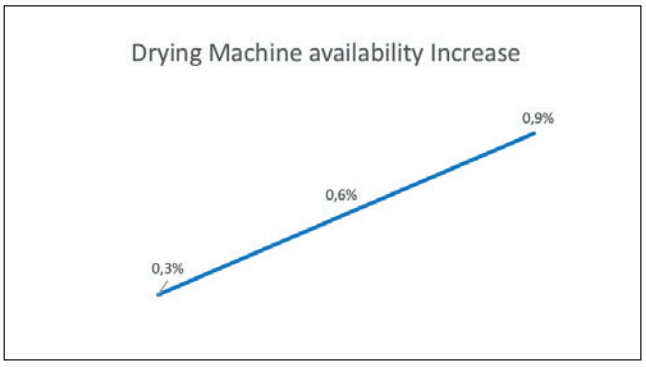

Figure 8. Drying-machine availability increase

CONCLUSIONS

The more capable a company is at managing risks, the more confident it will be with regard to future business decisions. Therefore, as demonstrated, the importance of Risk Management resides in being able to anticipate threat situations in a mill's operation. It is also possible to say that the GUT Method is a strategic planning tool that assists the decision-making process and is compatible with the risk management area. The Gravity, Urgency and Tendency variables are relevant aspects to be considered when evaluating problems related to this area.

Thus, the methodology presents results to guide the company's priorities and assists in decision making. It is very important that the demands not selected or reprioritized have a contingency plan to mitigate the risks of having postponed demands.

Lastly, the application of this method is satisfactory because it guides decision-making by directing information to the desired objective. Removing the subjectivity of decisions, creating parameters that help visualize the portfolio of demands, being important for equalizing demands of different stakeholders. ■

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