Assessment of Impacts of the Forest Incentive Program based on Eucalyptus Monoculture with the 'INOVA-Tec System'

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Abstract

The paper and cellulose industry uses as a source of raw material wood only from harvested forests, either in one's own lands or in other people's cultivated land, through land lease agreement or forest development programs. The present work suggests the use of a method created to evaluate the impacts of technological innovations, the Inova-tec System with modifications, to evaluate the impacts of the 'Forest Incentive Program (Programa de Fomento Florestal) based on a Eucalyptus monoculture'. The method 'INOVA-Tec System' is a system that allows the analysis of: i) the scenario to develop the program, and ii) the performance evaluation of the program, through the analysis of indicators performance. With the data on hands, it is easier for the evaluator to elaborate his/her recommendation list to guarantee a proper culture management and the best impact management, in order to mitigate the potentially problematic characteristics for the environment and for the society.

Keywords: environmental impact, forest incentive, Eucalyptus, silviculture, environmental sustainability.

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1. Introduction

The Forest Sector plants all the wood it needs and, in this way, the reforestation, which did not exist in commercial scale until the 1960s, corresponds today of more than five and a half million of hectares. Therefore, Brazil, which was an importer of paper and other forest derivative materials, from the 1980s on became an exporter, that is to say, the Forest Industry was created, established and became competitive in 20 years.

The National Forest Program (Programa Nacional de Florestas - PNF) was created with the objectives to stimulate the sustainable use of native and exotic forests, to incentive reforestation, to repress illegal deforestation and predatory extraction of forest products and sub-products, to support the development of a forest base industry, and to expand the internal and external markets for forest products and sub-products (Leão, 2000).

The Brazilian environmental policy is ambiguous and confuse. Sustainable development faces resistance from several segments of society and from the State. Economical interests wrongly consider the environment conservation an obstacle to Brazil's development and growth (Vieira & Cader 2007).

Eucalyptus in Brazil

Around 1905, the team of Dr. Edmundo Navarro de Andrade carried out several silvicultural (spacing, fertilizing, sprouting, etc.) and technological tests (durability, density, retractibility, inflection, etc.) with the most important forest species from the most traditional countries of the Forest Sector. These experiments showed that the genus Eucaliptus assembled the best silvicultural and technological characteristics for our conditions. Consequently eucalyptus became Brazil's silvicultural base and it is a worldwide reference (Leão, 2000).

In the 1960s several agencies were created and promptly started working on eucalyptus reforesting programs. With the publication of the New Brazilian Forest Code (Novo Código Florestal Brasileiro), Law N° 4.771, on 15th September 1965 - (D.O.U. ON 16/09/65), a new public forest policy was defined (Guerra, 1995).

In 1966, the Program of Fiscal Incentives for Forestation and Reforestation was established (Programa de Incentivos Fiscais ao Florestamento e Reflorestamento - PIFFR), aiming at a creation of a strong and competitive Forest Sector, to make the country stop importing these products since the climatic and cultural conditions were favorable. The original plan predicted Sector subventions for 30 years, but in 20 years period the Sector became competitive and we stop being importers and became exporters.

The Federal Government created the so-called "priority reforestation regions" aiming at a more balanced development policy. Besides, to avoid agriculture competition, the Brazilian Forest Sector established itself in abandoned farming areas due to misuse (Leão, 2000).

Forest Sector

The Brazilian Forest Sector has an expressive contribution to the GDP (Gross Domestic Product), to the generation of taxes and to employment, besides its social and environmental contribution. In 2006, the Forest Sector was responsible for, approximately, R$ 8 billions, what represents about 6% of the country's exportations. Eucalyptus generates one direct job position for each 2.3 ha of harvested forest (ABRAF, 2007; SBS, 2008).

The demand for raw-material will be intensively provided by harvested forests of short cycles and high productivity. The annual production capacity is on average 45m3/ha/year, one of the most productive of the world, while the native forests under management produce from 20 to 30 m3/ha per 30 years cycles. Therefore harvested forests will play a more and more important role in environmental services. In this context, silviculture stands out (SBS, 2008).

According to the data from the Statistic Annuary of Brazilian Association of Harvested Forest Producers (Anuário Estatístico da Associação Brasileira de Produtores de Floresta Plantada - ABRAF, 2007), the total reforested area in Brazil in 2006 was 5,373,417 ha, from which 3,549,148 ha were eucalyptus.

The paper and cellulose industry uses as a source of raw material wood only from harvested forests, either in one's own lands or in other people's cultivated land, through land lease agreement or forest development programs. This Sector contributes to reforestation of 25 to 30% of the area of small and medium properties in Brazil (SBS, 2008).

This kind of production by forest incentive started in Brazil, effectively, at the end of the 1970s and today is quite disseminated and practiced. In some countries like The United States and Finland this has already been happening for more than 100 years (ABRAF, 2007; SBS, 2008).

Forest Incentive

The Forest Incentive Program (Programa de Fomento Florestal) is a set of projects that incentive forest plantations. These projects can be from public, private or mixed enterprises, which as-

semble a set of incentives aiming at forest plantation in rural properties (Leão, 2000).

The projects' objectives are to work as mechanisms of social inclusion and economical-environmental development, and to claim the occupation of marginal and inactive areas in rural properties. The incentive by the private sector makes available to producers saplings, inputs, technical assistance, transfer of technology and environmental regulation, property georeferencing and crop insurance (Jorge, 2008).

According to ABRAF's data (2007), the area under development expanded from 258,006 hectares to 322,138 hectares between 2005 and 2006, so corresponding to 13.3% of the harvested area of Eucalyptus and Pinus by the large companies of the Forest Sector.

Several institutions seek advantages in forest incentive programs:

• Companies: investment return as a supply of forest products on low prices, no need for capital, institutional and marketing development, improvement of the company image through social and environmental development of the region;

• Producers: utilization of inactive lands, new income source, wood for use in the property, market guaranties, new market options;

• Government: social function fulfillment through taxes, settlement of men in rural areas, employment generation and reduction of forest deficit.

The forest incentive makes small and medium producers aware of the forest's importance, hence it reduces deforestation.

Characteristics of forest incentive programs

Most of the participating forest companies comprise from small producers to large investors.

These programs provide saplings and inputs that may come from donations or advance payment. The donation usually takes place when the company does not have a contractual bond with the producer. On advance payment, there is a contractual relationship between company and producer and the value of saplings and inputs (fertilizers and pesticides) is discounted at the end of the cycle, when the company buys the wood.

The technical assistance is more effective during the first two years, when the plantation is more vulnerable, especially to ant attacks.

The contract varies among companies, in general, the incentive company has the priority on wood acquisition, therefore, if the producer has a better offer for the wood, he/she should inform the value to the company and the company decides whether to cover the offer or not. The amount of wood sold is between 95 and 97%, and the rest belongs to the producer, who will determine its destination and may sell or use it in the property.

The viability of the incentive depends on the distance between the properties and the factory, which is usually 120 km on average and tolerates as maximum limit 300 km. The larger the distance between the property and the factory, the larger will be the minimum reforested area accepted, which varies from 5 to 10 ha, since smaller areas can make the project unfeasible due to exploration and transportation costs that can achieve 70% of the wood cost at the factory.

The Brazilian Forest Sector is one of the few sectors that obey the legislation, thus, to make the project feasible, it is necessary to regulate the possession of rural property and to obey the forest legislation, respecting permanent protection areas (APP – área de proteção permanente) and legal reserves (reserva legal).

Incentive programs directed to small properties are more sustainable because they generate social benefits and mitigate negative environmental impacts, when compared to extensive land properties. Besides, they leave the door open to social and community actions, created by companies' social responsibility programs (Oliveira, 2003; SBS, 2008).

2. Methodology

Inova-tec System

The INOVA-tec System (Jesus-Hitzschky, 2007) is a method created to evaluate direct and indirect impacts of technological innovations in several areas where the impacts can be perceived: social, environmental, economical, institutional development, training, introduction of (new) technology and unexpected events. The system allows evaluating the innovation/program scope and its performance, through significance and magnitude indexes. The inclusive nature of the method allows us to use it, with adjustments, for the assessment of Programs and Projects, inclusively the "Forest Incentive Program based on Eucalyptus Monoculture" evaluated here.

The method presents general indicators organized into criteria in each evaluated area. These parameters were raised and consolidated from enquiries with experts of several areas at in-person interviews. In order to have a more reliable evaluation, it is possible to insert specific indicators, enabling an analysis

for each case for innovations, programs or projects.

The system gives more objectivity to assessments, showing the indicators to be used and the most important components to reduce negative impacts and to optimize the resources used to implement the technology or program, in order to avoid and mitigate environmental damages.

The INOVA-tec System allows an evaluation ex-ante or ex-post the innovation is used. The evaluation ex-ante intends to diagnose its potential impacts, and it is of interest of funding and incentive agencies. While the evaluation ex-post evaluates its performance on the market and effective impacts on the environment and society, and it is interesting to supervisory and regulating agencies, technology buyer business and society in general.

Decription of Inova-tec System

The INOVA-tec System allows the evaluator to point out specific parameters for its innovation what enables an analysis of each case and consequently the use of the innovation in a responsible and reliable way. The information is organized in three tools: *i) worksheet to analyze the innovation scenario (significance index); ii) worksheet to evaluate indicators assessment (magnitude index); and iii) Impact Matrix that is produced from General Impact Index.* The use of INOVA-tec System decreases evaluation subjectivity by working as a guide that points out the indicators that should be analyzed. In order to make its use easier this method is presented in digital format[1] (software Inova-tec System v.1.0.), where the three tools are connected in a way that the evaluator can fill in the data on the worksheets and automatically observe the results on tables, graphics, matrix and as a descriptive report.

Aiming to evaluate the impacts of the "Eucalyptus Forest Incentive Program" this Program was compared to agricultural plantations using data from the specialized literature; afterwards, the data were converted to the format of the Software INOVA-Tec System and inserted.

3. Results and Discussion

Inova-tec System –Case Study of the 'Eucalyptus Forest Incentive Program'

The assessment of program impacts is an effective mitigatory measure to face the growing challenges of environmental degra-

dation and worker safety.

In order to identify the impacts related to the "Eucalyptus Forest Incentive Program", and to identify measures able to mitigate its potential adverse effects, this scientific method was used to create scenarios able to determine the scope of, e.g. environmental, social, and economical effects in this program with the potential to cause negative impacts, even before field tests were performed.

Post analysis recommendations about the way the impacts should be managed are presented here. These recommendations aim to produce a complete and effective evaluation able to guide rural producers on the possibilities of economical profits, but also to warn them about the potential negative impacts on the environment, society, farmers, etc. In the same way, this evaluation may lead companies to revise incentive contracts in order to strengthen even more the programs and the environmental and social certificates of approval claimed by these programs.

Based on data collected from literature revision it was possible to fill the worksheets out to analyze the performance of the following indicators: environmental (Table 1), social (Table 2), economical (Table 3), training (Table 4), and institutional development (Table 5).

Prospective Analysis – Forest Sector Scenario for the Incentive Program: Significance Index

Based on the information taken from literature it was possible to analyze the Forest Sector Scenario for the "Forest Incentive Program based on Eucalyptus Monoculture" and from the obtained result it was possible to generate the Significance Index. This index compounds one of the variables needed to calculate the general result on the Impact Matrix.

The making of the Scenario using the Inova-tec System depends on two factors (Figure 1):

i) Program Scope depends on the scope or influence of the effects of the incentive program on the forest sector, in a direct or indirect manner (environmental, human health, product or process quality, social, economical, political and legal). The sum of each one of these factors compounds the Program Scope.

In the case study of "Forest Incentive Program based on Eucalyptus Monoculture" it was possible to identify a *high (3)*

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1 Available for download at the site of "Embrapa Meio Ambiente:" http://www.cnpma.embrapa.br/forms/inova_tec.php3

influence of the program in a **direct (2)** manner on "environmental, social, economical and legal areas", totalizing 24 points for these four scopes. It was also observed a **high (3)** influence of the program, but in an **indirect (1)** manner on "political" environment (totalizing 3 points for this scope). Since the fulfillment of all contractual requirements tends to strengthen the company's productive area, keep the quality standards demanded by the sector and quality certificates, consequently it also brings benefits to the "Product Quality" showing **high** influence in a **direct** manner on this scope (**3 / 2**, respectively, totalizing 6 points for this scope). It was identified a **null (0)** influence for Human Health area.

These values were used according to the formula cited bellow, and generated **33 points for the Program Scope**. The attributed values are supported by these programs objectives: work as mechanisms of social inclusion and of economical-environmental development.

ii) The other moderating factor considered for the scenario analysis is the "Extension" of the program effects, that can be considered punctual (weight 1), local (weight 2), regional (weight 3), national (weight 4) and international (weight 5). In the case study of the "Forest Incentive Program based on Eucalyptus Monoculture" the effects on **national** level were considered since the spread of its use tend to influence the whole Brazilian forest sector, generating value **4**. The application of the formula bellow to the values previously obtained generates a **Significance Index equals 132**.

$$\Sigma \ (Scope_{a,s} \ X \ Influence_{a,s}) = Program \ Scope$$

$$Program \ Scope \ X \ Extension = Significance \ Index$$

Figure 1: Worksheet for Prospective Analysis – Scenario: Significance Index – case study of the "Forest Incentive Program based on *Eucalyptus* Monoculture".

Impact Evaluation – Performance of the Indicators using the Magnitude Index

In order to analyze the performance of the impact indicators, firstly, it was carried out a phase of identification and consolidation of the indicators needed for impact evaluation of the program, from the indicators presented by Inova-tec System. The indicators considered irrelevant for the "Forest Incentive Program based on Eucalyptus Monoculture" evaluation were excluded from the analysis. However, specific indicators were added to the most pertinent area. These indicators are listed on Tables 1 to 5.

The tables designed to analyze the indicators' performance were filled out directly in the Software Inova-tec System v. 1.0. The Software interface to analyze indicators is showed on Figure 2. The procedure of filling out this worksheet on Software format was carried out for each indicator.

The following formula was used to calculate a final value for each indicator and afterwards to calculate the General Impact Index:

$$\text{Indicator's Weight}_{a,g} \times \text{Weight value range}_{a,g} + \Sigma (\text{Correction Factors}_{a,g}) =$$
$$\text{Total Indicators' Weight from Field A} = \text{Field A Total Weight}$$
$$\Sigma (\text{Total Weight of Fields A, B, C, D, E, F, G}) / \text{Number of Fields Analyzed} =$$
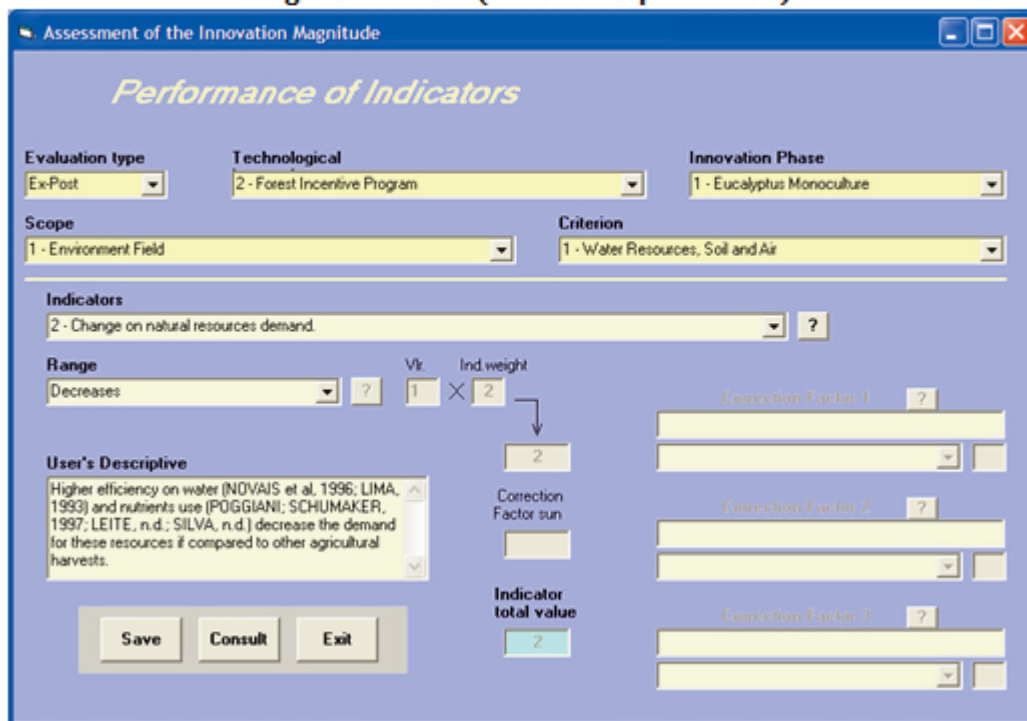$$\text{Magnitude Index (General Impact Index)}$$

Figure 2: Worksheet to analyze the Performance of Indicators: Magnitude Index– case study of the "Forest Incentive Program based on *Eucalyptus* Monoculture" – Environmental Field.

Table 1: Performance of Indicators Worksheet: Magnitude Index – Environmental Field

Weight	Indicator / Moderating factor	Information for Evaluation	Weight value range	Indicator value
Environmental Field				
Water Resources, Soil and Air				
2	Water quality	Lima (1993) showed many advantages on water quality compared to agriculture and livestock. The behavior is very similar to native forests; improves physical, chemical and biological properties of the water.	Improves (1)	2
2	Air pollutants emission	Carbon sequestration is higher in plantations in growth phase. According to Tsukamoto Filho (2003), in eucalyptus monocultures carbon sequestration is about 58.42 t/ha.	Decreases (1)	2
2	Chemical residues on soil	Lower need for pesticides (Poggiani, 1985; Poggiani & Schumaker, 1997; Lima, 1993).	Decreases (1)	2
2	Change on natural resources demand	Higher efficiency on water (Novais, et al., 1996; Lima, 1993) and nutrients use (Poggiani & Schumaker, 1997; Leite, n.d.) decrease the demand for these resources if compared to other agricultural harvests.	Decreases (1)	2
TOTAL CRITERION VALUE:				8
Biological Resources: microorganisms, flora and fauna				
2	Change of ecosystem balance	Increase of flora end fauna species due to a higher diversity in consequence of lower need for pesticides (Poggiani 1976, 1985).	Does not affect (0)	0
2	Occurrence of negative effects on plants and animals	Forests stabilize microclimate and provide a more pleasant environment, attracting fauna (Poggiani 1976, 1985).	No (0)	0
TOTAL CRITERION VALUE:				0
Environmental Conservation				
2	Monitoring practice or environmental management. Comparison between conventional methods.	Its long rotation cycle and simplicity makes it less dependent on intensive human interventions compared to other harvests such as greenery, but it demands more labor than orcharding or livestock, precluding the comparison between forests and different systems.	Maintains (0)	0
TOTAL CRITERION VALUE:				0
Environmental Recovery				
3	Provides stability to a threatened ecosystem.	Maintenance or implantation of permanent protection area and compulsory legal reserve through incentive contracts.	Yes (1)	3
TOTAL CRITERION VALUE:				3
Environmental-specific				
1	Emergence of unwanted species	A more balanced environment avoid the emergence of pests or diseases (Lima, 1993).	No (1)	1
TOTAL CRITERION VALUE:				1

TOTAL FIELD VALUE				12

Table 2: Performance of Indicators Worksheet: Magnitude Index – Social Field.

Social Field				
Weight	Indicator / Moderating factor	Information for Evaluation	Weight value range	Indicator value
Work Relationships				
3	Influence on work conditions (Occupational safety and health - OSH)	Compulsory use of safety equipment, respecting work legislation and environment required by ISO 14000 Certification guarantees better work conditions.	Improves (+1)	3
3	Creation of work positions.	The Forest Sector employs one worker for each 2.3 ha of forest, livestock employs one worker for each 10 ha and orcharding one worker for each 2 ha. However, this is not taken into consideration to decide on the adoption of the system or not, precluding the comparison between forests and different systems.	Does not occur (0)	0
TOTAL CRITERION VALUE				3
Social-Specific				
1	Income generation through programs of Forest Incentive	Important amount of familiar income for producers. Usually eucalyptus pays better than any other harvest (Oliveira, et al., 2000).	Yes (1)	1
1	Possibility of product diversification	The development of other activities and the improvements on the property outcome from generated income (Oliveira, et al., 2000).	Yes (1)	1
1	Pressure on food production	Decrease of food producing area (Koopmans, 2006).	Yes (-1)	-1
TOTAL CRITERION VALUE:				1
TOTAL FIELD VALUE				4

Table 3: Performance of Indicators Worksheet: Magnitude Index – Economical Field.

Economical Field				
Weight	Indicator / Moderating factor	Information for Evaluation.	Weight value range	Indicator value
1	Financial payback	Return at the end of the cycle (5-7 years).	Occurs (1)	Factor Longer than 5 years (0) 1
1	Alternative income source	Possibility of producers access to silvicultural area which is highly profitable and restricted to huge capital.	Yes (1)	1
1	Decrease of food offer	Food price increases.	Yes (-1)	-1
1	Production value	The wood increases its value due to the need for wood of Cellulose and Paper factories.	Increases value (2)	2
1	Production costs	Production and maintenance costs are paid by incentive	Decreases (1)	1

| | | | | companies (Jorge, 2008). | | |

TOTAL CRITERION VALUE:	4
TOTAL FIELD VALUE	4

Table 4: Performance of Indicators Worksheet: Magnitude Index – Training Field

Training Field				
Weight	Indicator / Moderating factor	Information for Evaluation	Weight range values	Indicator value
Training				
1	Technical training to promote the use of safety equipment	Training programs, occupational safety and health on the Forest Incentive Program to fulfill certification requirements (Nova Monte Carmelo, 2006; Jorge, 2008).	Yes (1)	1
1	Technical guidance for plantation and conduction.	Technical assistance for producers (Jorge, 2008).	Yes (1)	1
TOTAL FIELD VALUE				2

Table 5: Performance of Indicators Worksheet: Magnitude Index – Institutional Development Field.

Institutional Development Field				
Weight	Indicator / Moderating factor	Information for Evaluation	Weight value range	Indicator value
Partnership Establishment				
2	Constitution of a formal contract to accomplish the Program.	Incentive Programs only occur through contracts.	Formal contract (2)	4
TOTAL CRITERION VALUE:				4
Quality System Installed				
2	ISO 14000 certificate.	The Forest Sector has this certificate since the 1990s.	Yes (1)	2
2	Standards service	Fulfillment of environmental legislation, work legislation and sustainability in the long run.	Yes (1)	2
TOTAL CRITERION VALUE:				4
Specific Indicators				
1	Company's image	Fulfillment of social and environmental responsibilities	Yes (1)	1
TOTAL CRITERION VALUE:				1
TOTAL FIELD VALUE				9

With the data on hands, the methodology recommends an analysis of the program's performance by field (Figures 3 and 4) in order to identify which fields had worse performance and then, direct the recommendation to increase the effectiveness of impact management. In the present case, the most problematic fields are: Social (4); Training (2) and Economical (3). On the contrary, the Institutional Development scope, which refers to direct impact of the Program on the incentive company, had a better performance (9). This result shows advantages for companies in the "Incentive Program based on Eucalyptus Monoculture". The performance of Environmental scope was considered low and positive (12), because though it is a monoculture, it showed some advantages when compared to agriculture.

To calculate the General Impact Index the previous values were applied in the formula and obtained 6,2 points for the "Forest Incentive Program based on Eucalyptus Monoculture". This value corresponds to quadrant 5 on the Impact Matrix which suggests "management with restrictions" for a better performance of this program (Figures 3 and 5).
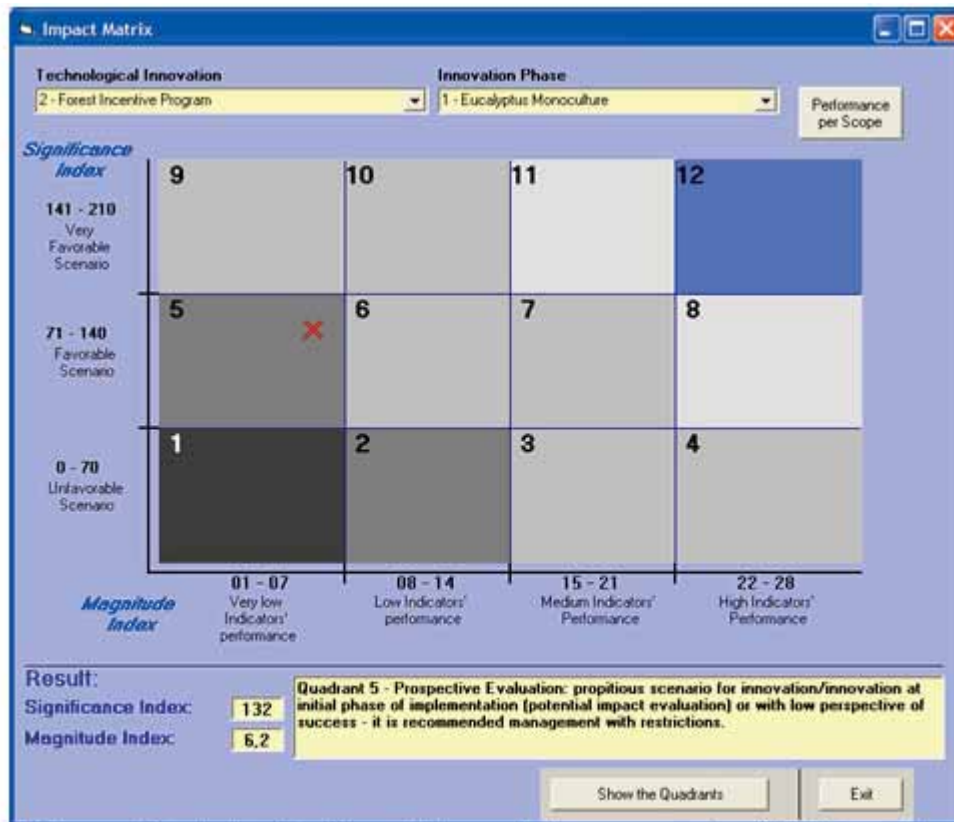

Figure 3: Impact Matrix showing General Impact Index – case study of the "Forest Incentive Program based on Eucalyptus Monoculture".
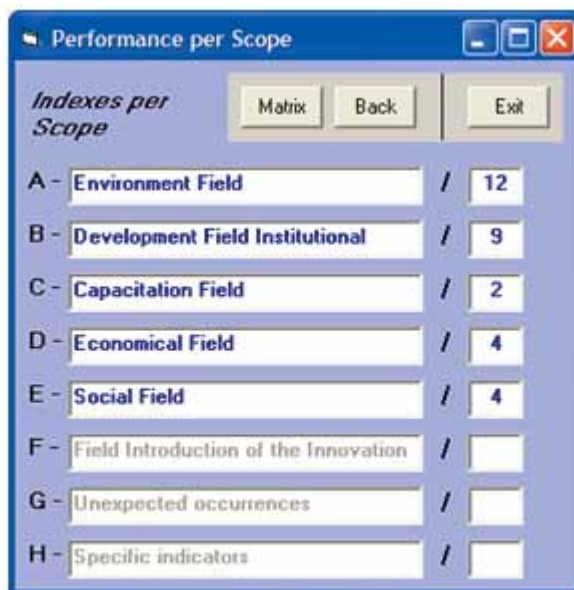
Figure 4: Performance per Scope – case study of the "Forest Incentive Program based on *Eucalyptus* Monoculture".
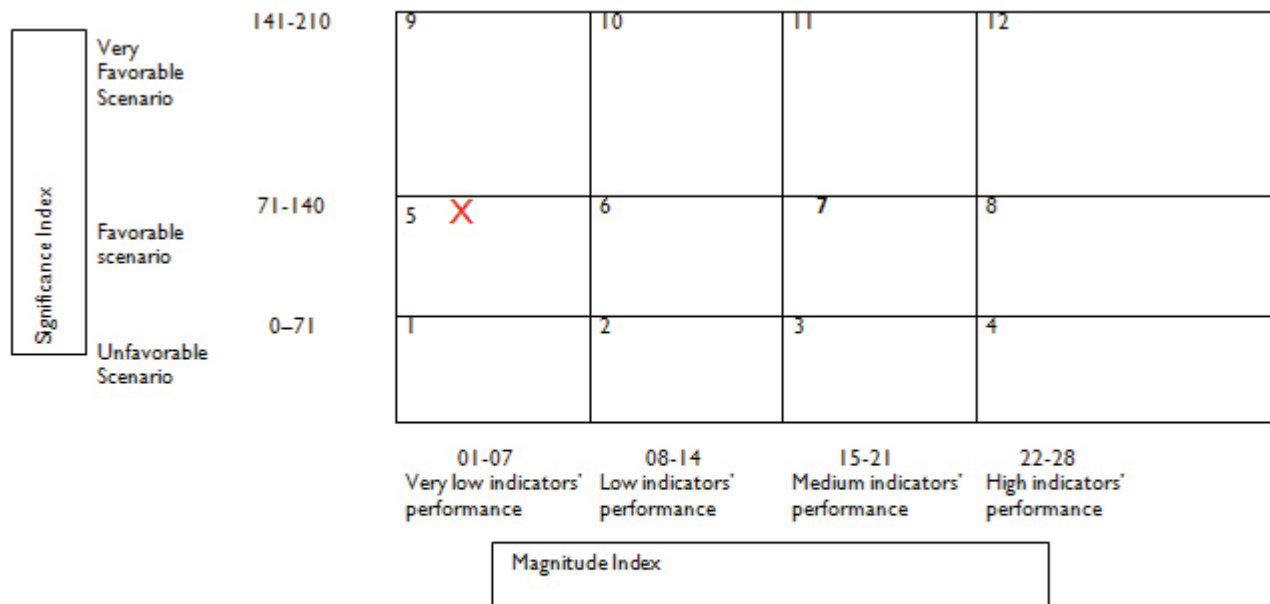

Figure 5: Impact Matrix: final phase of Impact Assessment of Inova-tec System. The Impact Matrix provides us an overview of the impact and defines how it should be managed. "X-axis" represents Magnitude Index's class and "y-axis" represents Significance Index's class.

The performance of the "Forest Incentive Program based on Eucalyptus Monoculture" was classified as follows:

(5) Prospective Evaluation: propitious scenario for innovation/innovation at initial phase of implementation (Potential impact evaluation) or with low perspective of *success – it is recommended management with restrictions.*

Impact Management: Recommendation List

Considering not only the evaluation accuracy but also the accuracy in the preparation of a proposal for impact management,

it is recommended that all process should be carried out in collaboration with specialists to guarantee the accomplishment of the suggestions made at the end of the work, and to ensure the best program performance on all fields where the impact can be perceived.

In order to improve economical impact's performance, the items on incentive contracts must be revised. For example: saplings donation may have a positive economical impact for producers, working as an incentive to improve productive processes.

Company incentives for mixed farming system (agrosilviculture) could bring an income increase, because it could enable multiple use of land, increasing its value. In the same way, it could enable a decrease on pressure for food and therefore, create a positive effect on social impact.

A higher contractual flexibility for species diversification cultivated on the percentage of land designated for producers' use (3-5%), increasing forest varieties, could diversify the producer's income source. They could cultivate for example, eucalyptus species suitable for other uses as woodwork and carpentry, designed to other sectors like furniture, wood sheet, essential oil extraction, or even to the production of fence posts for the use in the property. Harvesting crop varieties for food production could become an important alternative income source, because the economical payback of wood production is long, between 5 and 7 years after plantation. There are successful experiences of mixed farming systems of eucalyptus with rice, beans, soy and peach palm harvests. Another alternative is an agrosilvipasture system, where the eucalyptus is mixed with brachiaria grass and livestock. Bee breeding for honey production could also be an economical alternative for the property.

As a way to raise property income, training in harvesting and transportation could make more work available for producers' family members.

The impact of the "Forest Incentive Program based on Eucalyptus Monoculture" on environment is economical, social and environmentally very favorable.

Forest companies already have studies testifying that mixed harvest with annual crops or animal breeding (agrosilviculture) does not damage eucalyptus development, which is the most profitable harvest (Scanavaca Júnior, 2008). It is suggested that these companies incentive this practice, as well as, evaluate the impacts of agrosilviculture, taken as a whole.

4. Final Considerations

An impact analysis of a program must be carried out aiming at the prediction of potential negative impacts on the environment and society. This kind of analysis enables the use of protective measures on program implementation, aiming to mitigate, or even prevent effects resulting from the identified impacts.

The proposed method inserts variables that enable a less subjective evaluation, allowing quantifying and measuring the impact level based on data and technical information. The characterization of the scope or significance of the impacts also allows determining measures, on the activity implantation, to control or mitigate risks.

The use of a scale of weighing factors provides considerable quality to weighing and clearness to evaluation.

Although impact evaluation involves certain amount of subjectivity, especially concerning agricultural programs, the development of a methodology devoted to impact assessment, with an objective organization of weighing and with a diagnosis of potential impacts on economy, society and environment, can act as a more specific tool on the legitimacy of the evaluation process of forest enterprises.

In the case of the "Forest Incentive Program based on Eucalyptus Monoculture" the Inova-tec System let to conclude that despite the favorable scenario for incentive programs, they will only be efficient if they take into consideration the three scopes of sustainability: environmental, social and economical.

The Forest Sector nearly as a whole has ISO 14000 Certification, which requires the achievement of social inclusion, respect for legislation and sustainability in the long term. In this way, it is recommended a better divulgation of these partnerships' results and a larger debate of the parts involved in order to testify whether the criteria are followed or not.

Periodically, every ten months, a regulatory institution from ISO Certification checks if the company is following the agreement. It is suggested that; apart from confidential data of the company's exclusive use, the general data should be divulgated to legitimate scientific evidences.

In the same way, the update of the forest and agricultural production's census, which dates from 1986, could bring more quality and accuracy to the results of the sector's impacts.

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