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Resources Management and Effective Co-operation of Organisations in Amazonia: A Discussion on the Social Component of Recycling in the City of Belém

ARIMAR LEAL VIEIRA¹, MARCOS XIMENES PONTE², ANTONIO CARLOS REIS DE FREITAS³ AND REBEKKA KUBISCH⁴.

*1Federal University of Pará, Nucleus for Advanced Amazonian Studies (NAEA) -, Brazil**

2Federal University of Pará, Nucleus for Advanced Amazonian Studies (NAEA) -, Brazil,

3Brazilian Agricultural Research Corporation (EMBRAPA), Embrapa Mid-North Agriculture, Brazil

4 Johann-Wolfgang von Goethe-University Frankfurt -Germany

Abstract

This paper aims to understand the organisation process of recycling in Amazonia through the discussion of the social components of the sorting collection system mainly conducted by former farming families in the city of Belém. In the middle of the 70's, the Brazilian Amazon region faced several problems related to the implementation of large industrial and agricultural projects. Consequently, this situation caused mismanagement of natural resources, rural conflicts and loss of land used by farming families in some rural areas of the state of Pará. This unfavorable condition encouraged a process of migration of these families to Belém. Furthermore, due to the lack of opportunities in the formal labour market in the city, these families were forced to collect recycling materials, as scavengers, in order to earn their living. A broad understanding of this issue involves the relationships among different groups as well as the social-economical situation of these actors. To support this research, an interdisciplinary study was conducted mainly based on the fields of Industrial Ecology (IE), Theory of Groups, Cost-Benefit Analysis (CBA) and anchored by a Life Cycle Assessment (LCA). Life Cycle Assessment (LCA) is known as a promising tool for environmental management. In order to contribute to the discussion of LCA, as well as its application field, this study also intends to include the social component in its scope, through the analysis of the agents that act in the recycling of aluminum cans. Finally, the results show the current benefits of the sorting-collection system, indicating the gains through the organized groups which, in final statement, takes place by means of the effective co-operation among the actors.

Keywords: Farming families, life cycle assessment, recycling, social component, theory of groups

1. Characterisation of scavengers in Amazonia: the case of Belém

According to a research conducted by Vieira & Freitas (2002), the economic crisis of the city of Belém is essentially related to the public policy of the government to

* Contact Address: Arimar Leal Vieira, Federal University of Pará, NAEA -, Av. Augusto Correa s/n, 66055-000 Belém, Brazil, e-mail: arimarlv@yahoo.com.br

occupy the Amazon region. In the middle of the 70's, in consequence of it, the Brazilian Amazon region faced several problems linked to the implementation of large industrial and agricultural projects. This situation provoked a complex situation of mismanagement of natural resources, rural conflicts and loss of land used by farming families in some rural areas of the state of Pará.

A research conducted by Vieira (2004) with 261 scavengers who act in the sorting-collection system of recycling material in the city of Belém identified that 84,2% of the interviewees who live in the outskirts of Belém came from other municipalities and small villages of the state of Pará. Hence, this work developed a field research that was accomplished, contemplating essential subjects for its analysis. The Table 1 below presents the main socioeconomic features for the scavengers that act in Belém. The research created a profile for those workers based upon information obtained in the field study: Street, scavengers carrying manual wagons, open dumping area, Shopping/(Recicladores do Aurá) and Aurá Landfill.

Table 1: Main socioeconomic profile of the scavengers in the city of Belém

Scavengers profile	N° of Interviewees	Sex		Daily Working Hours		Monthly income(R\$ 1,00) and Percentage	
		M	F	3- 6 hours	7-12 hours	Less than one minimum wage	More than four minimum wages
Streets	101	74	27	30	71	38 (14,56)	63 (24,13)
Shopping/ Recicladores do Aurá	14	1	13	9	5	8 (3,07)	6 (2,30)
Aura Landfill	54	18	36	13	41	24 (9,20)	30 (11,49)
open dumping areas	41	15	26	6	35	27 (10,34)	14 (5,36)
Scavenger carrying manual Wagons	51	51	0	9	42	0 (0,00)	51 (19,53)
Total	261	159	102	67	194	97 (37,17)	164 (62,81)

Source: Research of Field.

*O value of the minimum wage of R\$ 150,00 in the year base.

Analysing Table 1, one can see that the 101 street scavenger studied are mainly from masculine sex, have a working day between 7 and 12 hours with a monthly income from one to four minimum wages. In analogy with relationship to the Shopping's scavengers or *Recicladores of Aurá* (Scavengers who work at Aurá landfill), a group that already presents a certain level of organisation it was observed that this type of scavenger has the shortest period of working hours.

On the other hand, the majority of the scavengers who collect recycling materials in the open dumping area are women and the daily income is lower than the scavengers who act on the streets. As you can see the scavenger who acts at the Shopping Centres in Belém has better opportunities compared to the ones that do not have any institution support. Another increase of effectiveness is the use of wagons to collect the materials, which are only used by male scavengers. This type of scavenger has the highest monthly income and the daily working hours are approximately 12 hours.

1.2. Effects of the Co-operative Organisations of the Recycling in Belém

Considering the aspects proposed in this research, one can assume the importance and the influence of the effective co-operation of organisations for the different groups of scavengers, as well as its context in the local market. However, in the initial phase of the study, it was verified that basically no group of scavengers were linked to a co-operative system.

In 2002, the Co-operative of the Scavengers of Aurá (COOTPA) was created. The main aspects supported by this Co-operative are the generation of income and the improvement of the quality of work for the scavenger that acts in the Aurá landfill. Therefore, for the co-operated workers it is extremely important to guarantee the collective benefit starting from the logic of working in group.

The main purpose of the scavengers who acts in the recycling market in Belém is the guarantee of earning for their families. They are workers who live in extremely poor conditions and find opportunities of surviving through collecting recyclable materials on the streets, open dumping areas as well as at the Aurá landfill in the city of Belém.

In a broad analysis on the scavengers' co-operative organisation, it can be stated that it is still in a very early stage, with fragile internal connection. Occasionally, the scavengers are engaged in collective actions that have been moved for effects of external aggregation, such as the actions of the City hall in the concession of some benefits for example: free tickets for buses, scholarships for the children of the scavengers or even production of personal documents such as certificate of birth and identity cards.

2. Recycling Perspective based on the Field of Industrial Ecology

Recycling is considered essential to obtain highly productive activity on the basis of environmental, economical and social fields. The evaluation of the benefits of recycling has been most consequential and has had its broader perspective on the field of *Industrial Ecology*. With this approach, significant academic contributions have been emerged in the last twenty years using diverse approaches and interest. However, the main purpose to optimize the use of natural resources and energy throughout an integrative process, analysing flow streams and cycle of materials is required in order to maximise the reduction of losses for the environment.

First, it must be stated that there is a demand for recycling activity within an integrated environment. However, recycling will not occur if some fundamental links of the chain (*recycling company, processing company, trash dealers and scavengers*), are not maintained. There can be no collecting without the scavenger. But, there are no scavengers without a recycling industry. And there can not be a recycling industry without the economic and technological opportunities that make it feasible.

It is worth remembering that Jackson and Clift, (1998), in an article titled *Where Are the Profits in the Industrial Ecology*, argue that it is difficult to deny that the profit motive is the fundamental motivator driving industrial ecology and that the viability of that metaphor is crucially dependent on agency conditions, therefore, it becomes necessary to identify the actors and what motivates their actions, or what incentives motivate them. If profit is the greatest stimulus, then the economic agents play the main role in this game.

In reality, there are profit motives for both for and against recycling. The most frequently stated reasons for recycling are: reducing the cost of waste disposal, avoiding environmental penalties, reducing insurance expenses, and improving one's public image. The impediments for recycling are in the fragmented political structure, the imperfect regulations, a deficient economic theory and the unbalanced costs/benefits of the industry.

The recycling of aluminum and of other products in the RMB, especially of the first one, reaches an extremely high level. This does not lessen the need for governmental politics or the education of the population that, sensitive to the environmental cause, mobilizes itself to be involved in the activity of recycling. The facts indicate that this activity has been stimulated by small business, which, in its

simplicity, makes feasible the occupation that, although precarious, performs an important social task. It is an activity motivated by the profit motive, but with the support of a single agency: structured outside normal corporate politics, in which the public power comes afterwards to bring together the operational rules of the agents and the official rule

The use of industrial ecology as a political stand in the industry provides the widening of perspectives for the agency decision makers of the corporation encourages the innovations and facilitates reconfiguration of products from the basic design, through production, distribution and final post-use disposition.

In reality there is a potential for optimizing the value extracted from a certain resource whose obstacles can be removed by the analytic standard of the industrial ecology assisted by an agency theory, as recommended by Jackson and Clift (1998). In this way, one is able to overcome obstacles such as: organizational inertia, lack of information, problems of agency and control, uncovering the synergetic potential among agents in the process of production.

3. The purpose of LCA in the study of the social component

Life Cycle Assessment (LCA)¹ is an instrument that can be used to evaluate the environmental burdens of a product, process or activity. With a basis of the study of the scavengers and of the LCA, this research suggests an integration of this tool with different theoretical approaches for the composition of an analysis of the environmental management with a social focus. The importance of the insertion of the social component in this analysis finds itself supported in studies developed by Curran (1996), Craighill and Powell (1996) and especially the one carried out by O'Brien, Clift and Doig (1996), upon discussing an approach of the LCA focusing also on the social implications of this methodology.

Curran (1996) concerns herself with the environmental question of the LCA, however, without disregarding what she suggests to be life cycle thinking in the field of public politics. The author proposes a practical and applied view on LCA showing the importance of the different actors that are responsible for the development of this methodology. On the other hand, Craighill and Powell (1996), in a study about systems

¹ Other synonymous terms for LCA: *Ecobalance*, *Life Cycle Analysis*, *Product-Life Cycle Assessment*, *Product Line Analysis* (*Produktlinienanalyse*), *Integrated Chain Management and Resource and Environmental Profile Analysis* (*REPA*). CURRAN (1996) and VIEIRA (2004).

of recycling in the United Kingdom, concern themselves in showing the approach of LCA by means of the evaluation of the environmental, social, and economic effects at a local level.

O'Brien, Clift and Doig (1996), upon doing a study involving the comparison of coal and residues as fuels, propose an evaluation of LCA introducing the concerns with the political and social processes, supplying a methodological outline that combines the environmental and social aspects of this particular tool.

To elucidate the proposal of LCA with the study of the social component, is stressed the importance of the facts of foreground (*vanguard*) and of background (*rearguard*) discussed in O'Brien, Clift and Doig (1996) that compose the operating model of the analysis utilized in the research. The foreground facts were collected on the basis of the study including the specific elements focused on the goal definition and scope. The background facts outline a capable *rearguard* to indicate the avoided environmental costs. In the conception of the study of LCA remain the stages of the inventory; the goal definition and scoping; the evaluation of impact and the interpretation of the results as illustrates Figure 1. However, they have the concern of broaden the analyses of the LCA by suggesting a discussion of the social agents involved in the activity of recycling of the aluminum tins.

In the phase of impact analysis and interpretation, the facts of the system *background* and *foreground*, are used to form an evaluation that goes beyond consideration on balance of energy and material flows. Those two systems contribute toward strategic purposes to solve environmental problems by means of the creation of an application that enhances the processes studied.

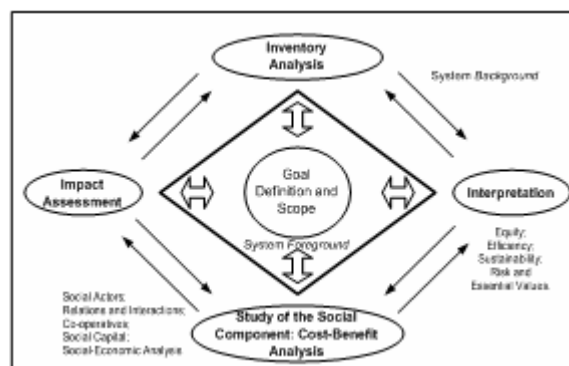


Figure 1: Operating model of the LCA with the study of the social component

SOURCE: VIEIRA (2004)

The purpose of this research includes a contextualization of the scavengers in the process of recycling, which evaluated the costs and resulting benefits of the collection of materials performed by this agent. It was observed that in the interpretation of the study the main indicator of costs and benefits are *equity, efficiency, sustainability, risks and essential values* (Figure 1).

Results and Discussion

The results show that the recycling system in Belém takes place through organisation, and it happens in different patterns of interests. The economical evaluation accomplished by the means of the Cost-Benefit Analysis obtained by each agent, is a fundamental instrument to explain the social component mechanism of the recycling activity for aluminum cans.

In a general analysis of the benefit for each agent, on the economic perspective of the scavengers, they are still living in a condition of large exploration including certain discrimination. The scavengers annual income is approx. R\$ 2.007,12. This is still far below part to guarantee a better quality of life for these workers.

To Belém City hall the benefits and the costs are more complex to evaluate. The recycling benefit involves the gain of the scavengers, the cost avoided with the final disposal in the Aurá landfill (approx. R\$ 268.582) and the costs of starting the Sorting-Collecting System and equipments (approx. R\$ 1.500.000) generating a negative benefit of R\$ 1.229.410. In this last case, a negative benefit appears due to the high cost with the implementation of the Sorting-Collecting System in the city.

One of the main purposes of this study was an integration of a social aspect in the methodology of LCA. For that reason, it was suggested a joint of different theoretical fields in order to evaluate environmental studies and social perspective. As a result of the figures for LCA and the cost-benefit analysis of the recycling activity in Belém we have noticed that with this integration the main indicators of costs and benefits are equity, efficiency, sustainability, risk and essential values. Therefore, although it presents high costs, the Co-operative of Scavengers of the Aurá Landfill is constituted as an important institutional innovation, because the collective action can minimize the level of exploration for the agent who works as a scavenger in the landfill area.

Final considerations

This work showed that the combination of an interdisciplinary study, gathering the methodology of LCA, applied in the social field of the recycling activity represents a valuable tool to achieve a complete and homogeneous analysis for the process of the resources management as well as the economical and social benefits acquired by the different actors that work alone or in groups in the recycling link.

Moreover, this study demonstrated that the recycling activity can be an alternative for a mitigation of environmental problems as well as an economic point of view. Finally, the perspective of the social sustainability can also obtain improvements with the progress of the effective co-operation organisations in Amazonian cities through the groups that support the scavengers who are workers in the line of poverty and disorganisation.

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