



Internalize Socio-Environmental Externalities to Contribute to Sustainable Local Development in Tshopo (DRC)

—Political Perspective on the Artisanal Timber Sector

Jean-Denis Likwandjandja

Higher Institute of Agronomic Studies, Bengamisa, Democratic Republic of the Congo

Email: jeandenislikwandjandja@gmail.com

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Abstract

The deficiency of public policy relating to the artisanal timber sector in Tshopo in the Democratic Republic of Congo is a major factor fueling socio-environmental externalities. The results observed in this Province revealed that these externalities are more negative than positive and therefore contribute to local underdevelopment in the exploitation areas. For this consideration, this article aims to show that the internalization of these externalities is one of the effective policies both for the socio-economic development of local communities and the Province and for sustainable forest management.

Subject Areas

Sociology

Keywords

Internalization, Socio-Environmental Externalities, Sustainable Local Development, Public Policy, Artisanal Timber Lumber

1. Introduction

It is clear that the artisanal timber sector alone will not be sufficient to trigger sustainable local development in Tshopo [1]. However, it is one of the important, even preponderant, factors that can significantly contribute to the effectiveness of this development. Rural areas in Tshopo are almost entirely forested, and timber resources inevitably constitute a vital resource for their transformation. This sector has a considerable impact on the livelihoods of many citizens [2].

The deficiency of public policy regarding artisanal timber exploitation is a factor that is certainly at the root of socio-environmental externalities in Tshopo, thus negatively impacting local development. To address this significant challenge, in this era of decentralization, where the environment is the central focus of development issues, internalizing these externalities remains a pragmatic solution for the benefit of both local communities and the entire province. In other words, the issue of local development is now a challenge for relevant public policies at all levels and the factor that must govern one of the responses to the problem of socio-environmental externalities.

This article addresses this question by shedding light on the problem of externalities, demonstrating the root causes of these socio-environmental externalities in the Tshopo region of the Democratic Republic of Congo (DRC), and proposing the policies needed to internalize them for the benefit of sustainable local development.

2. Methods

This research covers the period from 2006 to 2018. We have had the opportunity to frequently observe the phenomenon of artisanal timber harvesting, particularly in our role as Research Consultants with Tropenbos International in the Democratic Republic of Congo.¹

Using interviews, we collected data from various stakeholders, including artisanal loggers, policymakers (including agents and officials from the forestry administration), environmental civil society, and researchers. These interviews addressed both the mechanisms for developing public policy on artisanal timber harvesting and the relationships within this sector.

Three focus groups, structured around the themes of “Modes of relations between actors in the artisanal timber sector” (1), “Artisanal timber harvesting and environmental constraints” (2), and “Artisanal timber harvesting and local development” (3), were followed by documentary research. This research allowed us to access and utilize various administrative, legal, and political documents concerning public policy governing timber resources in the Democratic Republic of Congo in general, and in Tshopo Province in particular.

For data processing and analysis, we used Excel software with both static and content analysis. This enabled the processing of numerical data, resulting in data tables and statistical distributions. The use of statistical analysis allowed us to group the data from the semi-structured interviews to obtain the sample sizes, before calculating percentages based on a formula.

The construction of the demographic sample was made possible by the clear definition of the study² population and the units of analysis, facilitated by the

¹Tropenbos International RD Congo is a Dutch forestry research organization whose national office in the Democratic Republic of Congo has been located in Kisangani since 2010, headed by Charlotte Benneker, the director at the time.

²Depending on the types of categories of units of analysis, we had as many subpopulations considered.

non-probability sampling method using network sampling, quota sampling, and purposive sampling.

In total, 166 subjects were selected from all stakeholders, of whom only 120 were interviewed using a specific guide; the remaining subjects were considered key stakeholders.

2.1. From the Problem of Externalities to the Understanding of Socio-Environmental Externalities

Essentially referring to a situation where an economic agent indirectly influences the situation of other agents, without them having been consulted and receiving any compensation, externality has a fairly long history and always lends itself to several perspectives.

From any point of view, it is obvious that the first mention of the concept of externality seems to date back to A. Marshall [3]. In Marshallian theory, this concept serves to reconcile two principles. The first establishes that firms must necessarily encounter an internal economies phenomenon that limits their size. This principle is essential for market structures to verify the atomicity hypothesis and therefore the rules of competition. The second principle indicates that at the industry level, the efficiency of the production system is perpetually improving. This corresponds to the empirical observations made by Marshall.

The impossibility of explaining the second principle from the first leads Marshall to highlight explanatory elements located outside of firms. This involves prioritizing inter-firm relationships that are not taken into account by the market. Following Marshall, A.C. Pigou in the 1920s became interested in the concept of externality. Specifically, Pigou examined the issue of integrating externalities within a framework of pure and perfect competition.

What is externality, specifically? An economic situation presents an external effect or externality when a consumption or production activity has an indirect effect on a utility function, a profit function, a consumption set, or a production set. By indirect, we mean, on the one hand, that the effect is created by an economic agent other than the one affected, and on the other hand, that the effect does not act through the price system. In a very general way, the term externality refers to benefits or costs which, although they are added to the benefits and costs specific to a given activity, are not reflected in market prices and affect third-party economic agents, without the latter being legally obliged to pay or entitled to receive compensation. There are many examples of externalities.

The most famous example in the economic literature is that of J. Meade [4], who considers the neighborhood of a beekeeper and an orchard. The beekeeper's bees contribute to the productivity of the orchard by fertilizing the flowers of the trees; in return, the trees provide the bees with the pollen that goes into the production of the beekeeper's honey. In each of these cases, the production function of one individual is shifted upwards due to the activities of the other individual. These are therefore positive and crossed production externalities. Not all exter-

nalities are so positive: pollution is a typical example of a negative production (and also consumption) externality.

More systematically, it is possible to create a typology of externalities. A first dividing line concerns the effects of externalities. A distinction is made between positive and negative externalities. Positive externalities refer to situations where an actor is favored by the action of a third party without having to pay. Negative externalities refer to situations where an actor is disadvantaged by the action of a third party without receiving compensation. A second dividing line concerns the nature of the activities that generate the externalities and are affected by them.

Thus, several types of externalities can be discerned. Externalities can emanate from consumption activities and affect consumers. These are referred to as externalities between consumers. Consumption externalities refer to the improvement or deterioration of well-being felt by an agent B, not compensated, following consumption by agent A. This is the case of a smoker who degrades the satisfaction of a non-smoker by consuming tobacco. It is consumption that is at the origin of the externality. They can emanate from production activities and affect producers. We then speak of externalities between producers. Production externalities refer to the improvement or deterioration of well-being felt by an agent B, not compensated, following production by agent A. It is therefore production that is at the origin of the externality.

Externalities can also arise from production activities and affect consumers. These are referred to as producer-consumer externalities. Naturally, these two fault lines can be combined: externalities of each type can be either positive or negative.

To examine the “varied environmental aftereffects” observed in the Nord-Pas de Calais mining basin over nearly two centuries, following mining and related smelting, chemical, and metallurgical activities, Gwénaél Letombe and Bertrand Zuideau [5] preferred the term “environmental externalities.” Deploing the coal mining activity in this basin with its lasting modification of the subsoil, they pointed out that mining has led, over 270 years, to the extraction of 2.3 billion tons of coal from the entire Nord-Pas de Calais mining basin. Following Alain Bonnafous [6], defining the external effects (or externalities) of transport as: “(...) negative (or positive) consequences of a transport activity, without the person who causes it (or benefits from it) having to bear (or pay) monetary compensation,” Jacques Stambouli [7] considered that the environmental externalities of transport are the effects of transport activity on the natural environment, for which economic agents of transport do not pay or receive monetary compensation.

For this article, the socio-environmental externalities of artisanal timber logging are the effects it causes on local development and the environment and for which artisanal loggers do not pay or receive compensation. This is indeed the observed failure in the practice of artisanal logging, which must be rationally regulated in the provinces, despite the deficient national public policy relating to it.

2.2. Rooting of Socio-Environmental Externalities in the Artisanal Timber Sector in Tshopo

The artisanal exploitation of timber in the Tshopo Province generates several socio-environmental externalities, both positive and negative. However, for the present research, it is negative externalities that significantly fuel local underdevelopment as noted in the study region. In accordance with the qualitative data collected in the field, the results are presented in **Table 1**.

Table 1. Different externalities of artisanal timber exploitation (EAB) in the Tshopo region.

Component		Type of externality	Impacts, services and resource consumption	Features of in-game crafted wood	Effect
Transversal		Regulatory	Weak political regulation	Inadequate public policy	
		Informations	References produced for sustainable forestry	Documentation available	
		Job creation	At the scale of exploitation, transport, and marketing	Local labor	
		Taxes and miscellaneous payments	Tax and administrative revenue		
Environnemental externalities	Area	Resource	Wood footprint	Considerable yields	
		Faste	Environmental pollution		
	Water	Resource	Water pollution	Less directional felling	
	Biodiversity	Negative externalities	Low mortality and flight of animals, decline in biodiversity	Intense noises and light	
	Negative impacts of inputs	Fuel	Toxic aspiration of gasoline		
		Board	Diseases	Heavy weights of logs and bords	
		Board	Encroachment of plants	Unregulated discharge	
	Transportation				
Social externalities	Specifications	Multiple conflicts	Non-compliance with clauses	Oral and informal nature of agreements	
		Breach of trust	Détournement des clauses	Often intentional and premeditated	
		Pregnancies	Immoralité sexuelle	Social integration	
		Professional expertise	Semi-qualification des paysans	Social integration	
	Storage	Social assistance	Off-market profits	Lesser	
		Products	Unpaid service, theft	No formal contracts for security and storage, abandoned products	
		Boards	Funeral assistance	In case of death	
	Management	Waste	Public unsanitary conditions	In the forest and in the markets	

 Positif effect of EAB
  Positive effect, but not systematic
  EAB can have negative effects
  Negative effect of EAB
  Positives externalities
  Negatives externalities
  Resource consumption.

Table [8] above summarizes the externalities as perceived by the various stakeholders in the artisanal wood sector in Tshopo. It appears that negative externalities outnumber positive ones. Indeed, the artisanal wood sector is characterized by more negative externalities due to the ineffectiveness of the public policies governing it. These negative externalities are numerous and contribute to the local underdevelopment of the region studied. Consequently, appropriate regulation is essential.

However, in the case of a positive externality, the State can impose obligations or formulate recommendations to promote the production of this externality, subsidize the production of the good, or grant property rights to the artisans who generate it through their practices and knowledge, thus contributing to sustainable local development. It should be noted, however, that the distinction between negative and positive externalities is not always straightforward in a context where legal and illegal activities sometimes overlap.

Jean-Louis Caccomo [9] argues that even if negative and positive externalities exist, there is no reason why one category would be more significant than another without introducing a bias into the analysis from the outset. If one asserts that negative externalities (such as pollution) are the most significant, this concept becomes the instrument for developing a theory of endogenous growth, which essentially becomes a theory of environmental economics. From this theory, it inevitably follows that the State must regulate the competitive process, characterized by negative externalities that agents are unable to integrate into their behavior.

This is precisely the ambiguity of this concept, which allows for the introduction of a bias into the analysis. This bias disappears as soon as one recognizes that competitive processes generate as many positive externalities as negative ones. And since these externalities, by definition, escape the price system, it is very difficult to measure them and to conclude that the negative effects are greater or more significant than the positive ones.

However, since this study demonstrates that negative externalities outweigh positive ones, it emerges that the relationship between the political system governing the sector and the extraction areas, as an environment, is not self-regulating. This is illustrated by **Figure 1**, based on the Eastonian model.

Figure 1 reveals that the public policy governing the artisanal timber sector, as a system, is unable to respond effectively to the demands of the logging areas, namely the scale of operations and the socio-economic needs of the communities in the Province. The dotted arrow indicates that outputs are generally mismatched with inputs and generate more negative socio-environmental externalities.

Indeed, public policies are “a bit like mille-feuille pastries where instruments, content, ideas, actors, resources, and organizations are layered and always subject to rearrangement” [10]. It is a complex system akin to a reassembly of pre-existing elements: mechanisms, measures, budgets, personnel, organizations, and content that are cobbled together, reinterpreted, relabeled, and reassembled as pieces that add to, rather than replace, existing policies.

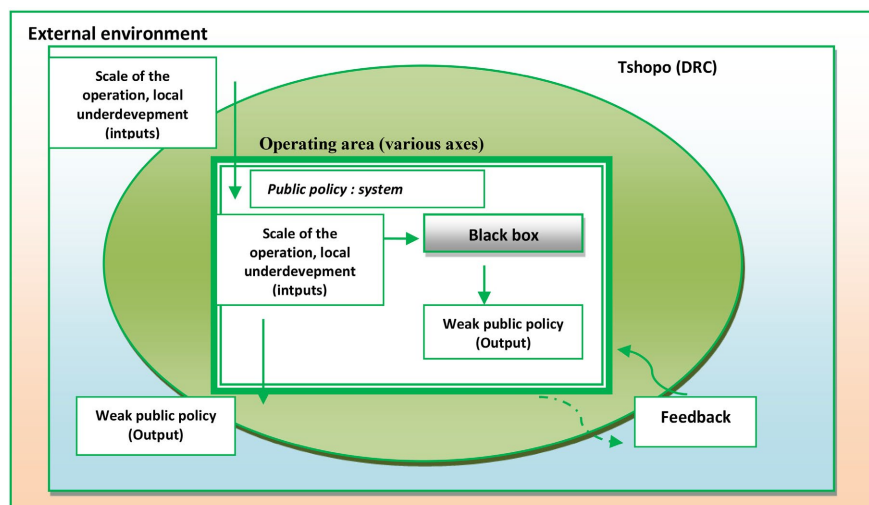


Figure 1. Relationship between public policy on artisanal wood and exploitation areas in the Tshopo region.

The rearrangement of these various elements (totalitarian character) in the Democratic Republic of Congo (DRC) in relation to artisanal timber harvesting was carried out using mechanisms whose purpose was not conducive to shaping either the relationships between actors or local development in Tshopo. This article notes that the almost centralized approach and the “gecko” policy are the means that have presided over the weak local development generated (equifinality character) by the artisanal timber sector. This degeneration justifies the negative entropic character of the ineffective public policy developed.

However, it should be noted that this result is also dependent on weak local political governance, namely the absence of a socio-political mechanism for ownership, involvement, and implementation at the provincial level, weak local leadership, and weak socio-economic organization in the logging areas, etc. (environmental and circular dependency). This makes the causal links between the system and the environment increasingly complex.

Therefore, internalizing the socio-environmental externalities, which are primarily negative, within this province to compensate for community, fiscal, or economic losses becomes essential.

3. Internalizing the Socio-Environmental Externalities of Artisanal Logging for Sustainable Local Development in the Tshopo

The effectiveness of environmental policies depends on the choice of instruments and how they are used. The constraint consists of regulating (imposing standards and penalizing offenders) and providing incentives so that the private costs borne by producers of negative externalities include social costs (thus internalizing the externalities).

The instruments available to public authorities to reduce inefficiencies due to externalities can be classified into three categories: regulation, economic incen-

tives, and market creation [11]. These different instruments share the common objective of increasing the efficiency of decisions by leading the issuer to take all effects into account in their economic calculations: they allow for the “internalization” of the externality. However, not all of these instruments are equivalent in terms of the distribution of the overall benefit obtained among the different parties compared to *laissez-faire*.

Indeed, to escape the disastrous logic that characterizes the artisanal timber sector in Tshopo, DRC, it is necessary to internalize negative socio-environmental externalities. This is a principle of environmental policy.

Even though this environmental policy continues to rely on regulations and voluntary approaches, the internalization of negative externalities has been progressing since the 1970s. In France, it was even enshrined in the Constitution in 2005 with the polluter-pays principle [12]. This internalization can be achieved by taxing the activity that generates the externalities, but also by creating property rights.

Indeed, for classical economists, foremost among them Ronald Coase [13], environmental degradation stems from the fact that the environment belongs to no one: if the soil, subsoil, fish stocks, or air had an owner, that owner would ensure its sustainable use. However, the problem should be resolved as soon as the DRC Constitution recognizes that the soil and subsoil belong to the State. Therefore, it falls to the State, or the provincial government of Tshopo Province in this case, to internalize the externalities of the artisanal timber sector through regulatory measures that primarily benefit the development of logging areas.

3.1. Internalization from a Regulatory Perspective

Regulations impose a cost on each party subject to them for compliance with the standard, in this case, an implicit cost of reducing negative socioeconomic and environmental impacts. These costs can vary to sometimes unreasonable proportions, just as measures designed to save human lives reflect—when their cost is compared to the number of lives saved—very disparate values placed on human life [14].

The first category of instruments consists of prohibiting or mandating certain behaviors that generate externalities. For example, encouraging small-scale producers to voluntarily reduce their negative externalities by adopting virtuous practices: this is, for example, the principle behind labeling. We can also consider the establishment of standards for the display of wood planks on the market. This type of instrument, if not accompanied by economic measures, amounts, in the case of negative externalities, to placing the burden on the producer and transferring all the gains to the consumer.

The results gathered in the field demonstrated that in Tshopo, loggers with and without permits operate in virtually the same context, a mix of legality and illegality. Therefore, to regulate this type of practice, it would be better, for example, to establish a “Labeled Market” (MALA) or “Open Card Market” (MACAO) system

at the provincial level. This would require vendors to label their products displayed at the market according to whether they are in compliance with the state regulations, or to display stickers or cards identifying them as artisanal loggers who own timber. This system would significantly reduce the flow of irregularities into the markets.

Another local regulatory strategy would be to prohibit the sale of timber outside of designated timber yards or timber markets to be established by the Provincial Government, both at logging sites and in the provincial and territorial capitals.

If, as is most often the case, the tax rate is insufficient, meaning it doesn't reflect the true extent of the environmental damage caused by the polluting activity, overall energy consumption is higher than desired. However, this suboptimal result is still achieved at the lowest possible cost. A tax is referred to as a Pigouvian or optimal tax when the rate accurately reflects the damage inflicted on humanity by its own emissions, thus leading to an optimal reduction in emissions. While the ideal carbon tax model involves taxing all small-scale operations at the same rate, regardless of the emitter, implementing such a system is often difficult in practice. The devil is in the details of implementation. The precise definition of those subject to the tax (and the associated exceptions or reductions), the tax base, and the use of the resulting revenue are what make this exercise so challenging.

In the inevitable debate on accompanying measures and distributional effects, it is important to bear in mind that the sole purpose of a tax is to marginally convey the social cost of negative socio-environmental externalities by altering the price structure faced by small-scale producers. The introduction of the tax can therefore, without any loss of effectiveness, be accompanied by a complete lump-sum redistribution of its revenue, or by tax relief based on other tax bases (wages, income). However, the redistribution of tax revenue must under no circumstances be used to counteract the "price signal" through exemptions or reductions in taxes on similar tax bases.

3.2. Internalization from an Economic Incentive Perspective

The second category of instruments encompasses all economic incentives, most often in the form of taxes or subsidies, on activities that generate externalities—so-called Pigouvian incentives, named after the British economist Arthur Cecil Pigou. By linking the production of the externality to the burden of an additional cost or, conversely, a resource, the consideration of this effect is induced in the decision that creates it. The tax or subsidy rate must be set to represent the marginal cost or benefit associated with the externality.

Ecotaxes, for example, aim to involve small-scale producers in the rational management of externalities by making them bear the social cost of storing and securing their timber in a village before its removal. This can also involve prohibiting or regulating the production of negative externalities, for example by imposing quality standards or limiting the volume of waste left in the forest after sawing, or the size of trees used for the process. In this case, the various logging regulations

deserve to be vigorously enforced and regularly monitored by the relevant authorities.

Internalizing the socio-environmental externalities of the artisanal timber sector in Tshopo Province through economic incentives requires thorough socio-political analysis at the provincial level by various stakeholders. Economic or monetary incentives can, as the example below illustrates, produce results contrary to expectations.

In any case, in the artisanal timber sector, taxes, to be imposed as appropriate, remain, until proven otherwise, incentives that could lead to the sector's regularization. For example, we can internalize: the externality of plant encroachment (during the removal of the planks), the yield externality (local labor effect), the legality externality (tax exemption policy, public procurement access policy, virtuous practice policy, etc.), the public health externality (fuel use), the accident externality (chainsaw use, transport of the planks), etc.

3.3. Internalization from the Perspective of Creating Markets for Externalities

Incentive instruments include taxation (environmental taxation) or the creation of a market for permits, as the European Union did in 2005 for greenhouse gases. Antoine Frérot pointed out that “taxing vice” (polluters) amounts to giving a “financial advantage to virtue” because companies committed to pollution cleanup will avoid the environmental tax. While it may be possible to directly subsidize good behavior in addition to environmental taxation, we should also stop subsidizing negative externalities as we do today.

The world faces two major ecological problems: the scarcity of raw materials and environmental pollution. While artisanal timber harvesting is certainly affected by all these problems, it is primarily affected by the first. According to Coase, “externalities are the consequence of a lack of pollution rights. If pollution rights are established, they can be traded, thus creating a pollution market” [15]. In fact, the artisanal timber sector is working to create markets related to various known problems, including: waste disposal in forests (zero-discharge policies, waste recycling policies), pollution (pollution control policies), etc. Establishing a market for rights (or socio-environmental externality permits, “SEDPs”) from scratch is possible. This has been done for SO₂ emissions from power plants in the United States, as well as for the greenhouse effect at the global level (Kyoto Protocol and its successors) and regional level (European Trading System—ETS—in Europe, local and voluntary initiatives in the United States pending the adoption of the Waxman-Markey Act) [14].

In the context of our thesis, a right to pollute—or permit for negative socio-environmental externalities (NSEE)—represents the authorization to assume responsibility for extra-clause facts due to artisanal logging. Creating a permit market involves 1) defining a new good (e.g., the right to encroach on agricultural plants when moving them from the logging site to another disposal site for the

market); 2) deciding on the distance of encroachment (*i.e.*, encroachment rights); 3) allocate these rights to the different actors (on the primary market) and finally 4) allow the rights to be traded on a market (called secondary).

To grasp the potential of a coherent public policy and local political governance in the artisanal timber sector to trigger sustainable local development in Tshopo, new approaches are needed to safeguard its future.

Therefore, given the ineffective public policy governing this sector in Tshopo, which negatively impacts both relationships between stakeholders and local development, the establishment of an interactive, peripheral system and the internalization of socio-environmental externalities within the province are crucial means of overcoming the impasse. These measures are responses to the glaring disparities observed in the study area between the large scale of artisanal timber harvesting and the weak local development. This disparity stems, in part, from the almost centralized nature of the relevant public policy development mechanisms in the DRC, and the lack of effective power relations between different stakeholders. On the other hand, weak provincial governance is characterized not by weak application of regulatory provisions put in place by the central government, but also by legislative and normative unproductivity for the implementation of these provisions.

4. Conclusions

In the Democratic Republic of Congo (DRC), in fact, “figures on timber exploited by the industrial sector show three hundred thousand cubic meters compared to five million cubic meters per year of timber consumed locally, which implies timber from formal and informal artisanal exploitation” [17].

However, the artisanal timber sector is an important sector in Tshopo Province (DRC) and contributes significantly to its sustainable local development. The public policy governing it, however, is flawed in its design and implementation, and thus generates socio-environmental externalities that can negatively impact development in the various logging areas. Therefore, this article has demonstrated that internalizing these externalities is one of the appropriate strategies for addressing this problem.

Conflicts of Interest

The author declares no conflicts of interest.

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