Community forest industry in Tanimbar, and prospective industrial scenarios

(JM Roda et al, 2005)

Overview of the local wood industry

In its present state, the analysis of the wood industry system in Tanimbar archipelago only covered the South part of the Yamdena island. In this part of the island, the wood industry system feeds the demand of the local villages and of Saumlaki. Among the villages of South Yamdena, two villages (Wermatan and Ilngei) are remarkable with their high level of wood activities. Thus these are analysed in the following sections.
In the north part of the Island, the system feeds the local villages, the city of Larat, but also some outer markets. While the structure of the system is certainly very similar to what has been analysed in the southern part of the island, the quantities may defer in a great proportion. This will be documented in the coming months.

Wermatan

Description of the wood activity

Wermatan is a remote traditional village (fig 1) on the western coast of the Island. Its still strong traditional features have an important effect on the wood industry organisation. The village can be reached only by sea.

Fig 1 : View of Wermatan (Photo JM Roda)

The wood activities in Wermatan basically consist into community-based logging operations. The logs are felled with chain saws, and are directly processed into sawn timbers with the chain saws, at the felling place (fig 2). The process is not very efficient in terms of wood recovering, with a recovering rate[1] of less than 5% (fig 3).

A typical team consists in one chain saw operator and two helpers. Usually the chain saw operator is the owner of the machine, but it can often be a relative who borrowed the chain saw. In this last case, the income is shared between the owner and the operator.
Such a team usually spend the week (of 5 days) in the forest, harvesting the trees, processing the timber, and carrying it up to the river side (fig. 4). The productivity of such a team is about 10 m3 of sawn timber per week. This wood activity is perceived by the villagers as a "complementary" activity, giving them the ability to quickly win some liquidity, with an easier work than with the fishing activity. It seems that a team usually doesn't need to produce more than 20 m3 per year.
The wood is transported to the village by boat. The village sea shore acts as a warehouse (fig. 5), and later on, the timber is transported with a bigger boat to Saumlaki. In Saumlaki; the timber is directly sold by the villagers to a few traders, who are apparently keen to buy at any time.

Fig 2 : Processing sawn timber at the logging place (Photo R. Nasi)

[1] The recovering rate is : [volume of sawn timber produced] / [volume of the log in the forest]. It is usually expressed in %. Conversely, 100% - recovering rate = % of waste from the process.

Fig 3 : Remaining log and plancks after timber processing at the logging place (Photo JM Roda)

Fig 4 : Stock of sawn timber on the riverside, before transportation to the village (Photo JM Roda)

Fig 5 : Stocks of sawn timber on the village seashore, before transportation to Saumlaki (Photo JM Roda)

Analysis of the wood activity development

Despite the very small scale of the village and of its activity, this recent development follows some of the classical rules of localised industrial developments:

- Introduction by a pioneer,
- Innovation process,
- Cooperation among the actors, and diffusion of the know-how.

Here, the pioneer was a villager named “Mateus”, who had been working in Irian Jaya, in timber concessions, and were he learned how to use chain saws with specific methods in order to produce acceptable sawn timber. He first demonstrated than buying or borrowing a chain saw in Saumlaki was a profitable operation, since the sawn timbers which are at good prices on Saumlaki market, beside their possible use in the village itself. The Saumlaki market provides liquidity in return of a short work, and thus, timber activity appears for the villagers as one of the possible means to escape of the subsistence activities (farming and fishering).

The innovation process was brought by Mateus, who taught the people how to use a tinted and tensed wire to mark a straight line on the wood, before to cut it with the chain saw (fig 6). This method, although simple, was not known by the villagers until Mateus learnt it abroad. It allows the villagers to produce decent sawn timber. Anyway, for further uses than what is demanded in traditional houses, the produce remains rough, and must be re-sawn or planned with industrial joinery tools like planners or circular saws, that exist in Saumlaki in three different workshops.

Fig 6 : Tracing the cut with the chain saw, following the tinted straight line (Photo R Nasi)

The diffusion of the know-how is naturally done to the helpers of the chain saw operator. They can work for him for several months, and when they feel that they know enough, they try to acquire a chain saw for themselves, and to become chain saw operators. They hire new helpers, who are going to learn, and to later become new chain saw operators, and so on.

The cooperation exist among groups of actors takes the form of alliances to release liquidity in order to acquire more production tools. For example, one villager wanting to buy a new chain saw, will establish a joint harvesting operation with a relative who already owns a chain saw. The first provides the chain saw fuel; both share the work and the income from the sales of the timber. When the first saves 8 million Rp, he can buy a new chain saw[2].
With such a share of the income, and depending on the harvested species, that 25 to 78 m3 of sawn timber have to be produced in order to pay a new chain saw.

The costs of production are given below, for different species. Pterocarpus sp provides by far the better income per m3 for the chain saw owner.

Production costs for different species (Rp/m3)

Wood specie	Intsia sp	Pterocarpus sp	Manilkara sp	Diverse species
Chain Saw costs	157 500	157 500	157 500	94 500
Workforce costs	200 000	200 000	200 000	200 000
Boat transportation cost	200 000	200 000	200 000	200 000
Income of the chain saw owner	342 500	642 500	442 500	205 500
Price paid buy the retailer in Saumlaki	*900 000*	*1 200 000*	*1 000 000*	*700 000*
Retailing costs	450 000	300 000	500 000	150 000
Price paid buy the final consumer in Saumlaki	*1 350 000*	*1 500 000*	*1 500 000*	*850 000*

Conversely, it appears that the interest of the community workers may differ from the interest of the chain saw owner. First, as shown above, the income for the workers of the community

[2] A new chain saw (Stihl) costs 8 million Rp; and a second hand one costs around 4 to 4,5 millions Rp.

is the same for all the species, while the work is easier for the diverse species, because they are significantly lighter and softer. Second, the cost structure according to the cash flow (fig 7) clearly shows the inequity of the incomes in the community according to the different species. The surplus of income gained with the more valuable species does not profit to the community workers, while, for the same amount of total cash flow (as paid by the final consumer), they earn more with the less valuable and easier species.

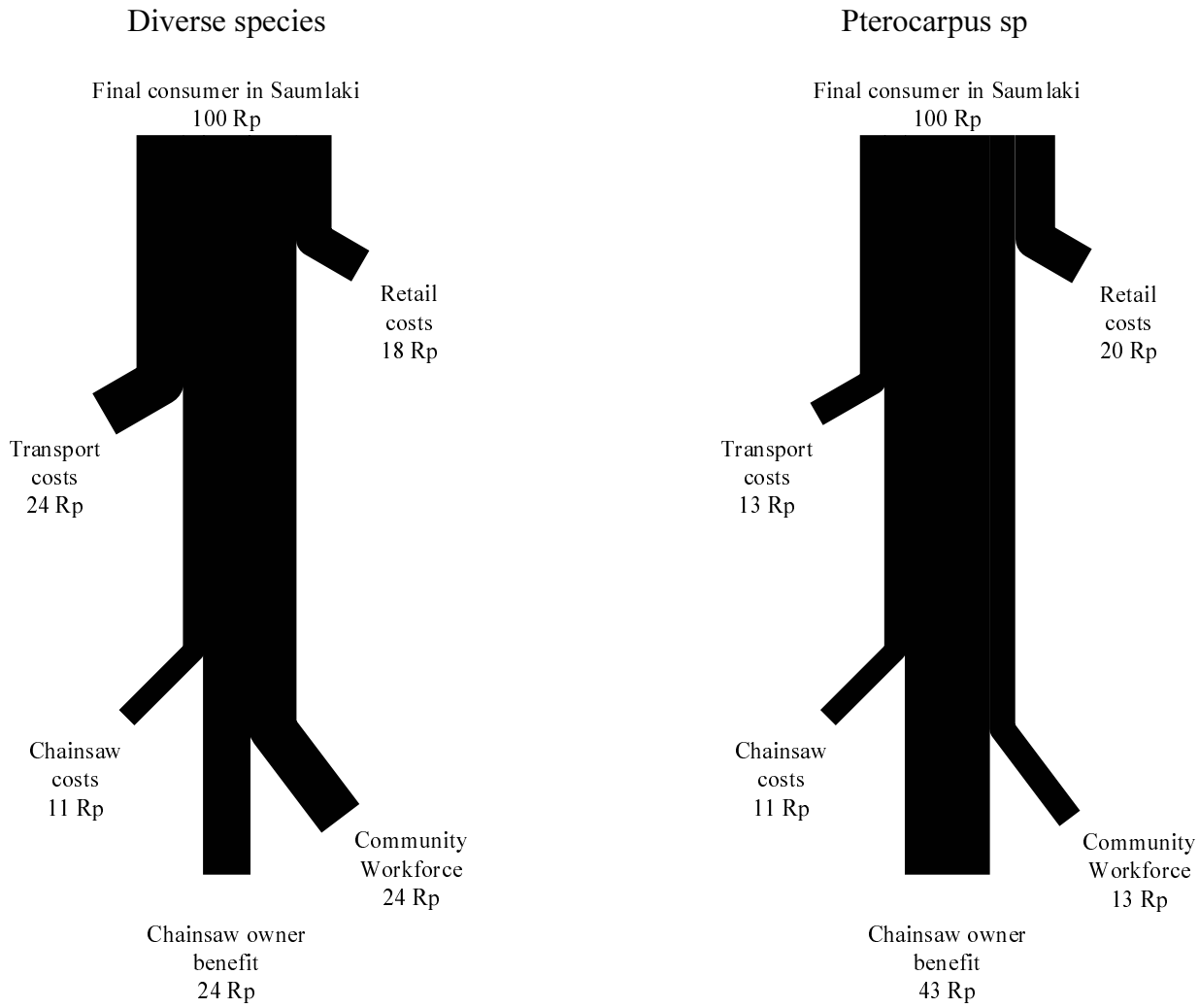

Fig 7 : Cost structure of the sawn timber production from Wermatan

Social structure of the village, and capitalisation ability

In Wermatan like in the other villages of Tanimbar, the society is divided into stylised groups, which represents the part of the boat that founded the village. Initially, the village was even topologically ordered following the disposition of this symboliclic boat. In Wermatan, the chiefs of the seven groups that constitute the village are: Rumked, Oduk, Fujebun, Olingir, Eblan, Lauran, Rolmur. They are ranked according their place in the boat (fig 9). Each group and its members have specific traditional roles:

- Rumked group : Speaker, decision applicant, speaks before the battle in case of war, and have a decisive role regarding the land attribution,
- Oduk group : Prepare the customary rituals, lead the rituals, and have a decisive role regarding the land attribution,
- Fujebun group : Prepare the warriors for the battle, and assist the rituals,

- Olingir group : Are wariors during the battle, and are advisors,
- Eblan group : Are wariors during the battle, and are advisors,
- Lauran group : Are wariors during the battle, and are advisors,
- Rolmur group : Decision maker,captain of the boat, give the direction, and are advisors.

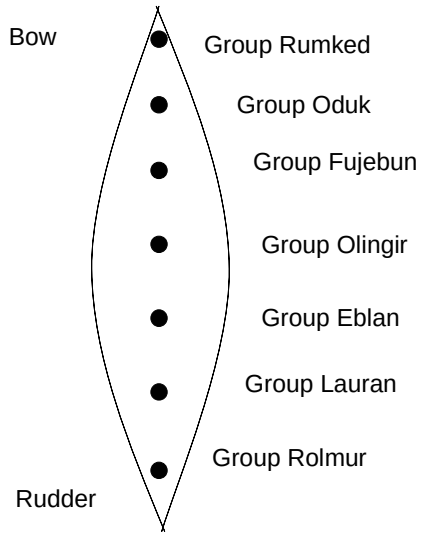

Fig 8 : The seven groups of the « village boat »

The groups have different possibilities to access the land and to have the right to harvest the timbers. This is no surprise that the 2 groups who have some decision power regarding the use of the forest, have developed the bigger number of chain saws (Fig 9). Paradoxically, the Eblan group is the group which Mateus the pioneer, belongs to. But since the group has less power on the land use, it never developed a large timber activity, and Mateus nnow how essentially profited to Rumked and Oduk groups.
In the case of the timber activity, where the initial capital is the forest, the groups that controls the forest and the land use, control the investment dynamic, and the capitalisation process.

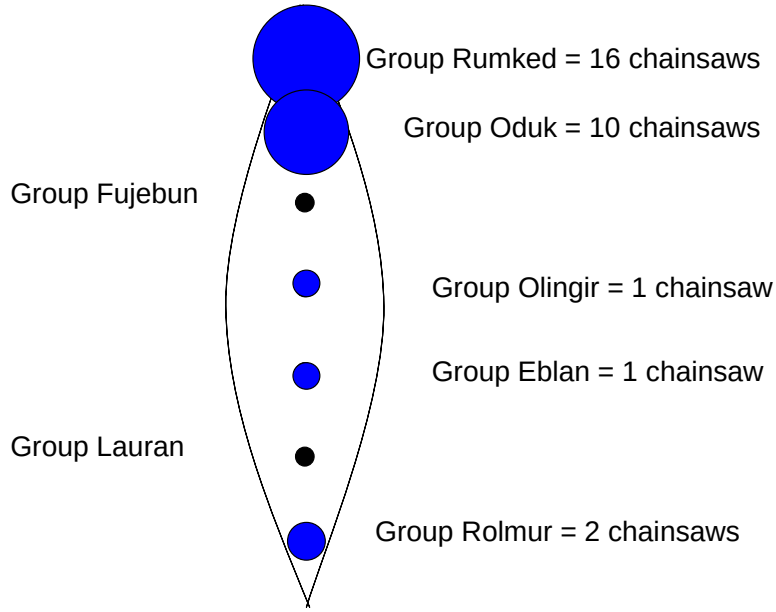

Fig 9: Number of chain saws in each social group of Wermatan village

It finally seems that the timber activity can be seen as a diversification activity that allows households to capitalize and increase their liquidities, beyond the traditional subsistence activities. It is also clear that the households which can invest in such diversification of theit activities are those who already have a "potential capital" with preferred access to the forest and to the land use "decision", but also those who have had the time to accumulate.
A simple Components analysis on the activities (agriculture, fishery, wholesale, teaching, carpentry, owning of chain saws, and helping in the wood industry) of Wermatan households shows that the more ancient households have the more diversification level (fig 10).

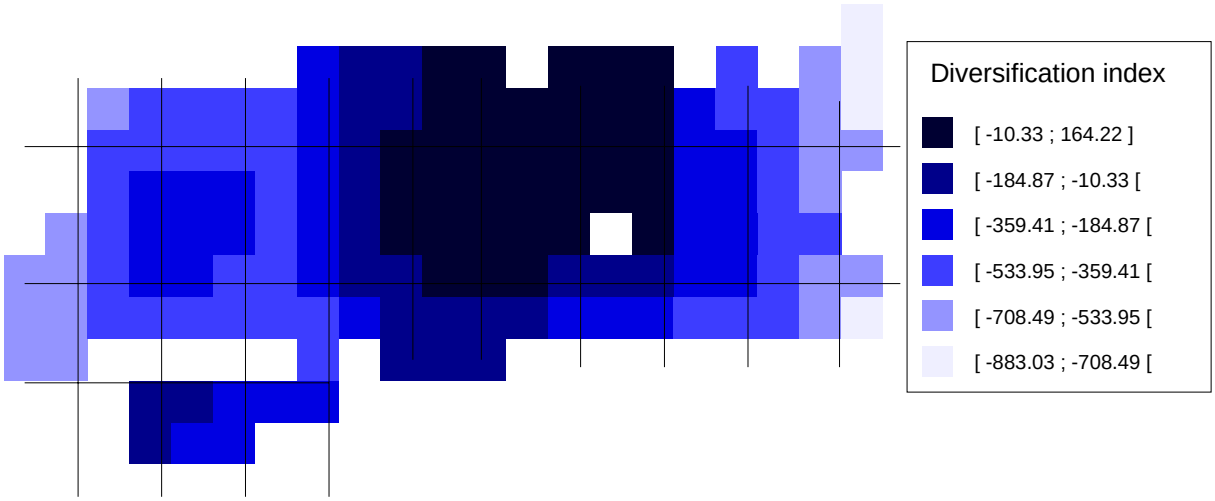

Fig 10 : Diversification index in Wermatan village – The dark blue concentration exactly corresponds to the limit of the first settlement of the village.

Ilngei

Description of the wood activity

Ilngei is a village on the eastern coast of the Island, very close to Saumlaki (10 km), connected by a very good road (Fig 11). It has less pregnant traditional features than what was observed in Wermatan, and it is more developed (fig 12). At least, the social structure is no longer visible through the timber industry organisation.

Fog 11 : The road from Ilngei to Saumlaki (Photo JM Roda)

Fig 12 : View of Ilngei village (Photo JM Roda)

There is two major differences with the case of Wermatan. First, the village is very close to the main city, and the proximity of the market emphasise the possibilities for the development of the timber activity. Second, there is also major track that goes far in the forest (fig 13), and that allows the villagers to go very deep in the forest along this track, provided that they use appropriate vehicles to follow this track. This extended their action range, but only in one direction. From the tracks, when they have to walk in the forest, they don't go on a longer distance than what Wermatan villagers do.

This track allowed not only the development of the timber activity, but the development of different services, too. For example, minibus services are now available to carry the workers in the forest; along the track, up to their working place. Such transportation services allow the villagers to diversify their activities in one week. While Wermatan villagers typically spend the complete week in the forest, when they decide to harvest trees and process sawn timber, the Ilngei villagers only spent 3 days in a week in the forest, and can use the two remaining days for other activities in the village itself.

The great number of villagers involved in this activity, has led to an over exploitation of the most valuable species. Now, the bigger share of the harvested species by the villagers of Ilngei is among the "Kayu putih", that is diverse and less valuable species.

Another impact of the track lies in the facility to sell the products. The villagers can either bring the sawn timber in Saumlaki, or wait that the traders come along the track with their own lorries, to buy and collect the products on the road side. For the villagers, this is an advantage, letting the transportation cost to Saumlaki, being supported by the trader from Saumlaki.

Fig 13 : The track in the forest, from Ilngei (Photo R. Nasi)

Analysis of the wood activity development

The history of the timber activity began at least 10 years before it did in Wermatan, and the development of the timber industry is widely spread among the village and among. With more time to develop and explore the limits of the activity, the tasks have become more specialised, and the work force is divided into several categories. Althought that the typical unit of work still exists (chain saw operator, and one or two helpers), there is also numerous teams with one chain saw owner and / or operator, 1 skilled and specialised helper, and 2 or 3 basic helpers / carriers. There is different wages according to the tasks.

The cost structure, althought similar to the one of Wermatan, has evolved towards a bigger part of the income for the chain saw owner. Village scale activities do not mean equity, and what is saved from the boat transportation costs, is not shared among the workers of the community, but kept at the level of the chain saw owner. The ranking of the species according their financial interest is still the same than in Wermatan, but the margin of the chain saw owner is significantly more important.

Production costs for different species (Rp/m3)

Wood specie	Intsia sp	Pterocarpus sp	Manilkara sp	Diverse species
Chain Saw costs	157 500	157 500	157 500	94 500
Workforce transport to the forest	8 333	8 333	8 333	8 333
Workforce costs	83 333	83 333	83 333	83 333
Income of the chain saw owner	500 833	900 833	600 833	313 833
Price paid buy the retailer on roadside	*900 000*	*1 300 000*	*1 000 000*	*650 000*
Retailing costs	450 000	200 000	500 000	200 000
Price paid buy the final consumer in Saumlaki	*1 350 000*	*1 500 000*	*1 500 000*	*850 000*

In the same way than in Wermatan, it also appears that the interest of the community workers may differ from the interest of the chain saw owner. First, as shown above, the income for the workers of the community is still the same for all the species, while the work is easier for the diverse species, because they are significantly lighter and softer. Second, the cost structure according to the cash flow (fig &') clearly shows the inequity of the incomes in the

community according to the different species. For the same amount of total cash flow (as paid by the final consumer), the community workers earn more with the less valuable and easier species, and they actually profit of the over exploitation of the valuable species, since the bigger share of the harvest is now represented by the diverse species.

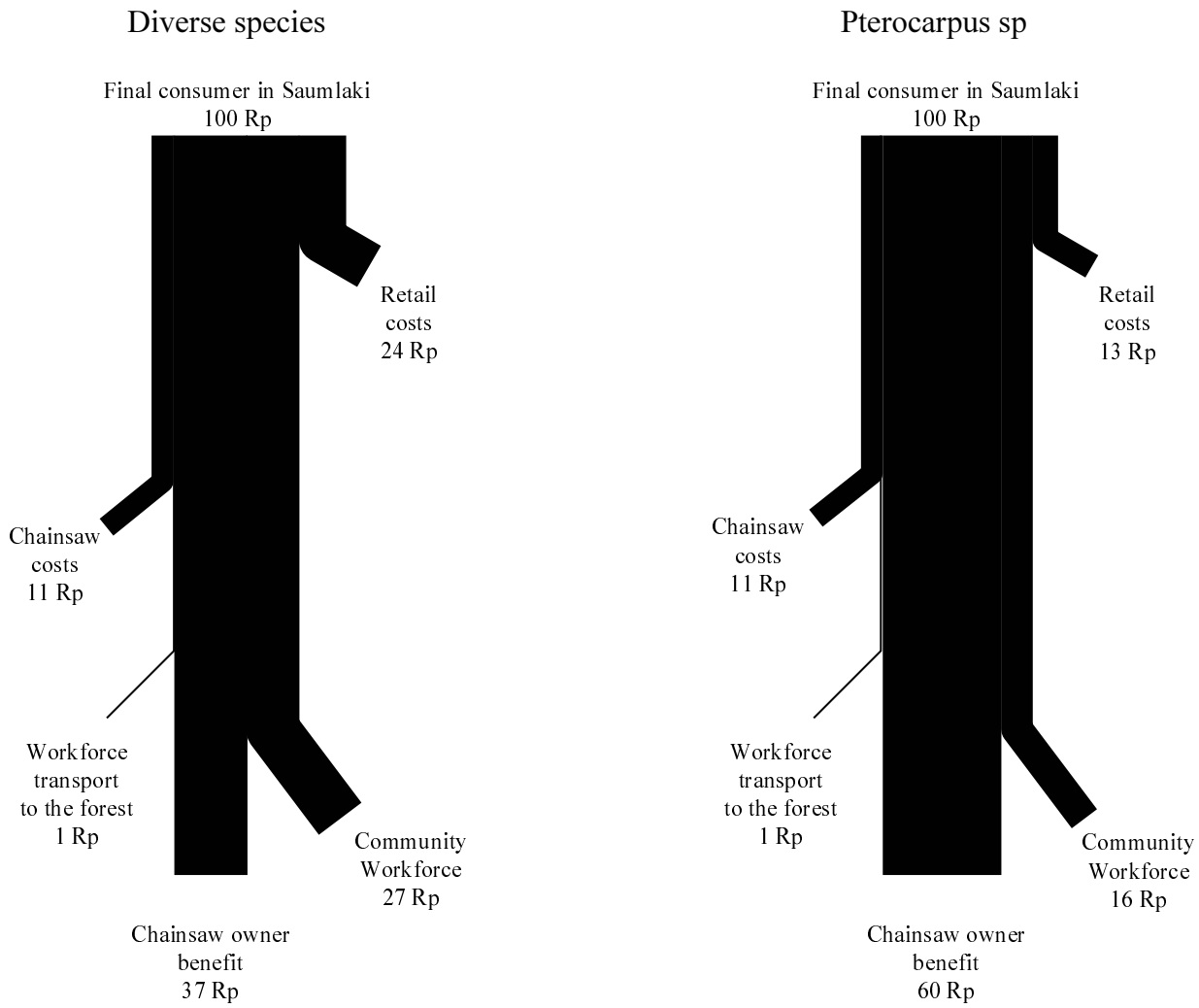

Fig 14 : Cost structure of the sawn timber production from Ilngei

Social structure of the village, and capitalisation ability

With the longer history of the timber activity in Ilngei village, the differences according the social groups and their differential ability to access to the forest, or to decide the land use, have been completely levelled down. Today it is hardly possible to notice such clear differences.

Still, the process of investment uses the preferential links of the family and of the group. A villager wanting to buy a new chain saw would, exactly like in Wermatan, first borrow a chain saw from a relative, or work with him in order to share enough benefit to make the investment possible.

Industrial prospective scenarii

(reducing local poverty, promoting local added value [sawmill], with reduced environmental damage)

Business as usual (harvesting by the communities)

An economic model is build, based on the actual cost structure of the local wood industry. It is calibrated according the minimum costs observed, as shown in the tables above. This model expresses the production cost for 1 m3 of a valuable specie, such as Pterocarpus sp :
Production cost = f(forest transport cost, community workers cost, chain saw cost, chain saw owner income, transportation cost, retail cost)

The transportation cost itself is a function minimizing the cost between the road transportation cost and the maritime cost towards Saumlaki or Larat :
Transportation cost = min(road transportation cost, seat transportation cost)

When applied to every portion of the territory in Tanimbar Archipelago, this model allows producing maps of the theoretical production costs of one m3 of valuable specie.

The Fig 15 shows the distribution of the production costs on the territory, when no forest track exists. In this case, most of the territory presents such high costs of production, that that it is unlikely that the forest would be harvested by the communities. Taking the actual selling price on the final market, a map of the potential margins for the main operator can be calculated (fig 16). In this map, positive margins are in various tones of blue. Negative margins are in various tones of red : their areas represent the area were the harvest by the local communities is theoretically non profitable.

Conversely, if the communities are able to build or to dispose of tracks like the one which starts from Ilngei, then most of the territory would be harvested, as shown in the Fig 16. In this case, only a very small part of the territory reaches the limit of 1 500 000 Rp/m3, which is the actual selling price on the final market. Any production cost being below this limit, would allow a margin for the main operator. This concerns the major part of the territory, and with this scenario, almost all the forest would be under pressure. The theoretical map of the margins shows, that with this scenario, all the areas of the Archipelago could be theoretically harvested by the communities (Fif 18).

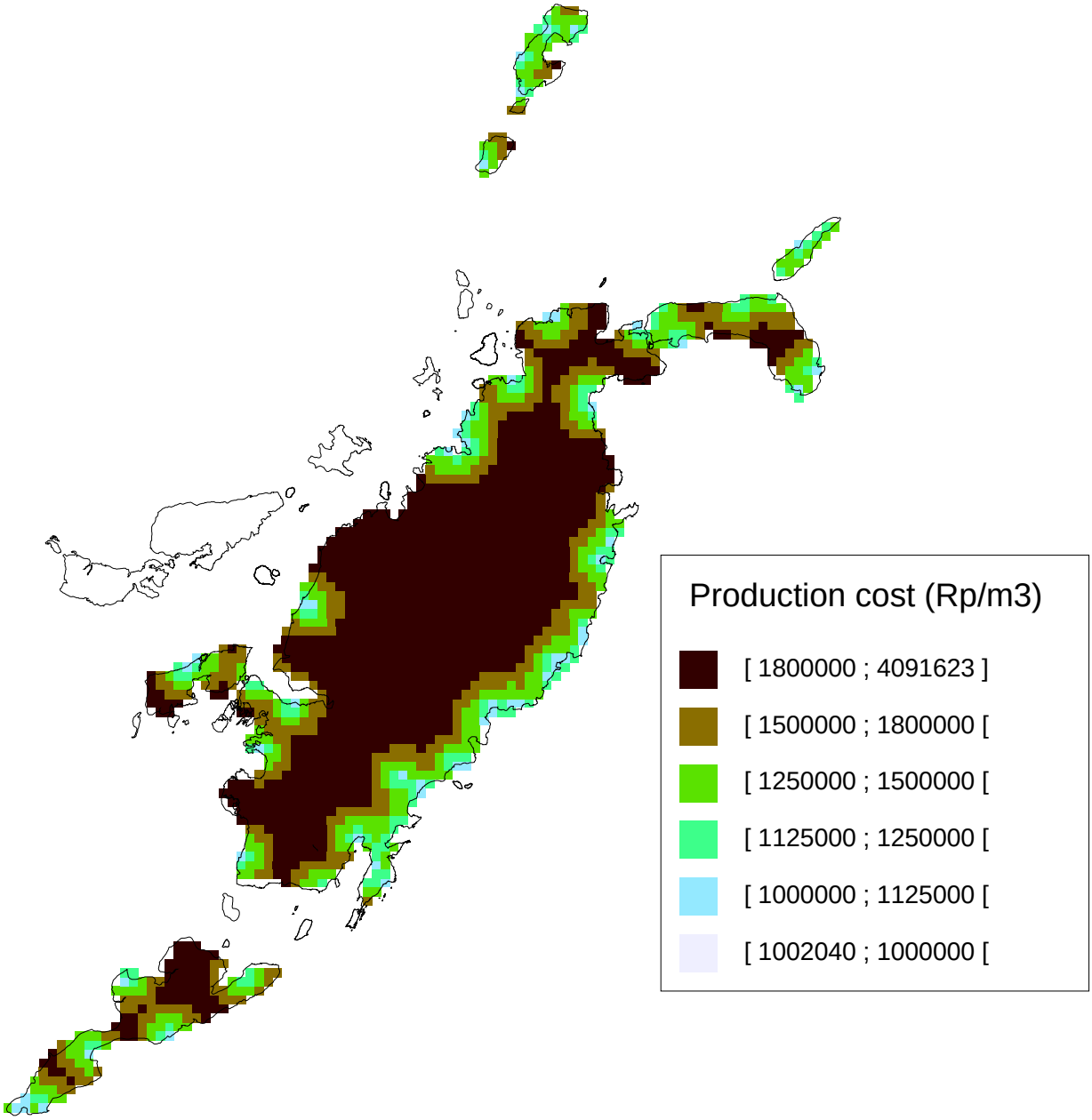

Fig 15 : Production costs of 1m3 of sawn timber, with no forest track

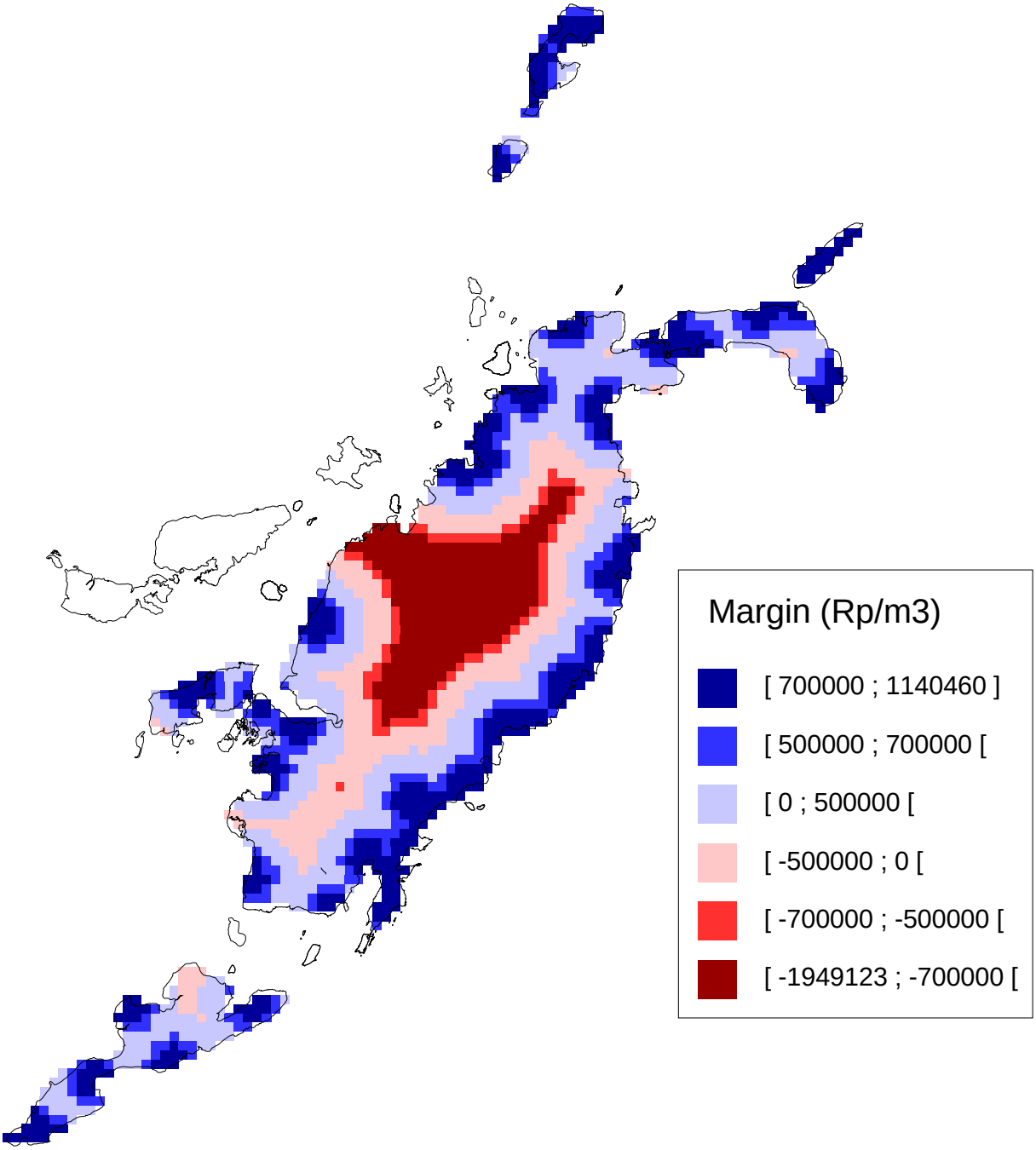

Fig 16 : Potential margins of a forest community based industry, according to the location, with no forest track

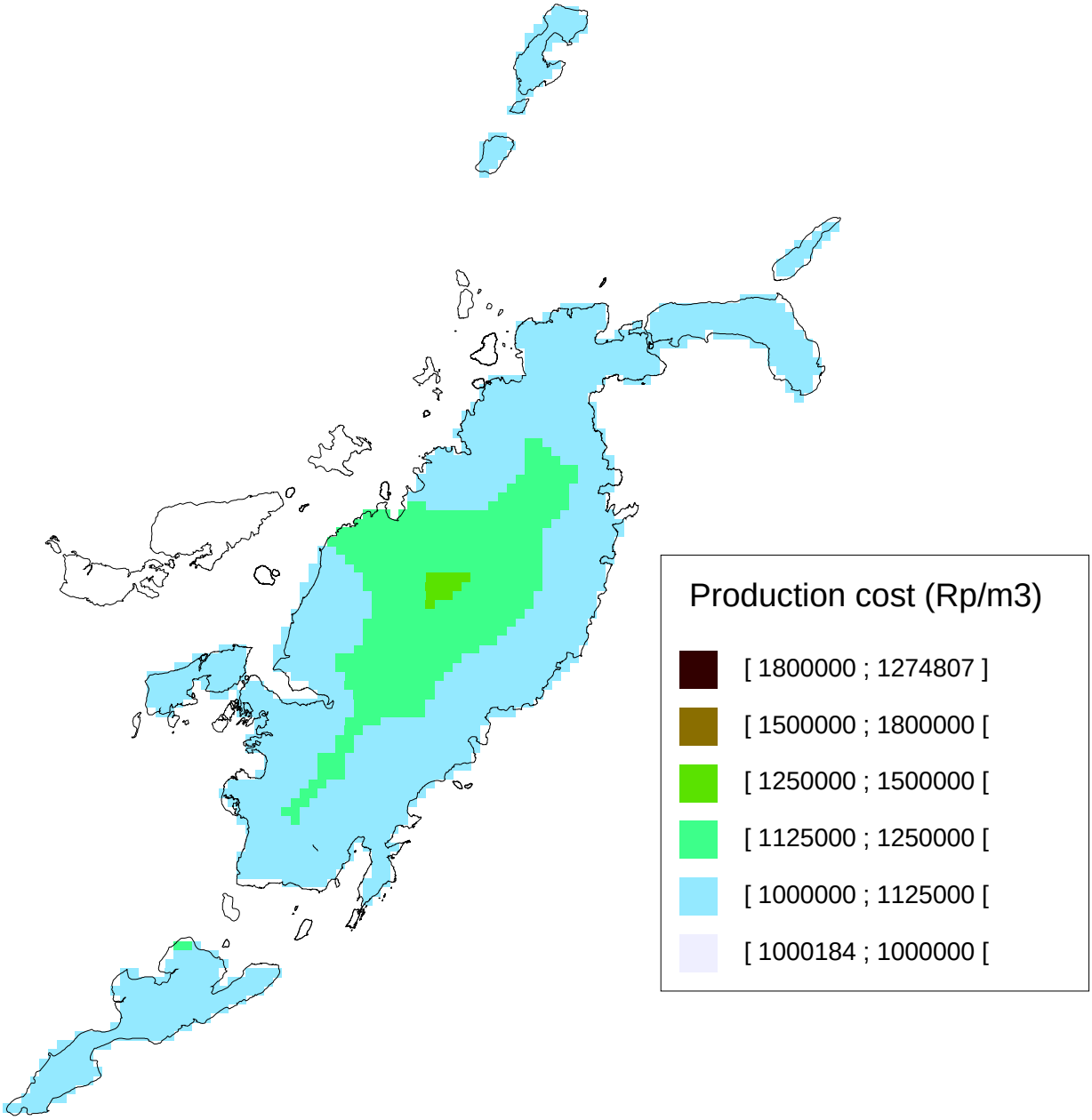

Fig 17 : Production costs of 1m3 of sawn timber, with forest tracks

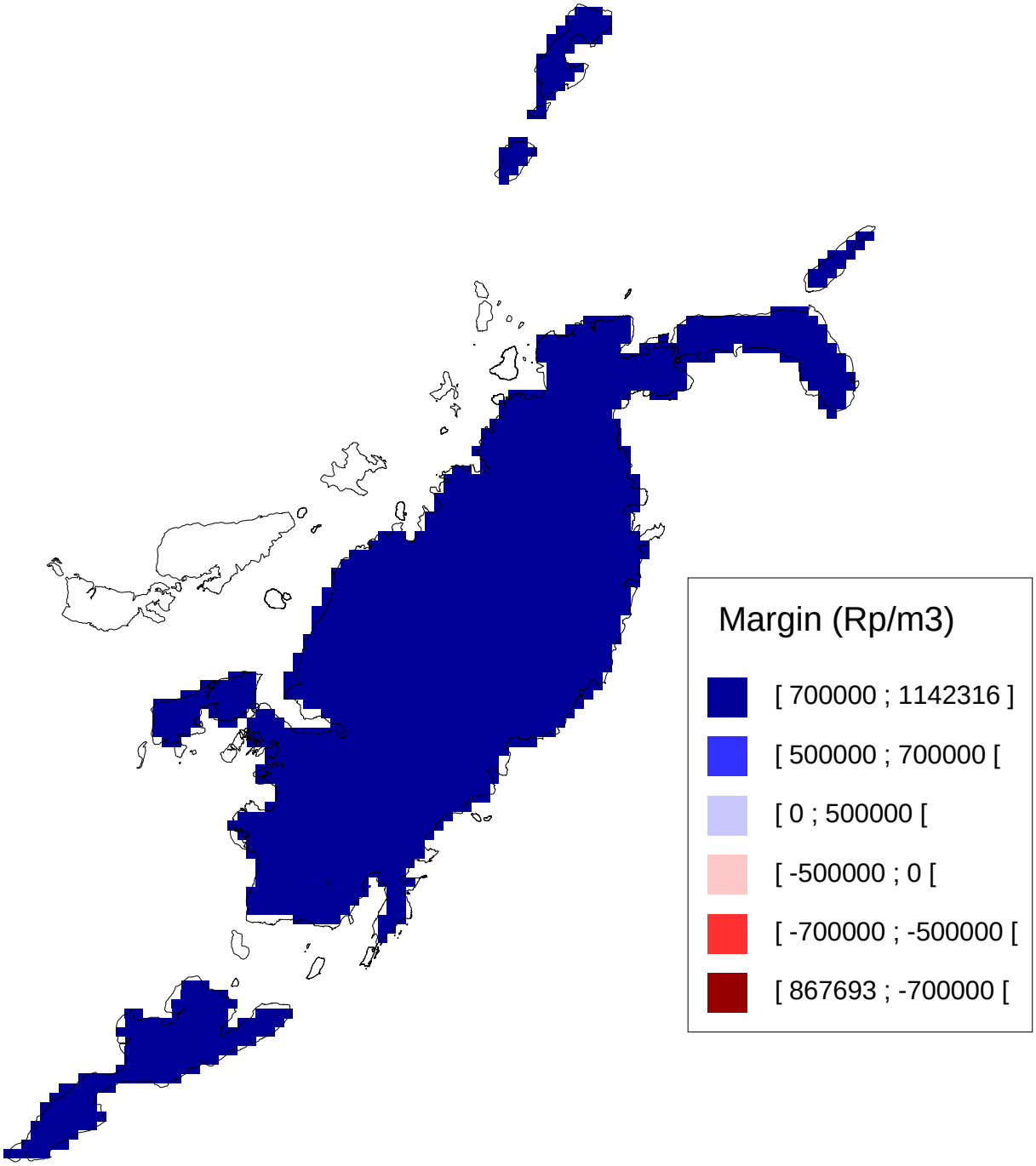

Fig 18 : Potential margins of a forest community based industry, according to the location, with forest track

Hutan Produksi Biasa

For a large scale industrial activity, the Tanimbar territory would be divided into two concessions of 35000 ha each. Each concession would be harvested within 35 years, and would be untouched for the following 35 years, according to the Indonesian regulation. Splitting the concessions into two parts would allow a continuous production over 70 years, in order to sustain the economic activity during all this period. Under the “Hutan produksi bias regulation”, the minimum diameter of harvest is 70 cm.

An economic model of an average industrial unit (minimum harvesting machines, 3 skidders, 1 loader, 1 buldozer, 1 lorry, 1 grader, and 1 sawmill with 27500 m3 of annual capacity) has been applied for each of the concessions, according to their respective richness (of species). The valorisation scenario, for all of the cases, is the following:

Specie	Quality	Selling price (USD/m3)
Intsia sp	Export sawn timber	350
Intsia sp	Local sawn timber	110
Manilkara sp	Export sawn timber	350
Manilkara sp	Local sawn timber	120
Pterocarpus sp	Export sawn timber	1000
Pterocarpus sp	Local sawn timber	400
Dillenia sp	Local sawn timber	80
Pometia sp	Local sawn timber	100

South concession

About 7 500 to almost 10 000 m3 are harvested every year, which is a low production. The production of sawn timber difficultly reaches 4 000 m3 in the good years (fig 19).
The cumulated balance of the operation becomes positive only 14 years after the beginning of the project (Fig 20), because of some regular losses, some years over the period (fig 21).
The internal rate of return of this industrial project difficultly reaches 8,49 %, which is below the normal banking interest rate in Indonesia (13,5 %). In other words, it is non profitable to run an large scale forest industry in Southern Yamdena, and it is even more profitable to place the equivalent investment in Indonesian banks for 35 years !

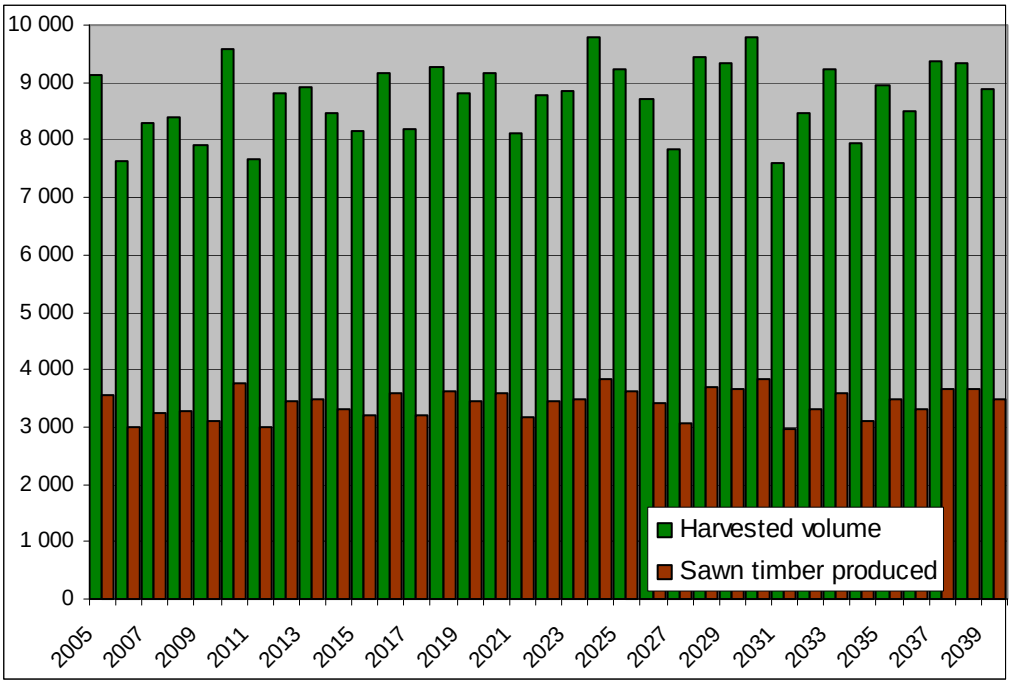

Fig 19 : Harvested volumes, and sawn timber produced over 35 years, hutan produksi biasa, South concession

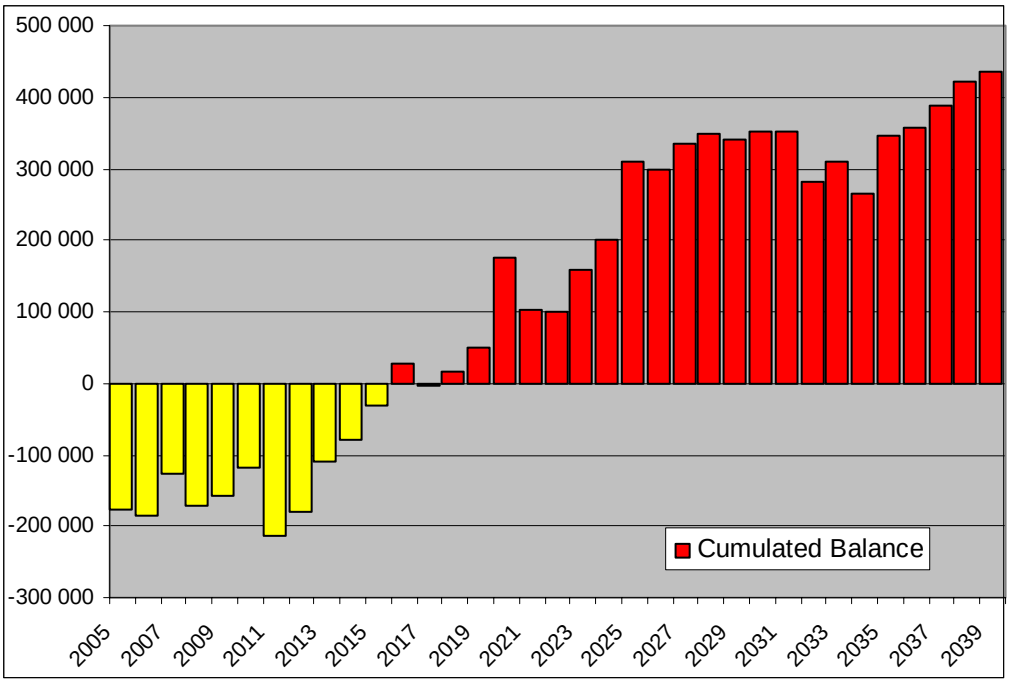

Fig 20 : Cumulated balance over 35 years, hutan produksi biasa, South concession

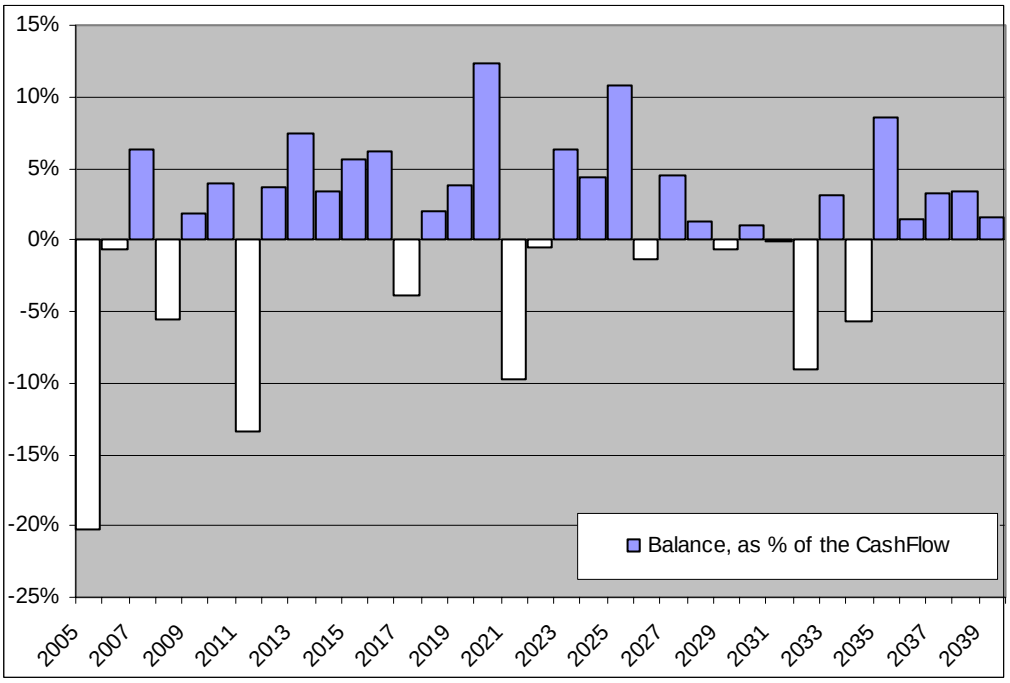

Fig 21 : Annual balance over 35 years in % pf the annual cash flow, hutan produksi biasa, South concession

North concession

About 15 000 to almost 19 000 m3 are harvested every year, which is a good production. The production of sawn timber reaches 8 000 m3 in the good years (fig 22).
The cumulated balance of the operation is positive from the first year of the project (Fig 23), because of regular gains, over the period. The annual balance is never below 25% of the annual cash flow (fig 24).

The internal rate of return of this industrial project largely overcomes 1 000 %. Even with an investment working at the same rate that the Indonesian banks, the industrial project is profitable. At 13,5 %, the actualised benefit of the project would be around 6 780 000 Rp over 35 years. In other words, it is really profitable to run a large scale forest industry in Northen Yamdena.

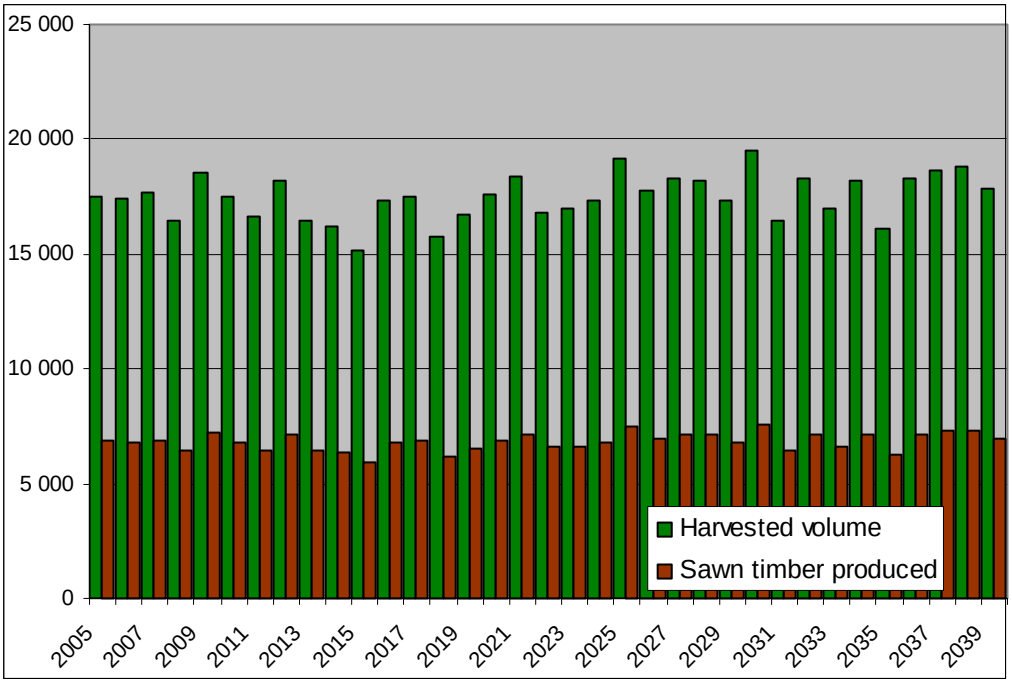

Fig 22 : Harvested volumes, and sawn timber produced over 35 years, hutan produksi biasa, Northern concession

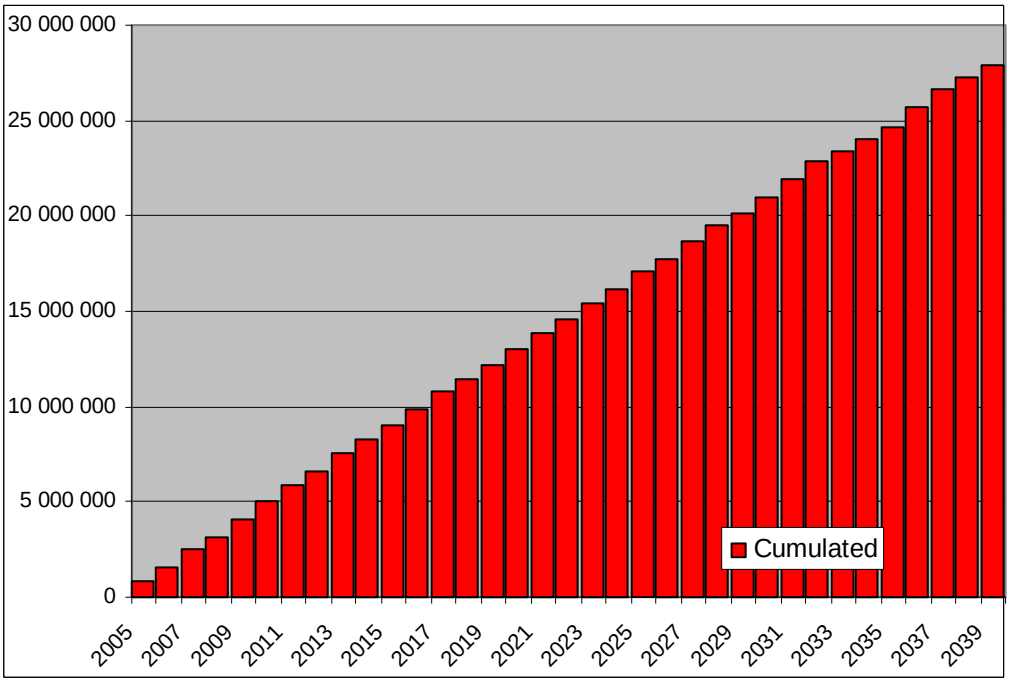

Fig 23 : Cumulated balance over 35 years, hutan produksi biasa, Northern concession

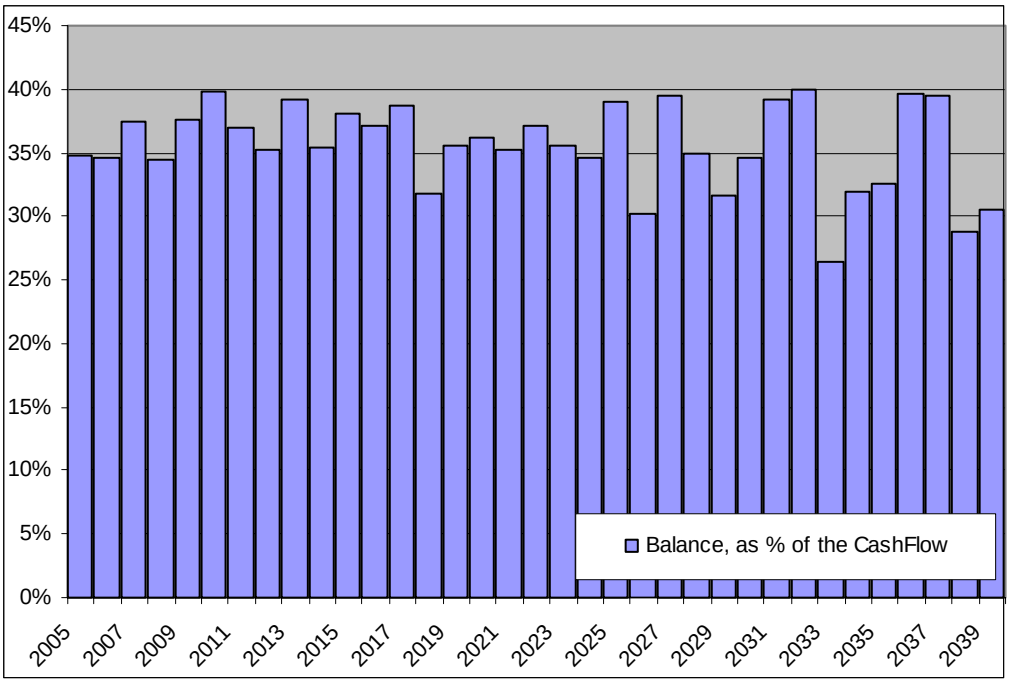

Fig 24 : Annual balance over 35 years in % pf the annual cash flow, hutan produksi biasa, Northern concession

Hutan Produksi Terbatas

Under the "Hutan produksi terbatas regulation", the minimum diameter of harvest is 80 cm, and all the other characteristics of the industruial projects are similar ti the hutan produksi bias

South concession

About 7 500 to almost 10 000 m3 are harvested every year, which is a low production. The production of sawn timber difficultly reaches 4 000 m3 in the good years (fig 25).
The cumulated balance of the operation also becomes positive only 14 years after the beginning of the project (Fig 26), because of some regular losses, some years over the period (fig 27).
The internal rate of return of this industrial project alsodifficultly reaches 8,4 %, which is below the normal banking interest rate in Indonesia (13,5 %). In other words, it is non profitable to run an large scale forest industry in Southern Yamdena, and it is even more profitable to place the equivalent investment in Indonesian banks for 35 years !

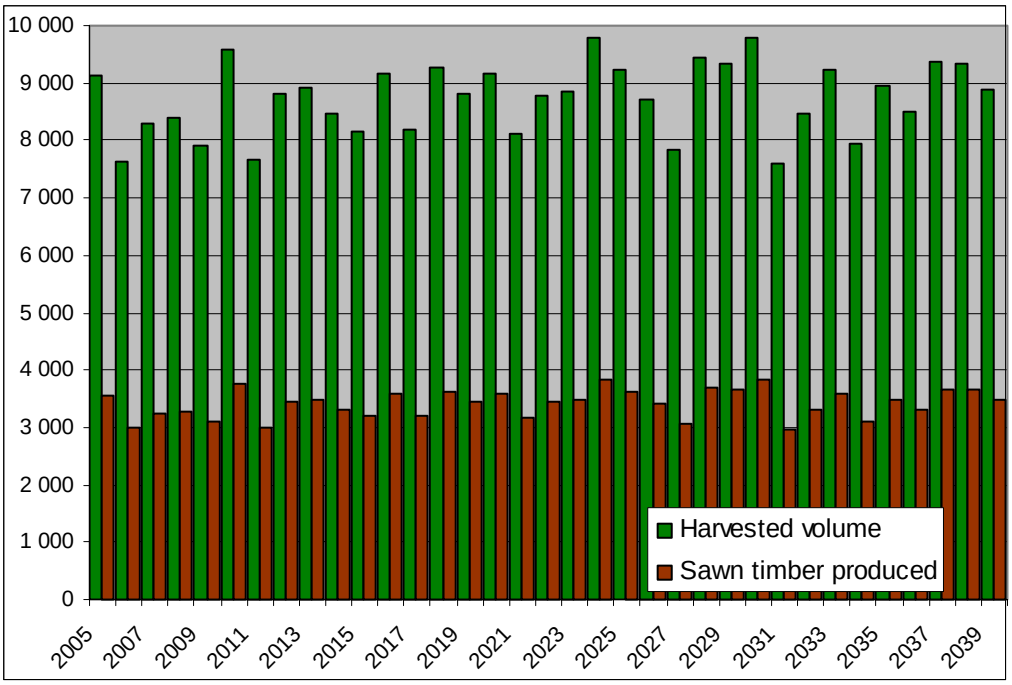

Fig 25 : Harvested volumes, and sawn timber produced over 35 years, hutan produksi terbatas, South concession

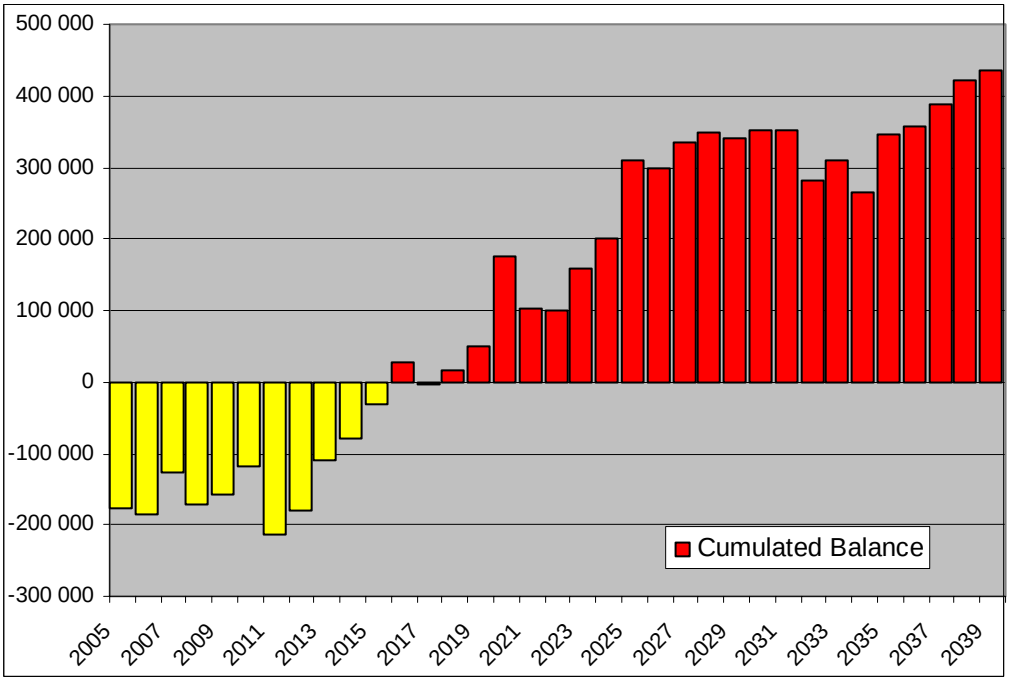

Fig 26 : Cumulated balance over 35 years, hutan produksi terbatas, South concession

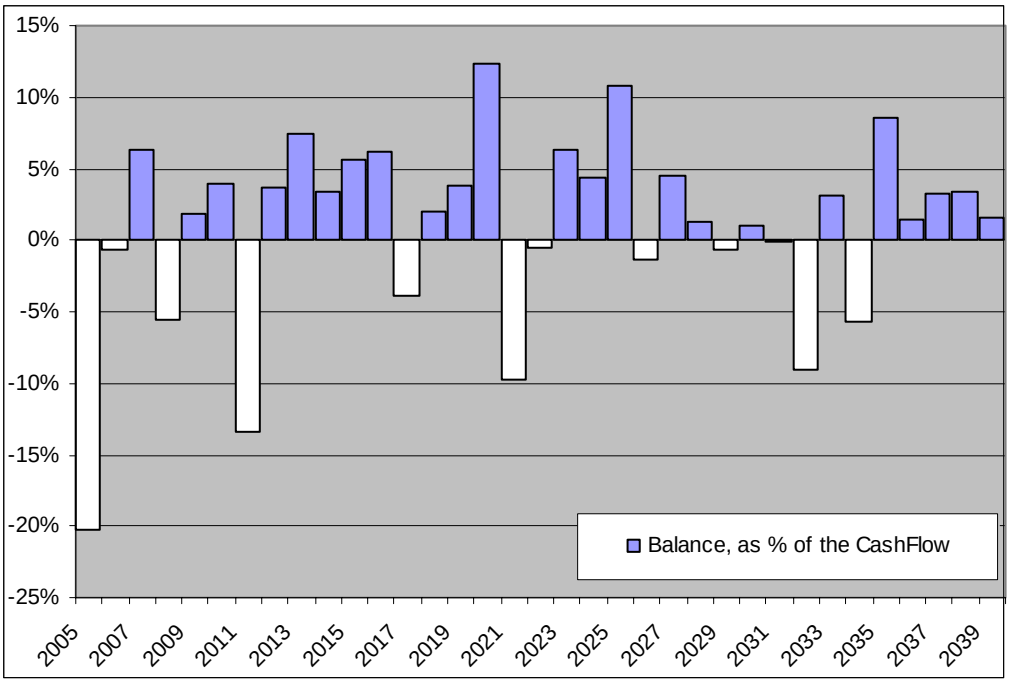

Fig 27 : Annual balance over 35 years in % pf the annual cash flow, hutan produksi terbatas, South concession

North concession

About 14 000 to 16 000 m3 are harvested every year, which is a good production. The production of sawn timber reaches 6 000 m3 in the good years (fig 28).
The cumulated balance of the operation is positive from the first year of the project (Fig 29), because of regular gains, over the period. The annual balance is below 20% of the annual cash flow, only in the first year (fig 30).
The internal rate of return of this industrial project largely overcomes 1 000 %. At 13,5 %, the actualised benefit of the project would be around 3 675 000 Rp over 35 years. In other words, it is really profitable to run a large scale forest industry in Northen Yamdena.

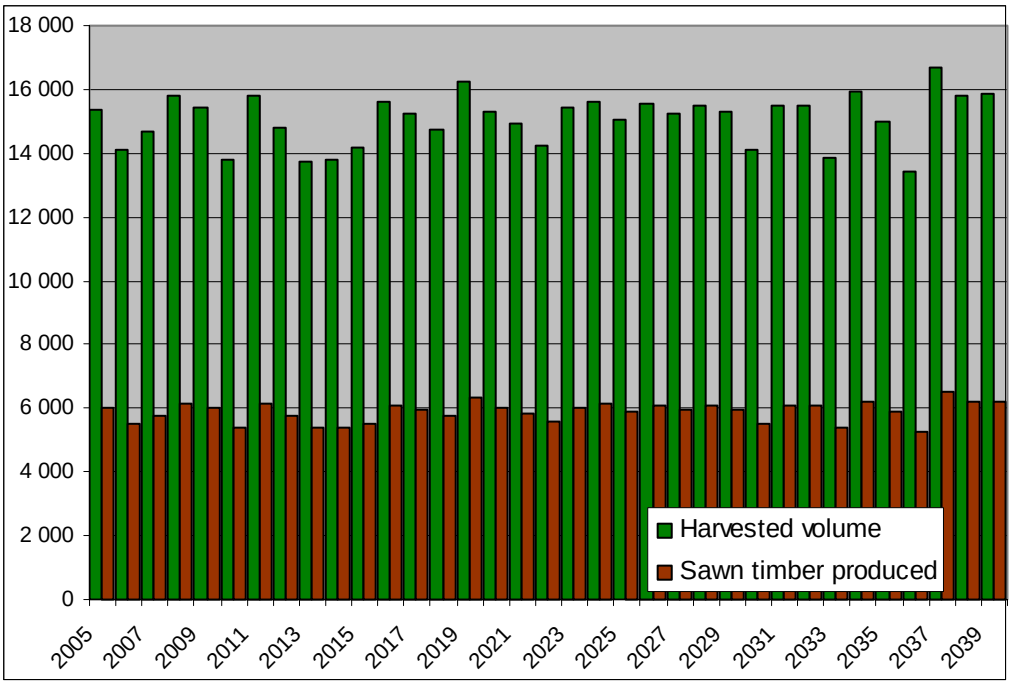

Fig 28 : Harvested volumes, and sawn timber produced over 35 years, hutan produksi biasa, Northern concession

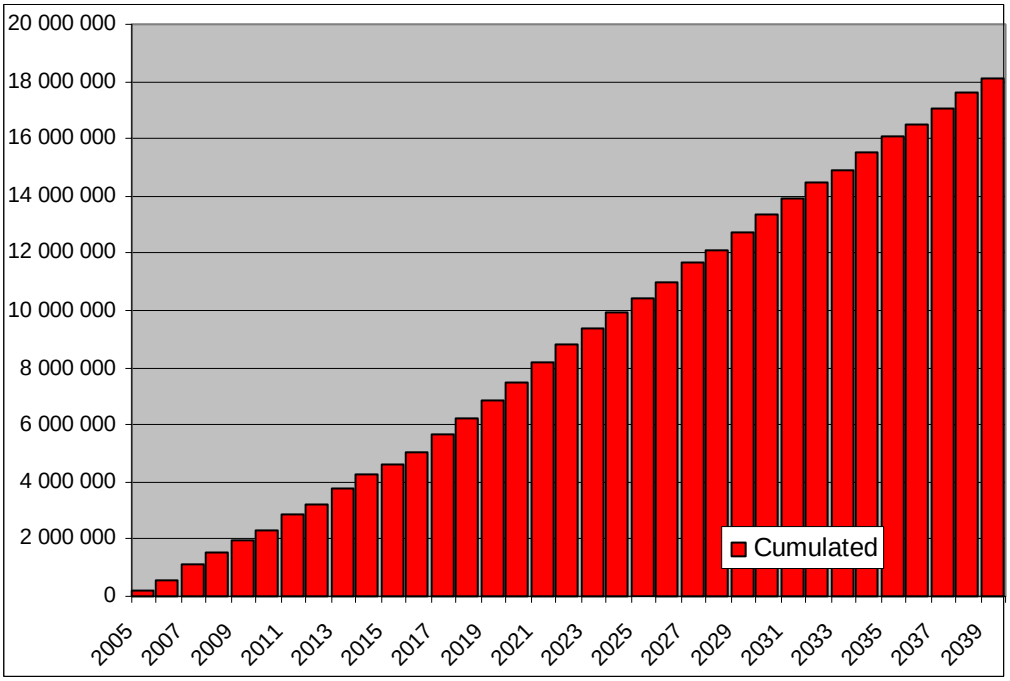

Fig 29 : Cumulated balance over 35 years, hutan produksi biasa, Northern concession

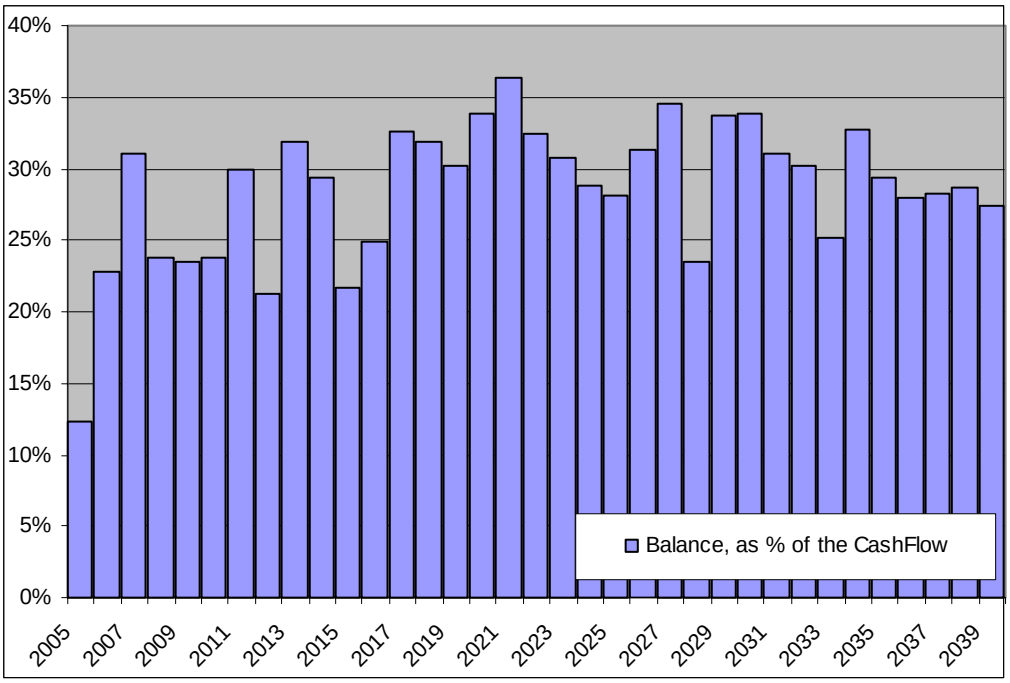

Fig 30 : Annual balance over 35 years in % pf the annual cash flow, hutan produksi biasa, Northern concession