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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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HISTORY AND ANALYSIS OF MARKETING ACTIVITIES IN THE FIELD OF BAUXITE AND ALUMINA (CASE STUDY OF HUNGARIAN EXPERIENCE)*

by

P. Relle**

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** Commercial Director, MINERALIMPEX (Hungarian Trading Company for Oils and Mining Products), Budapest, Hungary.

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I.

THE BAUXITE AND ALUMINA MARKET

At the Paris International Exhibition in 1855, when aluminum had been shown to the public for the first time, its value equaled more or less to that of gold ; it was considered to be a precious metal.

Of course, aluminum is not measured to gold any more, but it seems possible that those who invest their money in the aluminum industry make a better business in the long run than those who lock it up in gold.

1.

10 years ago, in 1968 world production of bauxite was 47 million tons, in 1977 beyond 80 millions.

Both figures contain about 1,5 million tons of non-bauxitic ores, such as alunite, nepheline, etc. Although the converting of these ores is - except for the Soviet Union - very restricted yet and it is known that research has been intensified also regarding e.g. American anorthosite and even kaolin resp. other clays, bauxite is still by far the most economic ore for extracting alumina.

I do not think that any of the mentioned substitutes could have any serious impact at least 10-15 years, unless a too high price of bauxite does not create a precarious situation, respectively does not create the competitiveness of its own rivals. As bauxite-exporting countries we have to keep an eye on that in the long run.

The bauxite-alumina-aluminum industry belongs to those most important industrial sectors of the world economy without the endproducts of which no country can do.

Hence, aluminum smelters had been established in many places, in more countries than bauxite is mined or alumina is refined at.

Thus bauxite became a par excellence commodity of international movements.

Where should alumina refineries be built ?

As to our experience two principles made their way up to now in the history of this industry :

a./ The first one says that alumina plants must be located near to the bauxite-deposits. In this way heavy transport-expenditure can be saved. Remember - depending on quality - two, two and a half tons of bauxite yield one ton of alumina.

b./ As to the second principle, be the costs of freight ever so high, still if needed, bauxite should be put on rail or boat and transported through countries or oceans, but the alumina refinery should be settled next to an existing smelter or at a place where an aluminum smelter is worth to be erected as well. I.e. so near to a cheap source of energy, as possible, let it be e.g. hydro-energy or what is most fashionable in our days, natural gas.

The international picture is the following :

Shares of world bauxite production, resp. alumina and aluminum-producing capacities /%/

	Bauxite-production 1976.	Alumina-producing capacity 1977.	Aluminum-producing capacity 1977.
Africa	16	3	3
Australia	28	15	3
Asia	6	11	17
CMEA-countries	14	17	15
Latin-America	28	15	3
North-America	3	25	37
Western Europe	5	14	22
T o t a l :	100	100	100

2.

The main export and import areas.

It is obvious that the main exporting regions are those, whose share in world bauxite production is significantly higher than in alumina refining.

These are: Australia, Latin-America and Africa.

The main importing regions are evidently the inverses of same i.e. those whose share in world alumina production is well higher than in bauxite mining: North America, Western-Europe and Asia /practically Japan./

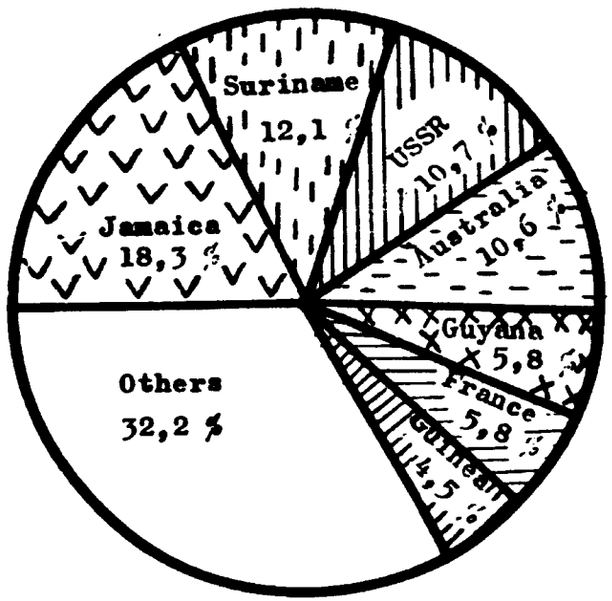
The pattern we have seen is definitely not a static one.

The bauxite- and alumina-scene has undergone fundamental changes in the past years. Let us see the next figures :

BAUXITE PRODUCTION OF THE WORLD

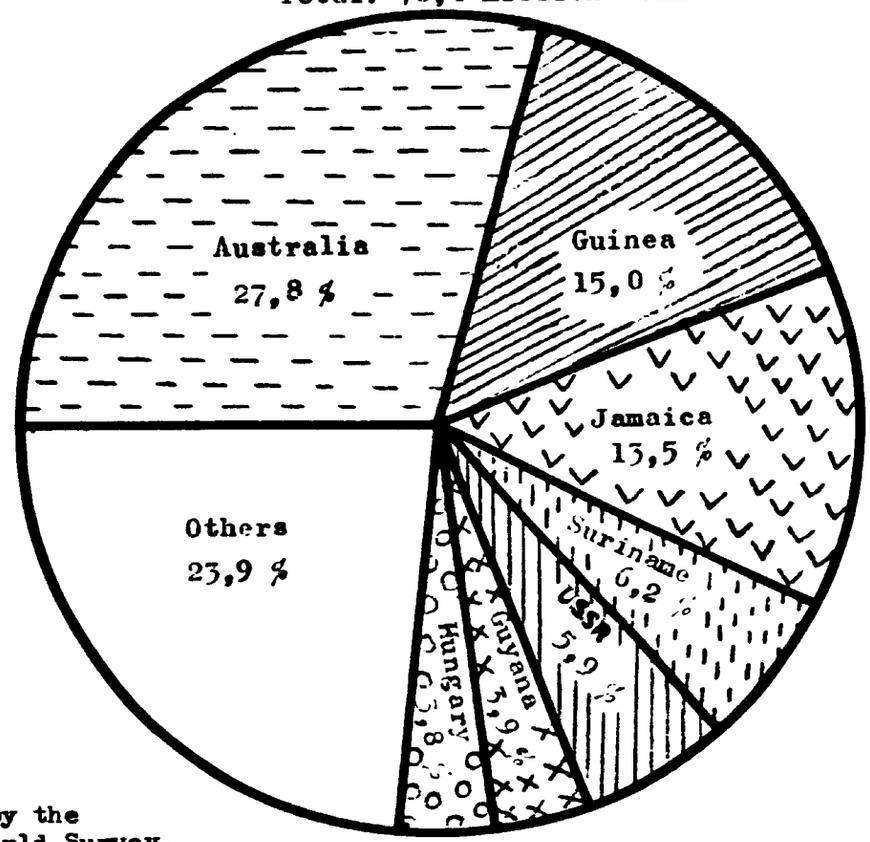
1968.

Total : 46,6 million tonnes



1976.

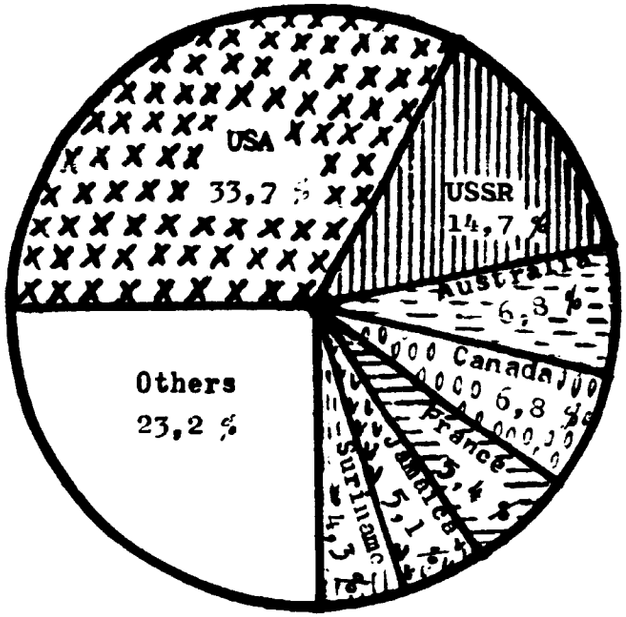
Total: 76,4 million tonnes



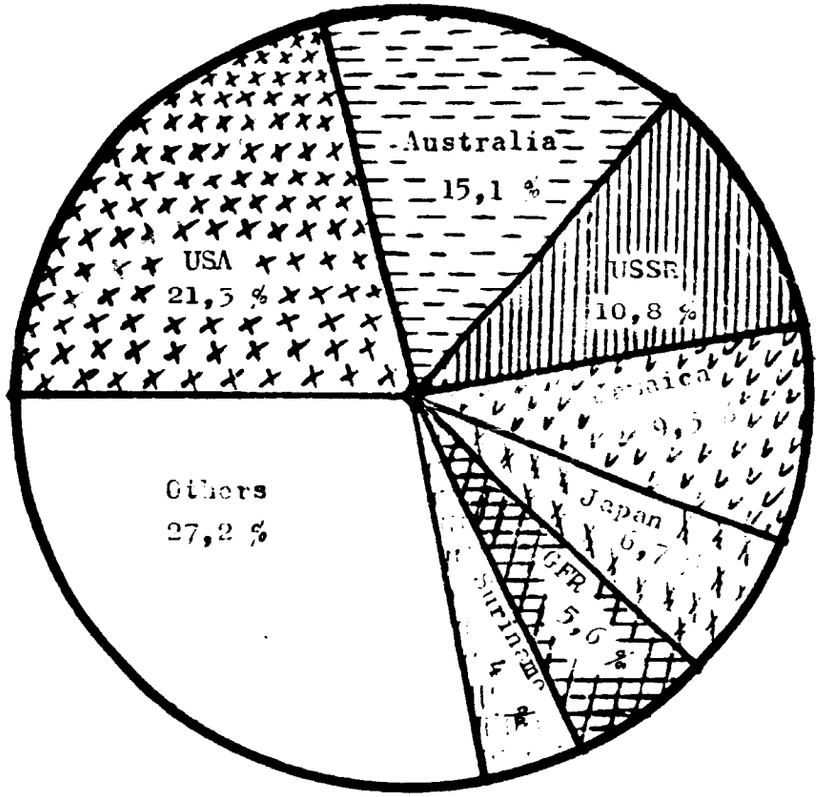
Note: Figures are based on own gathering of data by the author which was compared with that of MB World Survey.

ALUMINA-PRODUCING CAPACITY OF THE WORLD.

1968.
Total: 18,8 million to/year



1977.
Total: 33,0 million to/year



Note: Figures are based on own gathering of data by the author which was compared with that of MB World Survey.

Anybody could raise the objection, that these figures are good geographic portrayals only, but they are not meaningful from an economist's point of view, as the bauxite-alumina-aluminum industry is highly integrated and it would be more reasonable to comment upon the world-wide character and influence of the big transnational corporations than on the role of one country or another.

This topic is discussed in Chapter II.

Yet it is important to examine with serious economic considerations the figures showing the situation of the main countries concerned.

The more so, as the structural changes, which have been seen by the years gone by, are to be - as far as my opinion is concerned - attributed to fenomena connected also to national/state endeavours.

3.

Structural changes.

The majority, 60 - 80 % of proven bauxite-reserves of the world lies in developing countries and their share of world production is over the half of the total.

Downstream operations

With the strengthening of the statehood of the main bauxite-producing countries - in their majority developing countries - and in proportion as their economic horizon and expertise widened, so have they desired more and more definitely that downstream operations of bauxite should come into being on

their territory too, accompanied with a part of the financial returns of these operations.

It was about 15 years ago that this endeavour put on a pronounced complexion.

But let us be objective; this effort was not at all contrary to the interests of the multinational corporations carrying on bauxite-mining in these countries.

- The quantity to be freighted decreased by more than the half.
- Neither was it disadvantageous to find labour on favourable terms. /Even if they had to bear training and communal expences./
- Last but not least, developed countries are more and more against building alumina refineries on their own territory, due to the environmental damages caused by these mills.

The interests of both parties have thus led to the result that while the developing countries accounted for less then 1/10 of the alumina refining of the world in 1960, this rate is today over 1/3 and the trend is seemingly unchanged.

The formation of the International Bauxite Association.

If the mentioned increase of downstream operations was the common aim of bauxite producing countries and the big corporations, and all we can debate about is whose interests played a greater role, it can hardly be contested that the formation of IBA was a result of a unilateral decision of the bauxite producing countries.

This step was most probably inspired by the success of the Organization of Petroleum Exporting Countries. /OPEC/.

There are actually important similarities between the petroleum- and the bauxite-alumina-aluminum-industry of the world :

- In the case of crude oil it is OPEC, in the case of bauxite it is IBA whose members possess the majority of the global reserves, with the lion's share of the world production.

  As to data of 1976 the present eleven member countries of IBA dispose of the majority of proven reserves, having a share of 72 per cent in world bauxite production. / No need to say that IBA is not identical to bauxite producing developing countries./

- In both industries the majority of processing capacities, i.e. petroleum refineries, resp. aluminum smelters are located prevailingly in the highly industrialised countries.

  Developed countries have the upper hand concerning the geographical distribution of alumina plants too, however in the lesser extent than in the case of aluminum.

- Especially before 1973/1974 the role of the big transnational corporations was determinant in international trade and so was it in fixing the prices both in respect of petroleum and of bauxite-alumina-aluminum. On the model of OPEC, the bauxite exporting countries wish to increase their strength in these fields and raise financial revenues from bauxite export through the influence of IBA.

Further national endeavours in developing countries.

As we have seen, the national/state motives coming into prominence have largely contributed to the development of downstream operations in the bauxite producing countries and to the formation of IBA.

This element became manifest in the charter of IBA, stating that member countries will " ... take action aimed at securing maximum national ownership of and effective national control over the exploitation of this natural resource within their territories and to support as far as possible any such action on the part of member countries." / Art. IV. c. /

E.g.:

- The Jamaican tax averaged in the early seventies about 2 dollars per ton. Today with a 51 cent per lb world price for aluminum ingots the tax is abt.18 dollars and Jamaica has acquired participation in the ownership of downstream operations in the country.

- All other members of IBA /with the exception of Yugoslavia, where no foreign mining is taking place, and of Australia, resp. Ghana/ have increased their taxes hence in varying degrees./ Neither has Guyana foreign mining companies operating in the country/.
- Jamaica, Guinea and Guyana introduced or are just about to introduce measures to attach their bauxite dispatches - to a certain extent - to the employment of their newly established national shipping companies.

This is not a never-heard feature in world economy.

True, the wellknown Jones Act of the US limited itself to coastwise shipping only. However in 1974 US shipping persuaded Congress to enact that by 1982 as much as 30 per cents of US oil imports must be carried in tankers built and registered in the USA. This was vetoed by the then president - it could have been definitely not a right law.

But now a new, more moderate presidential plan seems to pass Congress, demanding that the percentage of US oil imports to arrive in US registered ships should be compulsorily increased immediately to 4,5 per cent and in 5 years to 9,5 per cent.

The establishment and the build-up of national aluminum industries is taking place even in a number of countries where bauxite is not mined, but the country is rich in cheap energy.

This duality will lead - in my eyes - to most interesting decisions and economic events.

Those governments who wish to establish a national aluminum industry on their soil, may have different motivations :

a./ Certain countries - those rich in bauxite - wish to attempt to maximize their foreign exchange income from their own bauxite resources. This could most probably be accomplished the best through downstream operations discussed before.

b./ The problem manifests itself in a fully different way in areas, where

- both bauxite and energy can be found, and also employment opportunities are to be created / e.g. Brasil/ ;

- the country has no bauxite deposits but it has ample fossile energy. There are a number of such countries, so e.g. the oil producing ones.

  They may export crude petroleum or process crude and export the refined products. If they dispose of natural gas, they can liquefy /at high cost/ and export it, or else what is the most value-increasing nowadays: to use a part of their excess energy to smelt aluminum and export ingots ;

- where energy is not fossile but e.g. hydro-energy /Iceland, Indonesia, Peru/, the abovesaid is the only way of exporting surplus energy.

All these conclude to, that he who has more motives to invest in an industrial sector, can stand easier occasional losses. Not necessarily because he is so rich: but because if a bad tendency of the market causes him a loss e.g. in primary aluminum, this can be offset by the gains in energy, employment and first of all foreign exchange.

And this is not a trifle.

4.

The Hungarian-Soviet alumina/aluminum agreement.

Knowing these internationally accepted theories and practices how did we Hungarians decide in the recent years ?

Hungary is rich in bauxite-deposits, but cheap power is scarce here.

From the beginning of our bauxite extraction until 1945, bauxite has been moved from the country overwhelmingly as raw ore. / Between 1925 and 1945 over 90 per cent of the bauxite brought to surface in Hungary was exported./

The true vertical build-up of the Hungarian aluminum industry started after World War II. and it was realised to a level, we could reach with the - not cheap but still economic - energy available.

In the late fifties however, we were step by step confronted by the problem, that though our bauxite mining and alumina refining develop in a good pace, we do not have enough cheap power for further smelters.

The solution was the conclusion of the Hungarian-Soviet alumina/aluminum agreement, signed in 1962.

We refine the economically exploitable Hungarian bauxite close to the mines into alumina; this alumina is shipped at relatively low transport costs to a Soviet aluminum smelter near the Volgograd hydro power station, where it is processed to aluminum metal. The full aluminum content - i.e. half of the tonnage of alumina delivered to the Soviet Union - is thereupon returned to Hungary in form of ingots or billets.

Hungarian alumina shipments under this agreement started in 1967, with 30 thousand tons. The export of alumina was constantly growing ; in 1974 it exceeded 200 thousand tons.

The quantities will reach their peak in 1980 with 330 thousand tons, and will remain on this level until 1985. The aluminum bought back increases naturally in the same rate.

Despite of the great geographic distance / 3000 km / aluminum comes us cheaper in this way than if Hungary had to produce it at home with expensive, partly imported energy.

A similar agreement exists between Hungary and Poland too, under which Hungary imports aluminum in a quantity, value of which is roughly equal to that of exported alumina.

II.

FIRMS PARTICIPATING IN BAUXITE AND ALUMINA TRADE.

Companies participating in bauxite and alumina trade can be classified into three categories :

1.

Transnational corporations.

Vertically integrated, world-wide large private enterprises, who carry on bauxite mining, alumina refining, aluminum smelting and fabrication of aluminum products alike.

As to our estimation about two thirds of the world bauxite and alumina trade takes place within the six transnational corporations in such a way that both the supplier and the consumer are sister-members of the same group of companies.

Concerning further quantities of no little amount, the corporations have mostly long term connections with a number of independent companies and sell respectively buy bauxite or alumina to resp. from them.

The large multinational corporations - Alcoa /USA/, Alcan /Canada/ Reynolds /USA/, Kaiser /USA/, Alusuisse /Switzerland/, Pechiney /France/ - have in the international bauxite-alumina domain thus such a dominating role as other transnationals have in the petroleum industry, so famous for its concentration.

The two main features of these corporations are

- the vertical, and
- the world-wide character.

These companies who started their activities as fabricators of sheets, etc, have always endeavoured to secure supplies by integrating back to primary aluminum production, alumina refining and bauxite mining.

The vertical character brought in its train the transnational organization; this feature attained full growth after the Second World War.

Historically these companies crossed their national boundaries mostly when they could find no more cheap energy or base material in their country, respectively when it was more economic to produce alumina not at home but at the site of bauxite, instead of carrying bauxite home.

In this epoch the large corporations acquired numerous concessions in bauxite mining abroad, resp. started production in new mines. This process is still going on.

Statistics reveal that the majority of alumina and aluminum production of these companies is given by refineries, smelters and factories in the mother country.

What does thus the transnational character of these corporations mean ?

If you investigate in how many countries the 6 large corporations have bauxite-alumina and primary aluminum subsidiaries you will arrive at a figure of roughly 15.

This is definitely not few, but I think that the world-wide character of these corporations means first of all, that they

acquired mining concessions in practically all bauxite-producing areas of the world ; they participate in one way or another in nearly every big alumina refinery, reduction plant, processing factory etc built abroad, resp. they are often built on their initative. /Except of course for the countries with centrally planned economies./

As to alumina refining capacities : 10 years ago, in 1968, the six large world-wide corporations had a share of abt. 80 per cent, while this changed to 67 per cent by 1977.
/This calculation presumes, that each shareholder can hold possession of the alumina refined in the percentage of his ownership./

The reason of the above relative decrease is, that

- companies, owned formerly by the corporations had been nationalized, /Guyana/ or e.g. Guinea acquired a 49 per cent participation in Friguia operating the local alumina plant ;

- new, state-owned enterprises came to existence over the past ten years, resp. they have built new capacities. E.g. Bharat Aluminium Co. in India or Seydisehir in Turkey.

- The companies independent of the largest corporations increased their capacities sharper than international average has been in these 10 years.

  The latter came to 70 per cent, while e.g. VAW of the FRG expanded its alumina capacity between 1968-1977 from 330.000 tons per year to 1 million, or the Italian state owned alumina industry has grown from 275.000 tons per year to 920.000 tons.

However this does not mean, that the alumina-production data of the transnational enterprises would have decreased. 80 per cent of world alumina production equalled to 12 million tons in 1968, however mid'77 the "only" 67 per cents made 17,5 million tons already.

2.

Producers, not belonging to multinational corporations.

It is hardly possible anymore to draw a line between transnational corporations and s.c. independent big producers.

The leading ones of the latters are economic empires themselves and they remain - or can remain - less and less within their national boundaries.

Vertical expansion becomes characteristic to those Western firms too, who were formed originally to work within their own countries only.

The difference between the two mentioned groups of companies is however, that

- the transnationals have by far bigger producing capacities and their activity covers all 5 continents ;
- the vertical integration of the transnationals is complete, the independents' definitely not.

Among the non-transnational large companies a growing number is partly or totally state owned.

If you go into the details of an up to date review of the most important figures of the world bauxite and alumina industry, broken down to countries and firms, you will find interesting inherences.
E.g. joint ventures of corporations, respectively corporations and state ; as the minimun economic size of new alumina refineries and aluminum reduction plants are forced

upward to a level, which is often highly above the needs of any single enterprise, how large it ever is. This is the reason of the formation of consortia with multiple producer participation.

Trading Companies.

This is the third group in the cast of the international bauxite and alumina trade.

Why is the existence of traders justified in a market so concentrated as the one we speak about ?

a/ In a number of countries production activities and trading is separated traditionally. And let us say at once that with no bad results.

Being in Hungary, I mention the CMEA countries. The system of dividing business in production and in trading is, as in reason, more or less an intermediate position between pure production and pure trading.

But no doubt ! The trading companies of the CMEA countries carry on their activity as independent legal entities and they are responsible for their actions, their risk taken, as any other good trading house of the world.

However, they are closely connected with the producers in their country, much closer than it is the case in countries with market economies.

The more so, as in most cases they have monopoly in exporting, resp. importing the goods they are charged with. The reason of this monopoly is e.g. that if a small country, like Hungary, with 10 million inhabitants only, had more foreign trading companies for the same product, none of them

could get along on the international markets being nowadays more and more concentrated. Thus none of them could gain a real reputation.

Strong connection between these trading companies and the industry means also that the latter has far reaching influence on the import and export activity, however, without any limitation of the responsibility of the trading companies in any form whatsoever. E.g. Hungarian Mineralimpex who sells to or buys from companies in countries with market economies is a trading house just like its partners.

b/ Not every producer intends to take the burden of trading.

First of all the newly formed national companies of developing countries wish to concentrate on well-managed production and leave the rest of the business i.e. international deals to trading firms with long years experience. They do so with the wise patience that if they could wait to participate in the aluminum business for decades, so having already a considerable share of the industry on their soil, they certainly have a few more years to wait and see, until they dispose of a team experienced enough to trade.

c/ It is probably correct to suppose that over the past few years producers recognised step by step the existence of the traders in the bauxite-alumina-aluminum market as well.

In the early sixties over 90 per cent of the alumina produced in the world was consumed by smelters within the own group of companies and only about 10 per cent was actually sold. The majority of this 10 per cent quantity was not brought to the open market place either, but moved under long term contracts from the alumina producers to primary aluminum plants. In 1967 a UNIDO Monograph has still stated, "... alumina is not traded on open markets." /Non-ferrous Metals Ind. 1969. p. 37. /

Even in the early seventies the general opinion was that max. 10 per cent of the alumina production of the countries with market economies was not captive. When saying 'captive' I mean the movements within each corporation and the movements from any producer whatsoever to a primary aluminum producing company under long term contracts.

It was only over the past few years that this rate has grown to nearly 20 per cent. I consider this to be a trend that will by and large hold on as long as the unpredictability of the market will last ; nobody could tell you the end of this period, but I am convinced that it will go well into the 90's / and I readily give my reasons for this hypothesis./

Let us come back to the statement, that the increase of the share of trading firms in the market is not a mere chance.

What are the reasons for it ?

They are - as to my opinion - the up-to-date functions of s.c. swap-activities.

Swap was invented in the industry and not in commerce; but it was and is the trader who made the most of it, to the benefit of the producers and to his own.

I would class alumina swaps in

- activities in time, and
- activities in space.

Activities in time

In depressed periods, when price reductions can - of course - not change the market situation, capacities are often shut down. If an unpredicted boom arrives, or it arrives sooner than foreseen, a number of aluminum smelters would appear in the market place for "spot" alumina. /See chapter IV./

Those traders who were far-seeing enough to have excess alumina available, can

- simply sell it /what is of no special interest in our case except to appreciate the fore-knowledge of a capital-intensive trader./

- or he can "lend" the alumina to be returned after a shorter or longer period of time. In such a case not only the foresight of the trader is to be appreciated / and paid / but his capital-intensiveness, too.

Activities in space.

This means that you "move" alumina without actually transporting it ; that you find a partner who needs alumina where you don't and gives you alumina back where you require it.

E.g. if a centrally located West-European smelter, not far from Hungary, needs alumina, he has the following choices :

- to buy it overseas and freight it to the next / but still far / European coast, plus from the port to the plant ;

- to buy it overseas and freight it to the arriving port only ; cede it e.g. to the Hungarians who return alumina at their border from where freight to the smelter is less, than from the port.

  It goes without saying, that the primary condition is, that in this case the Hungarian trading company should need alumina next to the sea. But if it is a large trading house - and it is - you have a good chance that it can find an interest in such a transaction. If you share the cost of freight you economized with your swap partner both of you made a good business.

III.

PRICE ISSUES OF BAUXITE AND ALUMINA

1./ Bauxite

Hungary is one of the most important bauxite exporting countries in Europe.

Thus we were always interested in using reasonable price-clauses.

Our experience is, that as - until recently - the price of bauxite has hardly - and rarely - changed, most of the price formulae were limited to 3 parameters of quality :

These are :

- moisture
- aluminium-oxide / Al_2O_3 / contents
- silicium-dioxide / SiO_2 / contents.

The basis of an actual Middle-European contract was e.g. 8 % H_2O, 55 % total Al_2O_3, 5 % SiO_2.

If moisture exceeds this rate, the difference is simply deducted from the quantity.

If the actual rate of aluminium-oxide is higher than foreseen in the price-basis, the seller is entitled to add a premium to the price.

If the Al_2O_3 contents of the bauxite dispatched is lower, the seller has to deduct a penalty from the price.

The premium resp. penalty we met in the course of the years were around 20-25 US cts for every per cent of the difference.

If the actual rate of SiO_2 is lower than the basic figure the seller receives a premium double as high as that for Al_2O_3 ; if the SiO_2 contents is higher than it ought to be, an equal amount has to be deducted.

This system is fair within strong limitations only as it stands to reason that freedom to use different bauxites in alumina refining is limited and thus a greater deviation from the quality you are accustomed to cannot be compensated so easily.

The main exporting countries endeavour presently to unify a marker grade of bauxite and set a base price for same.

As bauxite is a mining product, there are hardly two areas in the world where qualities are exactly the same.

As far as we know the target is, that a bauxite assaying 45 per cent available Al_2O_3 should be the base, with a floor price of about $ 24,-/metric ton, landed in the US and Canada.

This corresponds to the goal, that the price of bauxite should be 2,5 - 3 per cent of the primary aluminum ingot price as quoted in the American Metal Market.

2./ Alumina

Let us discuss one by one the most used pricing methods, which are - as to our experience - the following :

a/ contracts with fixed prices,
b/ linking alumina prices to the price of aluminum ingots
c/ escalation clauses of more factors

a/ Contracts with fixed prices

It was in 1973 when the great re-shaping of world economy started, practically parallelly to excessive inflation in countries with market economies.

Since the sharp rise of many basic material prices is a most important part of the new deal in world economy and the value of raw materials has well increased compared to the rest of goods, times have irreversibly passed when you could make a long term fix-price-contract with any serious producer.

The owners of raw materials reckon with good reason upon a further increase of the value of their goods, even if they would forget about any other effects influencing the scene ; so they are right not to enter into arrangements to fixed prices over an extended period.

I said "even if they would forget about any other effects ..." but you know well that one cannot forget about the "other effects", first of all inflation. The less as there was a two-figure inflation in a number of countries in the recent years and this will calm down only step by step or it might survive in several countries for an other while.

Thus the sphere of fixed prices is limited to the short term / e.g. one year/ resp. to the s.c. "spot" business.

I would definitely not sign willingly a multi-year contract with fixed prices neither as a seller nor as a buyer.

Why ? Because a business is not to be concluded only, it has to be realized, too. And he who trades to secure important materials for himself or his customer must not enter into a deal too nice to be true ; else he will be in the same boat with the peasant of the joke who bought seeds for autumn from his neighbour, in the spring. They shake hands on agreement and the buyer requests to put it down on paper. "What is paper for ?" asks the neighbour,

"if prices go down meanwhile, you will not take the seeds from me and if prices go up I will not sell them to you".

b/ Linking alumina prices to the price of aluminum ingots / in long term transactions /

The base of this system is that about 92 per cents of alumina refined in the world goes for aluminum smelting and so it is reasonable that its price should be connected to the price of aluminum metal.

Either in the form of expressing the price of alumina in a certain percentage of aluminum quotations, i.e. the quotation published on the day of the dispatch of alumina, has to be multiplied with the percentage fixed and this sum should be invoiced.

The price of alumina is - as to our experience - mostly linked to one of the aluminum-ingot quotations of the Metal Bulletin, published twice a week.

In many countries the daily newspaper American Metal Market is known better and so a number of contracts refer to one of the quotations of this daily. /The quotations of Metal Bulletin and American Metal Market are not the same/.

Another known possibility is to refer to the SEC 10-K figures. As far as we know the selling prices of ingots which the aluminium corporations in the USA have to report to the Security and Exchange Commission are summarized in certain reports.

It is a question of contracting, whether buyer and seller will consider a kind of average of the figures contained in such a price-report as basis, or they select even a single corporation and let the ingot-prices of this one regulate their alumina prices.

The determination of alumina prices by the abovesaid percentage-system has a number of advantages compared to fixed prices as it makes none of the parties particulary interested in backing down from the business.

However, this pricing system has got its reverse, too.

First of all, it is rather arbitrary to say that the bonanza of alumina will necessarily be always the same as that of aluminum.

After all we experienced repeatedly that e.g. the price of petrol does not for certain move up or down /be sure: up/ as the price of crude oil does. Besides, if the difference of price between alumina and aluminum is given mainly by the costs of energy, so we have already given one good reason why it is not fully justified to tie up the price of these two products so tightly.

But if you will sign agreements linking alumina prices to those of ingots, please give a careful consideration not only to the trade paper you selected for this purpose but also to the clear determination of the kind of aluminum and the denomination of the quotation you have chosen within the paper and even to the column of same.

We have often met and practised an usance which is not very different from the one discussed above and therefore it can be similarly criticized. This usance is the following :

- buyer and seller agree in a basic price of alumina and they let it be regulated by one of the quotations of e.g. Metal Bulletin.
- Every 1 cent increase or decrease of the mentioned quotation increases or decreases automatically by two, two and a half or three dollars the ton-price of alumina.

Why do I mention just two-three dollars ?

Let us see which alumina-price-increase per ton will correspond in percents to a 1 cent/lb aluminum price increase.

The formula is simple :

$$\text{Increase of the price of alumina / \$/ton /} = \frac{\text{agreed basic price of alumina \$/ton}}{\text{aluminum price quotation at the time of contracting /cts/lb /}}$$

In our case this means an

$$\text{Escalation} = \frac{120\ \$/\text{ton}}{51\ \text{cts/lb}} = 2{,}35\ \$/\text{ton}$$

The buyer will - most probably - suggest a degressive escalation, the seller will be fighting for a more progressive one. But realities will urge both parties to abide within close range of $ 2,35 in this instance.

This method is in a number of cases maximised and minimised. I.e. the price of alumina cannot go into the clouds even if the price of ingots rises sharply, respectively, it cannot go below rock bottom, if aluminum quotations would fall without end /what is practically never the case./

However, these are already such details which have to be examined at each business seperately, to find mutual interest.

You can see from what I have detailed that to tie up the alumina price with that of aluminum metal is definitely not a bed of roses. They are so bad indeed, that only all other methods mentioned or to be mentioned are worse.

c/ Escalation clauses with more factors

There are fields in international business where - I know it from practice - the use of escalation formulae of more factors cannot be avoided. However, the trade of alumina is - as to our experience - not one of them.

But buyer and seller may agree of course in any escalation clause more complicated than those discussed before.

Usually nobody neglects the price of aluminum ingots as a basis, but sellers often come forward with a suggestion that changes in the price of fuel oil and caustic soda, respectively the costs of investments should be taken into account, too.

Such formulae are however more often worse than not, compared to those clauses mentioned before.

Although at the first glance you could think that using 4 factors instead of one or two, would counterbalance extremities, on second thoughts you will see that just the opposite is true.

Notably :

- If you take the price of aluminum metal as your basis, you have already taken the price of energy into consideration to an extent of about 25 per cent. Why should therefore the price of fuel oil be involved, too ? The increase of energy prices is energetic enough ; there is no need to count it twice. To do it once is more than enough /as alumina refining does not need such a rate of energy as aluminum smelting/.

- To involve indexes of investment costs is not justified either. Why, in production costs of aluminum, investments of the smelters are represented by about 27 per cent ;

the rate of investment-costs of alumina refineries to appear in alumina prices is not higher either. If so, why should investments be taken twice into account ?

- And caustic soda ? This manifests itself in aluminum prices through alumina only. Are allowances neither to be made for this ?

This is a point ! However, fluctuation of caustic soda prices is very unforseeable. In Middle-Europe it was abt. 120 $/ton in 1973, roughly 400 in 1974, around 250 in 1975, again 120 in 1976, below 100 at the turn of 1977/1978. The risk of the buyer and the seller of alumina is thus much the same.
So they mostly drop the matter.

IV.

POLICY CONSIDERATIONS CONCERNING LONG-TERM AND SPOT TRANSACTIONS

1./ The investment side.

The cost of building an aluminum ton of capacity plus the capacity to refine two tons of aluminum-oxide and to mine abt. 4 tons of bauxite took - as to UNIDO data - 1600 dollars in 1968 : /25 dollars per ton of bauxite, 250 dollars per ton of alumina, 1000 dollars per ton of smelting-capacity/.

A similar investment needed in 1976 already 3600 dollars and more or less the same comes to abt. 5000 dollars now.

To be economic an alumina refinery must have nowadays a size of nearly half million tons per year. This means that the smelter belonging to it would be of 200.000-250.000 tons. Multiply these by 5000 dollars and you come to figures higher than a billion.

When costs of new plants are so high, the main concern of an alumina refinery cannot be any more how to buy bauxite by one dollar less and the same applies to the aluminum smelters in regard to aluminum-oxide; it is more important, that the capacity built with such expenses should not stand without work for a day, if market is good.

Continuous supply can be secured in most branches of economy by long term contracts only.
Bauxite mining and alumina refining facilities were always planned to assure adequate supplies for the aluminum smelters at full capacity. Bauxite and alumina were from the beginning rarely sold "spot" but moved under long term contracts even then when the vertical integration of the bauxite-alumina-aluminum industry was not so general as nowadays.

Regarding the high investment costs mentioned, I am convinced that the system of long-term contracts will prevail in the future even more then today.

This trend is reinforced further by the wish of developing countries to pay for their planned alumina plants with the alumina to be produced in same; and

- he who purchased the plant has to know clearly the conditions his aluminum-oxide can be sold on, till his instalments are paid off, respectively
- he who gave the credit does not wish to run after his money, but demands to know in no uncertain terms how he gets his capital back.

This vector /i.e. the investment side of the bauxite and alumina industry/ always shows in the same direction, urging the conclusion of long term agreements.

Actually our experience is, that no aluminum enterprise exists who would not care to assure the overwhelming part of the raw materials it needs, through long term contracts.

2./ The nature of spot transactions

This factor is much more doubtful and by far not as predictable as the first one has been.

- The market position of bauxite and alumina are linked to the fate of aluminum; when smelters work at full speed, alumina and bauxite are obviously more in demand, too.

  But as ingots have a rather cyclical market, a possible low demand usually forces reductions in smelting, causing excess supplies of bauxite and alumina; these excess supplies of alumina are often sold in the open market. This is one of the sources of spot offers.

- The second one is the quantity bought - by risk - taking - traders - in the "seven lean years" and sold when alumina is in short supply again.

- A third source is, that alumina refineries - as well as other factories - always keep a certain reserve-capacity for cases not to foresee. Now then, if prosperity is good and no breakdown occured, this reserve capacity can be used to produce additional alumina. If this is not needed by the company's own smelters, it will be sold probably in the open market-place.

  Buyers for spot quantities could be in the market for at least three reasons :
  - first, production difficulties in their own plants or at their suppliers ;

  - secondly if the market of aluminum is better than foreseen, every smelter throws in all stand-by capacities reserved and as these are obviously not covered with long-term alumina contracts, the enterprises try to make use of these capacities by purchasing spot alumina ;

- a third reason used to be that - first of all in slump - the aluminum smelters neither cover their normal needs with long term contracts in full, but speculating on a weakening market they try to buy certain quantities in the market, spot. This is something like a flirtation, parallel to happy marriage.

In the recent years, including the deepest recession since the Second World War, spot business was more often advantageous for buyers than for sellers.

Does this mean that a smelter can always be sure to find alumina in the market to reasonable conditions ?

Not at all. When between e.g. 1968 and 1970 there was an unusual and unpredicted aluminum boom and consumption grew yearly by 11-15 per cent in a number of countries, the production of countries with market economies was the following :

	1969.	1970.
	'000 tons	
alumina production	15.620	16.550
aluminum production	7.440	8.200
rate	2,1 : 1	2 : 1

The rate 2 : 1 meant that the world aluminum industry has needed practically every ton of alumina refined, no new stocks were piled and there was no excess at all.

The situation was much the same in the temporary boom in 1974, after the depression of the early seventies.

However, the position is different now.

Statistics state that "excess" production of the IPAI countries was about 700.000 tons in 1976; it made roughly

196.000, respectively 166.000 tons in the first two quarters of 1977 and - interesting enough - over 300.000 tons in the third quarter of the last year.

How about the future ?

In the years since 1973, also the world aluminum industry has experienced bad years. However, the primary aluminum capacity was utilized to over 80 per cent, a rate enviable by more than one industry even in better periods.

Now: there is an acceptable thumb-rule; the increase in demand for aluminum is roughly the double of the yearly growth of G.N.P.

As the annual growth rate of the world economy has been 3-5 per cent in normal years, we got used to a 7-8 per cent expansion of the aluminium production over the past few years.

At the same time the annual growth rate of primary aluminium capacity was less than 5 per cent in the same recend period.

The inflation has limited the number of those, who have capital enough to enter as new producers the aluminum industry of such a capital-intensive nature.

So one can suppose that the yearly expansion of the capacity of this industry will not exceed more the above mentioned 5 per cent in the near future.

If this is true and if world economy returns to its usual 3-5 per cents, so the likelihood is that the years ahead may see a shortage of primary aluminium and utilization of capacity will be high.

Parallelly bauxite and alumina will also be in short supply within a few years.

Under such circumstances it is only a good forecast of the bauxite and alumina market that gives you an answer whether you may count with the possibility to make a good spot transaction.

The profit or the loss of spot deals is not too much in proportion to the production of an alumina refinery, but it is very considerable if you compare them to your relevant expences.

A year ago a big West-European aluminium company, which has paid, with its escalation clause, within the frame of a long term contract 155 dollars for its North American alumina, procured another 40.000 tons, / left cleverly to be bought on the spot market,/ for 120 dollars only. This made 600.000 dollars, earned by nothing more but the salary of 1-2 experts and the will to run a risk.

But please ! If you decide that you shall also leave a yearly range of a few ten-thousand tons of alumina to be bought or sold in the market place /spot/ never say that a "reasonable risk is, where we gain at the end."

Business is not a run of luck ; the ball is round.

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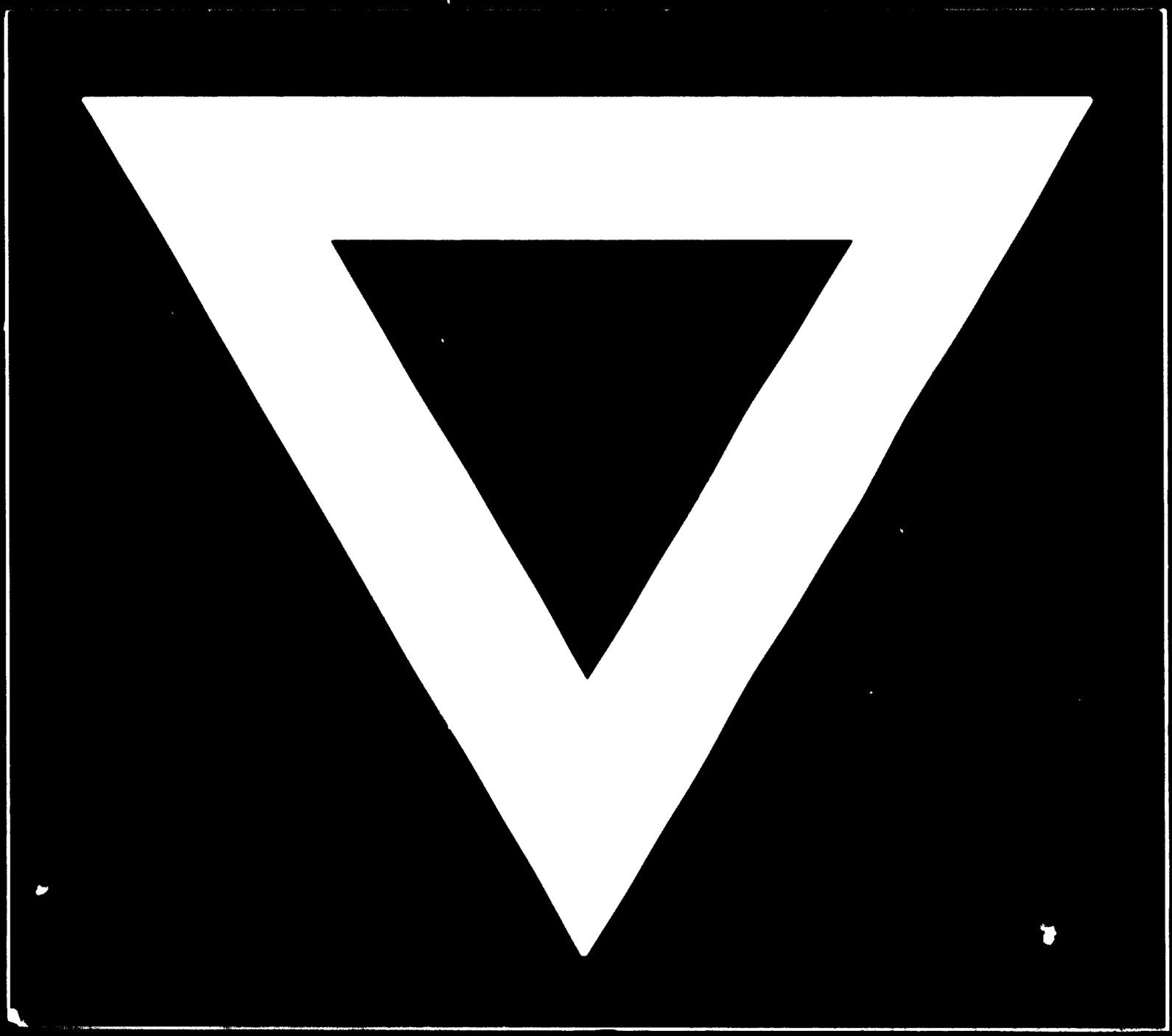

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