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POSSIBILITIES FOR INCREASING REGIONAL TRADE
IN METALLIC MINERALS AND METALS^{*}/

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I. INTRODUCTION

Human civilization and its economical and social development has always been vinculated, in every era, to the consumption of mineral goods and metals. So, as a result from this relationship, some scholars link the different periods of human civilization to the mineral and **metallic** goods then prevailing. **In this** sense and after that predominance have the different periods been named, such as The Stone Age, The Copper Age, The Bronze Age, The Iron Age, and the present one, The Atomic or Nuclear Age.

It is also true that the interlinking got even more close from chiefly the two following events:

. when Man first **developed** the early pyrometallurgical processes making use of wood's thermic and reducing proprieties. Until then, metals such as gold and copper were used in its "native form";

. by the Industial Revolution, started in England around XVIII century when machine granted the replacement of a large parcel of a work which until then had to be performed by men and animals.

In order to give a numerical view from what has been expounded and specially in relation to the century we live on, we present on TABLE I the evolution of world's consumption of steel and common non-ferrous metals at the 1900/1980 period. On the other hand, it is important and oportune on this occasion, that we pay attention to the fact that, while the consumption of metal **increased** by tens and hundreds and even by thousands, as it is shown on TABLE 1 - the world's population at the same period grew only three times, passing from 1556×10^6 to 4415×10^6 inhabitants.

We are sure that on next decades the pointed out interlinking that exists between the consumption of metals and minerals goods and the socials and economical development of human civilization will not only be maintained but will also grow both in intensity and in extensity. This affirmation of ours is based upon some considerations, from which stands out the following ones:

. natural enlargement of the different activities already traditional consumers of metallurgical products: industry of **capital** goods as well as naval, electric householdings, **automovilistic** and others.

. replacement, chiefly on advanced countries, of industrial equipment, transportation unities and others considered as obsolete.

TABLE I

PRINCIPAL METALS' WORLD CONSUMPTION' EVOLUTION
1900/1980 PERIOD (IN 10³ TONS)

	<u>1900</u>	<u>1970</u>	<u>1980</u>
STEEL	28.000	595.443	711.429
ALUMINIUM	7	9.928	15.245
LEAD	764	3.871	5.288
COPPER	470	7.265	9.503
TIN	115	228	224
NICKEL	6	567	718
ZINC	511	4.886	6.069

INFORMATION SOURCES:

1900 - A. SUTULOV

1970 and 1980 - STEEL: INTERNATIONAL INSTITUTE FOR IRON
AND STEEL; NON-FERROUS METALS: WORLD
METAL STATISTICS.

. national programmes of industrialization, of building, of transportation, agricultural, and others, which are being settled on several developing countries.

. new activities that are being developed by Man; and because of the continuous requirements of human civilization which aims at larger, better, and in some cases, sophisticated ways of life.

Therefore, pondering what we have just expounded, we can't agree with certain recent forecasts about world's steel consumption for 1980's decade, which, according to our point of view, are quite pessimistic.

As yet, we could not leave out considering the risk these forecasts represent, since they inhibit - as it has already happened in the past - the expansion of world's production capacity; and consequently, on occasion of economical revival, we are going to see the offering / demand condition's relation of inputs and metallurgical products unbalanced all over again. We can't forget that the expansion of a mineral- metallurgical enterprise takes from 2 to 4 years to its real full achievement. On its turn, the setting up of a new mineral and/or metallurgical project takes from 6 to 8 years of activity to reach its "mise en marche" stage.

II. LATIN AMERICA'S CHALLENGES AND NATURAL RESOURCES

We consider Latin America, geographically speaking **as being the** continental area which extends from Rio Grande, on the boundary between Mexico and the United States, to the southern extremity of Argentina. The total **area** includes 21 countries and territories summing up 20 million km² of area.

This large region's present population ranges around 350 million inhabitants, whose great majority is disposed of in concentrations located along the Atlantic, Pacific and Caribbean shores. According to international organizations' forecasts, Latin American population is expected to be near 550 million people by the end of the present century. Therefore, the expected annual population increase within the next 15 years require efforts from Latin America in order to properly be able to create millions of new jobs; attend to the expansion and/or setting up of infra-structures, whether in **dwelling** or, education, health, transportation and others, for millions of people.

On the other hand, the enormous distances that keep each Latin America's edging cardinal points apart, put together with the fact that its low **popu-**lational density remains preferentially disposed at the land's fringes, combined to the immensity of the Amazonic region plus the 7.200 km high walls represented by Andes, and some more other geographical accidents, such factors makes it hard for both national and regional programmes of social and economical development.

Nevertheless, the challenges that have just been pointed out must be overcome any way, even if necessarily appealing to imagination to meet new answers to make it possible, by instance: a river crossing of South America's central part, north-to-south way, by means of connecting Orinoco, Amazon and Plate Basins; utilization of Lake Titicaca for electric energy generation and soil irrigation of countries located on the

III. MINERAL - METALLURGICAL INDUSTRY POLITICAL IMPLICATIONS

As we have already had the opportunity to comment in the later chapter, Latin American mineral and/or metallurgical industry is going to play a role of capital importance on the region's development. This affirmation of ours is based on the following, among others, political implications:

. The mineral-metallurgical industry promotes or **intensifies** the research of mineral resources. It is interesting to point out that in some cases, it happens that along with these researches, new kinds of mineral resources are discovered. The "GREAT CARAJAS PROGRAMME" is one of the most significant examples: located on the northern region of **Brazil** and aiming at first the research for new Brazilian resources of iron ore, it ended up by the discovery of other mineral resources, as **bauxite** cassiterite and manganese, gold, copper and other mineral ore. Those discoveries turned CARAJAS to be one of the world's richest areas in variety and in quantity of mineral resources.

. The mineral-metallurgical industry furnishes inputs and capital products for any kind of economy. No country, in any degree of development and specially those owners of enough or plentiful mineral resources should **depend** totally on foreign supplies of mineral and/or metallic goods. Such would be the case of iron/steel and of bauxite/alumina/aluminium in Brazil; of copper in Chile and Perú; of zinc and lead in Mexico, Peru, etc., etc.;

. Mineral-metallurgical industry had manifolding effects, for its implantation and/or expansion allows and fortifies the integration of industrialization's vertical processes. They constitute the so - called "backward effects" and "forward effects". In the first case are, among others, the refractory and the alloy-iron industries. In the second case are the industries of forging, melting, of capital goods, of durable consumption goods, etc.

. Mineral-metallurgical industry plays an irreplaceable role as a direct and indirect generator of jobs. In 1980 solely the steel producers of Latin America - and therefore excluding the sectors of mining and beneficiation; transportation; correlative industries (melting, forging, refractory, etc.); universities; entities for research and siderurgical planning; enterprises for service rendering, etc; - the steel producers did directly employ 270.000 individuals, according to ILAFA. In other words, over a million people at family level - depended upon the region's siderurgical industry in that year. So, if we take into consideration the sectors that were excluded, these numbers should at least be multiplied by 8 or 10 times.

. It is fundamentally important to point out the fact that mineral-metallurgical industries intensely promotes workmanship's knowledge and specialized know-how at every level or sector of its activities, besides constituting one of the main levers for the development of national technologies, whether by means of adapting the inputs and metallurgical products to national conditions or by means of developing processes and new operational techniques. It is opportune to, herein, point out the efforts mineral-metallurgical industry has been exerting on the area of reduction and maintenance of energy since the petroleum's crisis eclosion almost 10 years ago, it being also meritorious the work done in favour of that basic segment, aiming a substitution for the formerly employed petroleum, specially in countries which are dependable on foreign supply, replacing it for alternative resources of energy, preferently the native ones.

. Mineral-metallurgical industry collaborates intense and extensively on the trade balance of its respective countries, whether through the exportation of inputs and metallurgical products in countries plentiful of mineral resources, whether through the replacement of importation, either whole or partially, by national production in case of reserves at least small or enough to. As an example, the increase of Latin

Andean region; etc.

There is no doubt that there will arise problems of all kinds and magnitudes to take over, such as the distortions long accumulated from the past, international situations, etc. It is also easy to understand that the financial resources demanded to meet with the so pointed out challenges' answers will amount up to fabulous sums.

In short, we believe that this brief survey will supply an idea to all the numerous and complex problems of political, social, technical, economical and financial nature, which shall have to be solved lest Latin America goes back to a thoroughly underdevelopment state.

Latin America as a whole is one of the world's richest in natural resources, among which stands out the metallurgical and the energetic ones: TABLES II and III. Consequently, as it is going to be demonstrated on the following items, Latin American mineral-metallurgical **industry is** going to play a role of capital importance on the economical and social region's **development**, as for example, by generating foreign exchange credits whether through exportation of inputs and metallurgical products or avoiding its importation; by direct or indirect generation of thousands of new jobs; by promoting the industrial verticality, and so on.

TABLE II

WORLD MINERAL RESERVES^(*) (IN TONS)

	MUNDO (A)	LATIN AMERICA (B)	(B)/(A) (%)
BAUXITE (1)	22.900 x 10 ⁶	6.026 x 10 ⁶	26,3
CASSITERITE (2)	10.000 x 10 ³	1.587 x 10 ⁶	15,8
LEAD (2)	157.000 x 10 ³	11.484 x 10 ³	7,3
COPPER (2)	493.000 x 10 ³	189.445 x 10 ³	38,4
IRON (1)	247.090 x 10 ⁶	53.772 x 10 ⁶	21,7
LITHIUM (2)	2.236 x 10 ³	1.270 x 10 ³	56,8
MANGANESE (1)	5.447 x 10 ⁶	170.000 x 10 ⁶	3,1
NIOBE (2)	4.387 x 10 ³	4.169 x 10 ³	95,0
NICKEL (2)	65.300 x 10 ³	23.879 x 10 ³	36,5
ZINC (2)	240.000 x 10 ³	15.536 x 10 ³	6,5

^(*) including indicated end measured reserves

(1) in terms of raw ore

(2) in terms of comprised metal

INFORMATION SOURCES: ECONOMICAL COMMISSION FOR LATIN AMERICA;
NATIONAL DEPARTMENT OF MINERAL PRODUCTION
IN BRAZIL; MINERAL COMMODITY SUMMARIES.

TABLE III

WORLD AND LATIN AMERICA ENERGY RESERVES

	WORLD	LATIN AMERICA
PETROLEUM (barrel)	655×10^9	84×10^9
NATURAL GAS (foot ³)	2.579×10^{12}	164×10^{12}
MINERAL COAL (TM)	10.125×10^9	35×10^9

INFORMATION SOURCE: OLADE/ ILAFA

American siderurgical production in terms of steel inputs has on the last 5 years passed from 19 million tons in 1976 to 29 million tons in 1980, thus permitting that importations of this metallurgical product remained practically still at the same period. As for the non-ferrous and according to a recent study elaborated by CONSIDER - COUNCIL FOR SIDERURGY AND NON-FERROUS in Brazil - the implantation of new enterprises and the expansion of the already existent ones in the country will permit the exportation of metal products of approximately US\$ 1.500 million's worth as well as an annual economy of foreign exchange credits up to more than US\$ 2.000 million till the end of this decade, only by substituting the imported goods.

Finally, we can't miss the opportunity to consider another strong political implications on mineral-metallurgical industry, related to industrial decentralization. On account of technical-economical reasons present today in almost every country in the world, metal producer industries are apt to be settled on mineral reservation areas. **Consequently there** takes place a natural verticalization of the industrial process with issue of several supplying industries for inputs and others, as follows: consumers of products obtainable at the area; service renders for technical, social and other ones.

IV. PRESENT STAGE AND OUTLOOK OF LATIN AMERICAN MINERAL-METALLURGICAL INDUSTRY

As we remarked, economical and social development on any age of human civilization has always been linked to mineral and metallic goods consumption in a continuous and increasing way. According to studies and informations about the matter, that relationship in Latin America dates from pre-columbian period, keeping rather **intensively** throughout hundreds and hundreds of years. In late **centuries**, however, due to a series of both internal and external political reasons as well as productional, transportation and other factors, the consumption of metal and mineral goods in Latin America didn't grow to a degree compatible to the region's needs and got even under the world media. For illustration sake, on Table IV we present figures for both world and regional consumption of steel, aluminium, copper, lead, tin, nickel

T A B L E I V

CONSUMPTION OF METAL IN LATIN AMERICA AND IN THE WORLD IN 1980

	<u>WORLD</u>		<u>LATIN AMERICAN</u>			
	(x 10 ³ tons)	(kg/inhab.)	(x 10 ³ tons)	(kg/inhab.)	*(x 10 ³ tons)	(B)-(A)
STEEL	711.429	161,14	24.536	64,56	61.213	36.677
ALUMINIUM	15.245	3,45	670	1,76	311	641
LEAD	5.288	1,20	252	0,66	456	204
COPPER	9.503	2,20	502	1,32	836	334
TIN	224	0,05	9	0,02	19	10
NICKEL	718	0,16	179	0,05	61	44
ZINC	6.069	1,37	329	0,86	521	192
POPULATION (x 10 ⁶ inhab.)	4.415	-	380	-	-	-

* taking world "per capita" consumption's in 1980.

INFORMATION SOURCES: INSTITUTION FOR IRON AND STEEL IN LATIN AMERICA AND WORLD METAL STATISTICS.

and zinc in 1980, along with their value in Latin America in case they had reached the respective world media in that year.

Latin American mineral-metallurgical industry and its consumption of inputs and products started in the pre-columbian period on gold and other precious metals. In terms of "modern industries", that is, industries of "big size", Latin American mineral-metallurgy development dates from decades 20 and 30 of our present century through a few enterprises and specially on copper and steel. Imported metals granted most consuming markets where, then, it flowed enough financial means due to exportation of other primary goods.

On issue of World War II, some regional countries strived for the enlargement of their respective production capabilities for inputs and metallurgical products in order to meet their own needs. But when that world tragic event came to an end, a good parcel of these efforts was desestimulated because of, among others, the following factors: the stockage of siderurgical products and non-ferrous metals accumulated throughout the world became sources of supplyings at a more convenient price; lack of both governmental politics and support for the basical sectors; etc. Consequently, the regional mineral-metallurgical industry turned to a developing stage neither compatible nor suitable to the several important segments.

Table V prints in numbers the facts we have just signaled. Incredible as it may look, the fact is that, on the grounds of exportation and importation of metallurgical products and inputs there doesn't exist a strong and continous regional trade among the members of Latin American community. Among the reasons for this regional illbalanced import-export relationship on mineral goods and metals are, for example, the following ones: lack of acknowledgement from Latin American importers of the quantities, qualities and sorts of regional inputs and metallurgical products available for exportation; non competitive financial conditions towards a third furnisher; expensive freights and irregular transportation among Latin American community members.

Within rare **exceptions**, it doesn't exist any study on the subject of inputs and metallurgical products' offering/demand prospects at whether regional or national level. Solely for an exercise, we present on Table VI the calculated results of consumption previsions for year 1990, based on the following hypothesis:

T A B L E V

1980'S PRODUCTION AND CONSUMPTION OF METAL
IN LATIN AMERICA (IN 10³ TONS)

	REAL PRODUCTION	REAL CONSUMPTION	MINIMUM DESIRED CONSUMPTION
STEEL	28.896	24.536	61.213
ALUMINIUM	827	670	1.311
LEAD	407	252	456
COPPER	1.387	502	836
TIN	17	9	19
NICKEL	20	17	61
ZINC	313	329	521

INFORMATION SOURCES: WORLD METAL STATISTICS AND TABLE III.

T A B L E VI

1990'S METAL CONSUMPTION OUT LOOK IN LATIN AMERICA

(IN x 10³ TONS)

	<u>1980</u>	<u>1990</u>
STEEL	24.536	76.000
ALUMINIUM	670	2.070
LEAD	252	720
COPPER	502	1.320
TIN	9	30
ZINC	329	822

INFORMATION SOURCES:

1980, TABLE III; 1990, author's exercises for the non-ferrous; ILAFA's forecasts for siderurgical products.

such as transport, ports, technological development, training of general and specialized labour, etc.;

- Achievement of industrial complementation in the manufacture of particular inputs and metallurgical products in order to avoid setting up superfluous units, and

- Promotion and establishment of joint multinational ventures in the field of mining, metallurgy and related industries, as well as marketing centres and channels.

We do not believe that it would be necessary to set up a new body to carry out the measures proposed and apply the priorities set forth. For this purpose, we already have ALADI, ECLAC, ILAFA, OLADE and OLAMI, to say nothing of such extremely important agencies as UNIDO, the OAS and the sectoral bodies which exist in the countries of the region. As we see it, it would simply be necessary to co-ordinate and unite the technical and financial efforts of the above-mentioned international, regional and national bodies. We should also attach importance to the technical, economic and financial support of bodies from outside the region, such as the EEC, in carrying out the above activities.

VI. CONCLUSIONS

Gentlemen,

Each member of this immense Latin American continent holds many great possibilities and natural riches while presenting at the same time, a pressing need for something they lack and others hold. Logic and common sense show us the only way to take, which is that each Latin American community member must be willing to contribute with its plenty and natural resources, with its technology and finally, with its own fruitful experiences, in order to fulfill everyone's needs and deficiencies. Other membership countries have already given us some admirable examples to be followed. If we are fit to do so but fail to, we shouldn't blame anything or anybody for the failures which may occur since each member alone and on his own, will always be a subordinated one. However, everyone in mutual cooperation and as far as mineral-metallurgy is concerned, we shall be able to, in a short time, become one of the regional main producers of mineral and metallurgical goods, and so, within our context, cooperate the utmost on Latin American economical and social development.

