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Rio de Janeiro, Brazil
10 - 12 March 1969

UTILIZATION OF PRODUCTIVE CAPACITY IN THE LATIN AMERICAN IRON AND STEEL INDUSTRY[1/]

by

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Corrigendum[1]

Page 7 **Table 1** Rolled products, Mexico: Change 3,380 to 3,996.
Totals: Change 11,375 to 11,991.

Change footnote c/ to read: Corresponds to integrated, semi-integrated and rolling plants.

Page 8 Para 19 Delete last 9 words and substitute: because of transitory complications in raw material supply.

Para 22 First line: Change 11.4 to 12.

Page 9 Table 2 Flats, Mexico: Change 1,740 to 2,400[a]
Totals: Change 4,576 to 5,236

Add footnote: a/ Figures supplied by Nacional Financiera SA.

Para 26 Insert at beginning of para: A major part of

Page 10 Para 29 Second line: Change 40 to 44.

Table 3 Brazil: Add [b]

Crude steel, Prod.: Add: a/
Mexico, Capac.: Change 3,382 to 3,996
Mexico, Util.: Change 71 to 64
Totals, Capac.: Change 11,375 to 11,991
Totals, Util.: Change 68 to 64

Add footnotes: a/ Includes foundry steel.

b/ Production figures compiled by IBS: pig iron 3,057, crude steel 3,696, rolled products 2,709.

1/ Corrections submitted by the author.

Contents

Tables

Page 11 **Para 33** Change 68 to 64

Insert Colombia after Chile

Page 11 **Table 4** Flats / Mexico, Capac.: Change 1,740 to 2,400

Mexico, Util.: Change 71 to 52

Totals, Capac.: Change 4,574 to 5,236

Totals, Util.: Change 70 to 67

Page 12 **Para 41** Delete para and substitute:

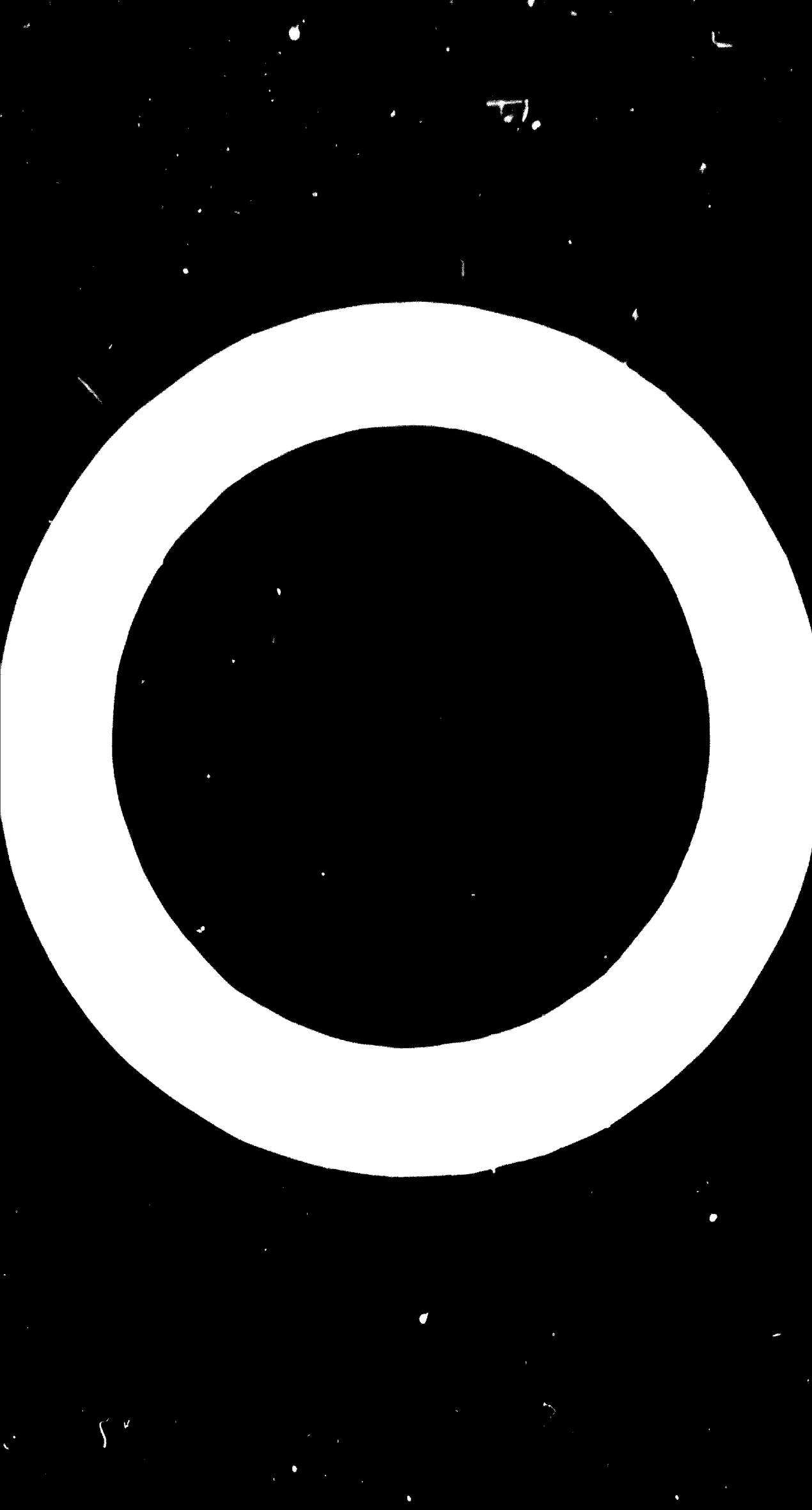
Under-utilization of the Brazilian potential was due in part to problems in market conditions and to unbalance in COSIPA's and USIMINAS' production lines.

Page 13 Para 45 End of first sentence, add:

... and in the lining of Paz del Rio's blast furnace.

Page 14 Para 49 End of first sentence, add:

... due to stops for rolling mill repairs.



1. The numerous studies conducted on divers aspects of the Latin American iron and steel economy reveal that the area shows a production deficit in relation to its consumption. Thus, the gap during 1966 amounted to 3.4 million ingot tons of rolled products, while it is expected that by 1975 it will reach some 7 millions.

2. Notwithstanding this insufficient production, it is suspected that the regional steel-making capacity is not used fully. The same paradoxical situation appears more evident at national scales, showing that production figures alone are insufficient to evaluate the industry's potentiality.

3. Having posed the problem, it would now be of interest to discuss the exact situation affecting the productive capacity of the installations, the degree in which they are being used, the reasons for the under-utilization of this potential, and the manner how a better utilization may be promoted. An analysis of the above aspects follows.

Concept, definitions and measurement

4. There is no doubt that the concept of production capacity is one of the least clear in the minds of industrial economists. Valuable efforts have been made to penetrate more deeply in its true meaning, which have contributed to a better understanding of the problem. But, nonetheless, none of the definitions proposed up to now has been fully accepted by economists.

5. The above indefinition naturally also affects the general idea held about the installed or productive capacity of the iron and steel industry. An effort will be made, nevertheless, to define some of the most usual concepts on the capacity of this particular industry.

6. In the first place, it is important to differentiate between what is understood by "production capacity of an equipment" and "capacity to manufacture a product". In connexion with the first, references are often made to capacities of the blast furnace, of an electric furnace or of a rolling mill. In the generality of such cases the reference implies the "nominal" or "design" capacities; that is to say, the maximum production given by the equipment manufacturers according to its specifications and in ideal conditions of operation. Furthermore, they usually refer to a standard production and do not take into account either the bottlenecks that may appear in the production line before or after the particular equipment nor any eventual difficulties in raw material supplies.

7. Undoubtedly, the entrepreneur who must safeguard an investment or maintain a balanced production line is more interested in the above-mentioned design capacity than the planner, who is busy with the possibilities of producing plates to be used by the naval industry or tinplate for the canning industry. The latter will evidently be much more interested in investigating the potentiality to produce these items than in the capacity of the equipment which will produce them. In this connexion, it is necessary also to differentiate two concepts: the "theoretical" production capacity, which is the maximum production of a given item regardless of manufacturing costs, and the "real" production capacity, by which is meant the maximum production of a given item under normal conditions of operation and with the usual product-mix. There is no doubt that this definition does not apply identically to the various plants, since both product-mix and manufacturing conditions vary from one to another. It is not even valid for one given plant for different periods of its existence, as both assumptions change also in the course of time. Nonetheless, considering the purposes of this paper, the latter definition will be used.

8. Numerous factors have a bearing on the real production capacity, the first being the number of work shifts at the plant or in its various sections. The majority of the Latin American integrated works, forced by the necessity of a continued chemical process for pig iron production, tend to work in three shifts. On the other hand, semi-integrated plants or re-rollers often use only part of the working day. The product-mix to be manufactured is also of decisive importance due to the ensuing greater or lesser changes of equipment parts. The quality of raw materials affects to an important degree the first stage of production as the capacity of the reduction facilities can be greatly increased through special ore conditioning, whereas the quality of the manufactured products necessarily influences the last rolling stage capacity according to their degree of finishing. The aspects just named are relatively easy to measure, but others which must also be considered - such as work organization, technical and administrative capacity, labour productivity, etc. - are much harder to quantify.

9. Production techniques are constantly improving. Consequently, the concept of capacity is an essentially dynamic one, particularly so in the iron and steel industry, where there is a real technological revolution affecting its three fundamental stages: reduction, refining and rolling.

10. Efforts have been concentrated to increase productivity of the blast furnace, which continues to be the classic equipment for ore reduction, as a means to avoid considerable investments in new installations. Thus, in the United States the average production capacity of the blast furnaces increased about 60 per cent in the period between 1950 and 1966. Half of this percentage has been attributed to technological improvements alone. Of these, the most significant have been the use of pre-reduced ore, better preparation of charge materials, and divers operational innovations such as oxygen and hydrocarbon injections, use of high temperatures in the air insufflated, and high top pressure.

11. In the refining stage, capacity increase has originated especially in the intensive use of oxygen in the various steel-making installations.

12. The reduction and refining processes are of a chemical nature, whereas rolling is essentially mechanical. In consequence, the task of increasing the potentiality of the rolling equipment now in use is much harder. Improvements have been achieved by reinforcing some elements, by adding stands, and through more efficient operation programming. Plant technical personnel coincide in pointing out that intensive application of production programming and control techniques have made possible important increases in their equipment output. Further, intensive use of computer elements has greatly facilitated application of the new techniques.

13. Naturally, these technological improvements are not applied evenly throughout an integrated plant, thus producing a continual imbalance in its divers sections. It also requires a permanent programming of expansions for the existing bottlenecks.

14. The fact that there are no universally accepted definitions of installed capacity makes for the lack of standard methods to measure it. In general, the information available is based on estimates. The forms distributed by agencies in charge of compiling statistics of the various industrial sectors in Latin America often include questions such as "which is the production capacity for such and such an item in one work shift?", or, "in what percentage do you estimate the utilization of your installed capacity?". Quite often, the inconsistency of the data supplied in reply to such questions makes any analysis impossible, so much so that in certain cases the corresponding figures are not even published.

15. In the iron and steel sector there is no systematic information available either on production capacities for pig iron, crude steel or rolled products. However, in January 1969 the Instituto Latinoamericano del Fierro y el Acero has set in operation a survey on investments made and projected in the Spanish-speaking American iron and steel sector and the capacities they will originate. Simultaneously, in Brazil the survey will be undertaken by the Instituto Brasileiro de Siderurgia. It will thus be possible in the near future to count with reliable data from such a basic and dynamic industrial sector on this very controversial matter.

Production capacity in 1967

16. Looking regional information on the industry's potentiality in Latin America, the writer asked ILAFA's Regional Secretariats in Argentina, Mexico and Venezuela and the main integrated plants in Chile, Colombia, and Peru for estimates on their respective countries' installed capacity. Corresponding data on Brazil was furnished by the Instituto Brasileiro de Siderurgia.

17. Nearly the totality of the data compiled refers to the real production capacity in 1967 in the three fundamental sectors of the industry.

18. Pig iron production capacity amounts to [illegible] million tons and corresponds mainly to blast furnaces with the unique exception of Venezuela, which uses exclusively electric reduction furnaces. The greatest potentiality is to be found in Brazil, Mexico and Argentina, concentrating [illegible] per cent of the capacity among the three. All of the Latin American countries appearing in table 1 have a significant steel production, with the sole exception of Uruguay. The smallness of the market in the latter has not justified installation of an integrated plant to date.

Table 1

Latin American production capacity of pig iron, steel and rolled products in 1967
(thousand tons)

Country	Pig iron	Crude steel	Rolled products 1/
Argentina	780 a/	1,964 b/	2,501 c/
Brazil	4,965 d/	5,013	3,713
Colombia	210	300 e/	300
Chile	520 f/	665 g/	505
Mexico	1,680 h/	3,400	3,380
Peru	300	380	230 i/
Uruguay	-	15	36
Venezuela	640	885 j/	710
Totals	8,343	12,022	11,375

Source: ILAFA
IBS (unofficial data for Brazil).

1/ These figures must be taken with some reserve in view of remarks made in the preceding chapter, notwithstanding the reliability of the sources of information. The above in no way invalidates, however, the general conclusions reached further on.

a/ Includes SOMISA, Alto Hornos Zapla, Alto Hornos Siemens, and Ferro-Mineros S. Matos.

b/ Comprises 15 plants; capacities according to processes are: Siemens-Martin 1,261; electric furnaces, 423; and Thomas, 280.

c/ Corresponds to Acindar, Soc. Militar de Aceros, SOMISA, and CLIMA associates.

d/ Includes 634,000 tons from independent blast furnaces at Minas Gerais.

e/ Includes a certain amount of undetermined capacity for foundry steel.

f/ CAP's 3 blast furnaces' capacity is 900,000, but it is limited by the ancillary installations.

g/ Comprises CAP, INDAC, PAMAG, and AZA.

h/ Includes a 450,000 ton-capacity to produce sponge iron; does not include the 500,000-ton capacity of the third Fundidora blast furnace which was started in December 1967.

i/ Corresponds to SOGESA, Aceros Arequipa and Fundición Callao.

j/ Comprises SIDOR and SIVENSA.

19. All these pig iron capacities have been computed on a three-shift basis. Nonetheless, there exists a considerably margin for increase by applying the technological improvements previously commented, which have not been utilized very extensively in the area. It has also been increasingly difficult to utilize the charcoal-fired blast furnace capacity in Argentina and Brazil, this being a raw material in process of extinction.

20. The steel-making installed capacity is equally concentrated in Brazil, Mexico and Argentina. They are responsible for 85 per cent of the 12 million tons produced, in order of importance in open-hearth, electric and basic oxygen furnaces, Thomas and Bessemer converters. Over 20 per cent of the above potential is to be found in semi-integrated plants; that is, those starting with steel-making and using exclusively scrap as raw material.

21. Steel-making capacities are normally computed on a three-shift bases at integrated works, and one or two at semi-integrated plants. We have here, too, an ample margin to achieve production increases in the steel-making furnaces, particularly open-hearth, through massive use of oxygen to speed up the refining process. Up to 1967, the process was employed only in some Brazilian, Chilean and Mexican facilities.

22. Rolling production capacity in the area totals 11.4 million tons and is equally concentrated in the three major countries of the region. The above potential has been calculated, in the majority of the cases, on a two-shift basis and at rolling mill level. The latter is significant, as capacity at the preceding blooming stage is considerably higher as a consequence of the tendency to install oversized blooming mills to set off rigidity in their operation, as any capacity increases that may be achieved at this stage by means of transformations are of modest import.

23. Contrary to what has been noted in connexion with the first two processes and for the reasons already pointed out, Latin American rolling capacity cannot be raised significantly through technological changes. Rather, there exist a number of obsolete rolling plants which started to operate during, or a little after, the Second World War and are now in no condition to compete with up-to-date integrated works.

24. A study of the structure of rolling capacities in regard to its potentiality to produce flats, non-flats and seamless tubes provides an added light as to their scope or extent. The three named items are generically different and, further,

the equipment required to produce flats or seamless tubes, being more sophisticated than that for non-flats, represents, in consequence, a higher investment.

Table 2

Latin American production capacity of rolled products in 1967
(thousand tons)

Country	Flats	Non-flats	Seamless tubes
Argentina	752	1,609	140
Brazil	1,775	1,794	144
Colombia	30	270	-
Chile	279	226	-
Mexico	1,740	1,400	196
Peru	-	230	-
Uruguay	-	30	6
Venezuela	-	415	295
Totals	4,576	5,974	781

Source: ILAFA
IBS (unofficial data for Brazil).

25. It can be clearly appreciated from table 2 that only the five countries where consumption is more developed as a result of their industrial evolution possess the capacity to manufacture flats. The most remarkable anomaly occurs in Venezuela, which has registered a significant delay in deciding to set up the required facilities, even though counting with a considerable demand.[1/] Brazil, Mexico, and Argentina show the biggest production potentiality, totalling 93 per cent among the three of them.

26. The capacities for flats given in table 2 correspond to integrated works with relatively modern equipment. They can be increased by solving certain bottlenecks in their production lines. But, the greatest advances must come from improving the programming systems and from the employment of operational investigation techniques. There are plants which have increased their productivity considerably by manufacturing longer production series and by adapting roll changes to their production programmes.

1/ After 1967 both Venezuela and Peru decided to install plants for production of flats.

27. All the countries analysed have capacity to produce bars and sections. In each and all cases they are the products first manufactured by the industry, for three reasons: they are the first items with a market, they require smaller investments in equipment, and have a production technology free of complications.

28. Only five Latin American countries have seamless tube plants, Venezuela, Brazil and Mexico showing the biggest installed potential. As can be observed, Venezuela in this instance joins the Club of the Great, having decided in an early period to supply its important oil industry's tube consumption.

29. The relationship between production capacity for flats and the total rolled is of 40 per cent for the whole area. This percentage is symptomatic of the sector's fitness to sustain the industrial development process. However, it reveals some noticeable anomalies in some countries of the area and does not represent the levels reached by its transformation industry.

Production and its relation with capacity

30. Table 3 - showing the relationship between pig iron, steel and rolled products capacities and production in 1967 - was prepared for examining utilization of the production potential.

Table 3

Capacities, production and capacity utilization in the Latin American iron and steel industry in 1967
(thousand tons)

	Pig iron			Crude steel			Rolled products		
Countries	Prod.	Capac.	Util.%	Prod.	Capac.	Util.%	Prod.	Capac.	Util.%
Argentina	617	788	78	1,326	1,964	68	1,348	2,501	54
Brazil	2,963	4,265	70	3,665	5,013	73	2,848	3,713	77
Colombia	203	210	97	258	300	86	196	300	65
Chile	498	520	96	631	665	95	450	505	89
Mexico	1,611	1,680	96	3,023	3,400	89	2,416	3,382	71
Peru	31	300	10	80	380	21	51	230	22
Uruguay	-	-	-	14	15	93	18	36	50
Venezuela	422	640	66	690	885	78	367	710	52
Totals	6,345	8,343	76	9,687	12,022	81	7,720	11,375	68

Source: ILAFA
IBS (unofficial data for Brazil).

31. Utilization of pig iron production capacity in the area reached 76 per cent. Colombia, Chile and Mexico show the best indexes, while Peru has the lowest.

32. Ingot producing installations show an 81 per cent utilization. The best relative conditions can be found in Colombia, Chile, Mexico, and Uruguay.

33. Only a 68 per cent rolling mill capacity was utilized in 1967, with Chile, Brazil and Mexico heading the list.

34. It is important to learn how the production capacity for flats, non-flats and seamless tubes is utilized, since rolling is the process demanding the heaviest investments in any integrated plant regardless of its technological structure.

35. It can be appreciated that in the majority of the countries having these expensive installations for flat products, their capacity was utilized only a little over 70 per cent, with the striking exception of Chile, with a 92 per cent utilization.

Table 4

Capacities, production and capacity utilization in rolling in 1967
(thousand tons)

Countries	Flats			Non-flats			Seamless tubes		
	Prod.	Capac.	Util.%	Prod.	Capac.	Util.%	Prod.	Capac.	Util.%
Argentina	520	750	72	714	1,609	44	94	140	67
Brazil	1,428	1,775	81	1,334	1,794	74	69	144	48
Colombia	22	30	73	174	270	64	-	-	-
Chile	256	279	92	192	226	85	-	-	-
Mexico	1,240	1,740	71	999	1,400	71	156	196	80
Peru	-	-	-	52	230	23	-	-	-
Uruguay	-	-	-	17	30	57	1	6	17
Venezuela	-	-	-	269	415	65	98	295	33
Totals	3,486	4,574	76	3,751	5,974	63	418	781	54

Source: ILAFA
IBS (unofficial data for Brazil).

36. In 1967 only 63 per cent of the bar and section rolling equipment existing in the area was utilized and, once again, Chile used it to the best advantage.

37. Utilization of the tube manufacturing capacity was very irregular throughout all the countries, going from 17 per cent in the small Uruguayan installations up to 80 per cent in Mexico. The average percentage for the whole area was 54.

Causes of the under-utilization of the production capacity

38. It is interesting to analyse first the reasons for the existence of an idle capacity throughout the various stages of the productive process in the course of the year being analysed, and then extend the reasoning in search of the causes most frequently responsible for the situation during the last years.

39. Before going on to this analysis it seems convenient to point out that maximum productions obtainable are nearly always lower than the capacities, particularly in those countries with a more diversified production. This is due to the multiple contingencies they are exposed to. Thus, in Europe, capacity utilization of the different steel producing sectors has not exceeded 96 per cent even in the best years.

40. In general, 1967 was a good year as regards utilization of the pig iron-making potential, as may be appreciated in table 3. In the Argentine case, the reasons for unutilization of almost a quarter of its capacity reside, first, in forced paralysations for repair of the SOMISA blast furnace and, secondly, partial inactivity of the Zapla blast furnaces due to difficulties in the charcoal supply, and the total inactivity of Ferro-Misionera.

41. Partial inactivity at Volta Redonda #1 blast furnace accounts partly for the unutilized Brazilian potential.

42. Peru used only a tenth of its potentiality, due mainly to the fact that within its expansion programme the 200,000 t.p.a. blast furnace was installed before the dock for ore disembarkment was ready. The reasons for Venezuela's low output - it used only two thirds of its potential - lie in the extensive use of pig iron stocks and in a reduction of operations programmed for SIDOR's electric furnaces as a consequence of a market contraction early that year.

43. Latin American steel-making capacity in general had a more deficient utilization than blast furnaces. Argentina shows a one third unused capacity corresponding to electric furnaces of semi-integrated plants, which had to adjust their production to the needs of rolling mills.

44. Brazil, with a 27 per cent idle capacity, was also affected by the reduction in steel demand from rolling departments.

45. The small idle capacity in Colombia was originated in difficulties in pig iron supply due to repairs in the coking oven plant. Mexico left only 11 per cent of its capacity idle; however, its magnitude represents nearly 400,000 tons. This situation was due mainly to the scarcity of pig iron in some of the plants and to the fact that some steel-making furnaces which started to operate that year did so only partially. The same is true for Peru, which also had a low utilization percentage. Venezuela used 78 per cent of its steel-making capacity. This figure was affected by reduced operation at the beginning of 1967 due to adverse local and international market conditions, since SIDOR's seamless tube plant - originally planned to absorb over 60 per cent of this steel - worked at only a fraction of its capacity.

46. Table 3 shows that only 68 per cent of the area's rolling potentiality was used, which, translated into figures, means that 3.7 million more tons could have been produced. It should be noted that the unutilized capacity was higher than the imports of steel products in the area, even though this reasoning is not entirely valid as the major part of the purchases abroad corresponds to specialties not manufactured in the region. It is interesting, in any case, to remark at this point the low use made of the equipment concentrating the highest proportion of the fixed assets of Latin American plants. In this connexion, table 4 contains a detailed analysis of utilization of the production capacities for the divers types of rolled products.

47. The imbalance in certain sectors of SOMISA's production line provoked the unuse of a little more than a quarter of Argentina's potential for non-flat production. Furthermore, only 44 per cent of the existing capacities in the same country for non-flats could be used; that is to say, some 900,000 tons more could have been produced. A most unfavourable evolution of the demand for these items caused the above noted anomaly, also making operation of some 20-year old rolling plants, precariously installed, particularly difficult.

48. Brazil suffered an 8 per cent market reduction in 1967 in comparison with the prior year. Flat products were specially affected, with a 27 per cent decrease. It is estimated that in 1967 an inventory reduction policy prevailed among manufacturers, distributors, and consumers. This situation was the

main cause for the 23 per cent unutilisation of rolling capacity, or, in other terms, a lower production of 865,000 tons.

49. In Colombia, also, a little more than a quarter of its flat rolling possibilities went unused. The above percentage, however, is not significant, as it amounts only to about 8,000 tons. In the same way, over a third of the country's potential for producing non-flats was not utilized because of difficulties in securing raw materials - billets and scrap - under favourable economic conditions.

50. Chile's 8 per cent unused capacity in flat production can be considered optimum. The fundamental reason for this excellent utilization lies in a sustained demand from the metallurgical and canning industries. The 85 per cent capacity utilization for bars and sections was also the highest in the area. It could have been better had it not been affected by a reduction in bar sales due, in turn, to a diminished activity in the building industry and smaller dispatches of ore-grinding bars.

51. Mexican plants used only a little over 70 per cent of their flat and non-flat producing possibilities, due to imbalances in their main production lines and to market conditions. Domestic market restrictions, not fully compensated by exports, accounted for the utilization of only 80 per cent of the seamless tube plants' capacity.

52. SOGESA's unbalanced production line, labour problems, and the magnitude of imports caused the less than a quarter capacity utilization of bar and section production potential in Peru. In Uruguay, which occupied only 57 per cent of its bar producing capacity, the absolute figures are irrelevant in the area's total.

53. Venezuela left unused less than a third of its production capacity in bars and sections due to an insufficient local demand. However, the above amount was partially compensated by a massive export of tubes, billets, and slabs. Only one third of the tube producing capacity was utilized as a consequence of the plant being originally planned for a much greater demand from the country's oil industry. Due, however, to prevailing conditions in the international oil market the expected demand has not yet become a concrete reality.

54. Having examined the reasons for the partial unutilization in 1967 of the iron and steel installations, we will now try to reach some valid and more permanent generalizations for the sector. These causes will be grouped under technical and economic ones, a classification which appears more useful since, to some degree, the former are of the industry's responsibility while the latter tend to escape its control.

55. The preceding examination shows oversizing of some units or sectors of the iron and steel plant as the most important technical cause of unutilization of production capacity. This condition stems mainly from the fact that while steel demand increases slowly and persistently, the entrepreneur trying to satisfy it must use the minimum design capacity of some equipment, though well knowing that even this minimum is excessive for the projected market requirements. In other cases, the designer tries to move ahead of future expansions and uses, from the beginning, oversized equipment, particularly blooming and rolling mills, which afford technical possibilities of expansion at lower costs. There is no doubt that in a few cases this situation has come about, to some extent, because of weaknesses in feasibility studies due particularly to deficient methods of consumption projection. On the other hand, as has been previously remarked, there exists a permanent imbalance in the iron and steel production lines all over the world, since invention of new operation techniques or innovations in equipment design do not advance at the same rhythm in the divers stages of the process and the entrepreneur has only a limited range of possibilities from which to choose a solution for certain plant bottlenecks.

56. Production programming systems are another important source of installed capacity under-utilization particularly at the rolling stage, product-mix and the variety produced being responsible for the difficulties in programming. In this connexion, Latin American plants use, in general, two systems of operation: they work either against stocks or against orders. Evidently, the first system is easier to plan but has the disadvantage of the added burden of financial interests on stocks. The manufactuers' desire to minimize their production costs, however, has led them to adopt the second system in the majority of cases, with a consequently more rigid programming.

57. Product-mix affects not only the finishing equipment capacity; it also has a negative back effect on the production line. In effect, a preceding

equipment may have a larger economic production lot than the rolling mix being produced at the moment and, if adapted to the latter, will be left with an idle capacity. There is no doubt, in any case, that regardless of which production planning system is employed, they are susceptible of improvement. The experience of some of the area's plants is illustrative of the production increases that can be achieved through such improvements.

58. Maintenance problems are also to blame, to a good degree, for unutilization of iron and steel facilities. The traditional struggle between the men in charge of production and the equipment maintenance personnel is well known and is responsible for the less intensive application of preventive maintenance techniques in the iron and steel industry than in other industrial sectors. Undoubtedly a clarification of company aims together with fast methods for determining operation costs, should greatly aid executives to solve the conflicts that daily come up, particularly at rolling departments, and avoid a better equipment utilization at cost sacrifices.

59. Lastly, there are numerous examples of how ignorance of production technologies for certain specialties have also prevented a better equipment utilization.

60. In so far as economic motives are concerned, undoubtedly the most important one resides in domestic market contractions originating from the weakening of some of the most important consumer sectors, such as the automotive, building, agricultural and oil industries. These conditions affect to a greater degree plants in smaller countries, since their economies are less diversified. Thence, a contraction in bar demand, for example, cannot be offset with an increase, or simply maintenance, of consumption of automobile plates. Steel demand restrictions frequently occur in the periodic depressions affecting the whole economy of these countries.

61. Even though the Latin American steel industry has been projected to supply solely the domestic markets, assuredly the international markets constitute a good outlet during these periods of crisis. Nevertheless, efforts to use this recourse have met with only a limited success. Thus, in 1966 only 5 per cent (343,000 tons) of the Latin American production could be exported. The above figure constitutes, nonetheless, one of the highest in export sales and proved to be a valuable incentive for Brazil, Mexico and Venezuela.

62. The fundamental reason for not using the industry's idle potential for export purposes is to be found in an over-capacity of world production in relation to steel demand. Faced with this condition, producers on other continents have decided to keep up a double price system whereby export prices are notoriously lower than those in their domestic markets, thus rendering international competition particularly hard. On the other hand, there prevails among Latin American producers a noticeable lack of knowledge of other markets' conditions and commercialization methods, which has an adverse effect on the decision to expand their export sales.

63. Labour problems have been an important obstacle to productive efforts, so much so that certain plants have had to face long periods of inactivity because of strikes for salary factors.

64. Obsolete equipment at some plants represents capacity that can be used only under optimum market conditions, as their operation costs do not resist the hard competition derived from adverse conditions.

65. To a lesser degree, the unutilization of some productive units may be justified by scarcity of raw and other materials or by insufficient financial resources to raise production levels in some plants.

Recommendations for increasing production capacity utilization

66. It is interesting in the first place to offer some recommendations whose application will not only have a direct influence on a greater use of iron and steel installations but will also permit to plan and measure the under-utilization problem better.

67. As has been already seen, the amazing diversity of concepts on capacity existing at present reflects itself on the absence of precise definitions, of measurement methods and of corresponding statistics. With specific reference to the industry's production potentiality, the latter situation will be almost totally remedied by the survey undertaken jointly by ILAFA and IBS which, by supplying working definitions for theoretical and real capacities, will permit their computation. Capacity determination, however, will continue to be based on the informants' estimates. It would be desirable, in consequence, that the survey be repeated yearly and that the two above-named organizations persist in their efforts to secure more exact measurements. In this connexion, only Japan has deepened on the problem at a national scale. At the Government's request,

the Iron & Steel Institute of Japan developed mathematical formulas to measure capacity of the divers production equipments as a means to evaluate the country's iron and steel potential, having successfully completed their job. The Japanese experience may prove most valuable for Latin America and possibly UNIDO may hire an expert from that country to collaborate in this task.

68. Undoubtedly, excess production capacities stemming either from oversized equipment or from market contractions may be absorbed by steel exports both to Latin America itself or to other areas.

69. "As one way of expanding local markets for industrial products, Latin American Governments established the Central American Common Market and the Latin American Free Trade Association. For steel-making purposes, only the latter is of any interest. Nevertheless, the negotiations of tariff liberation for steel have been hindered due to unsolved problems such as disharmony among monetary policies, exchange systems, regulations governing imports from extra regional countries, internal tax refund methods, etc. It is unlikely that in the future Latin American Governments may wish to advance any further along the road to economic co-operation while these problems that distort the potential value of permanent tariff concessions remain unsolved. Conversely, a certain degree of intra-regional steel trade may feasibly arise due to temporary disadjustment between internal consumption and supply of given products, which continuously appears in these countries because while the former grows in regular form, the latter grows by leaps and bounds, as the various expansion projects reach the starting stage. Steel-makers of the area have repeatedly stated that they are interested in setting up a system whereby such possibilities of temporary co-operation might be utilized and the resulting experience used as a basis for broader economic integration patterns. The fulfilment of such aspirations would greatly contribute to carrying out projects that require implementation on a larger scale than that determined by domestic consumption, by opening LAFTA markets to the products originated by such projects."1/

70. It is evident that the existing world excess capacity in this sector greatly hinders any aspirations of exporting to extra-regional countries. The Latin American Governments - conscious, however, of these possibilities - have repeatedly asked - through world and regional organizations - for a preferential treatment that will allow their manufactured products to enter the markets of industrialized countries. Although to date these requests have

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1/ From the paper "Economic Conditions Regulating the Growth of Latin American Steel Production" presented by the author to the Second Interregional Iron and Steel Symposium organized by UNIDO (Moscow 1968).

not met with much response, it should be remembered that resistance put up by the interested parties supplying those markets always makes such negotiations tediously drawn-out.

71. On the other hand, the last few years have witnessed some important changes in the world iron and steel geography. Trade trends, too, have varied significantly. The Latin American iron and steel industry should watch these changes attentively and evaluate its export possiblities permanently. The collaboration of United Nations agencies such as UNIDO and UNCTAD would be of particular value to start a study of the international market, the national and regional organizations being fully capacitated to continue this survey.

72. As pointed out in the pertinent chapter, local producers have successfully developed new devices, effected transformations, applied new processes etc., thus obtaining some significant capacity increases or a better equipment utilization. These improvements, however, have not transcended abroad and have remained unknown to the other producers of the area. A meeting organized by UNIDO and ILAFA to acquaint the technical staff of the area's steel plants with innovations in the various stages of the productive process should prove of considerable interest.

73. A solution to the deficiencies noted in demand projection techniques can be considered in the permanent survey of the Latin American steel market which ILAFA will undertake in 1969 with Inter-American Development Bank assistance. In effect, in the course of the survey ILAFA, with the active collaboration of the area's steel enterprises, will try to uniform these projection methods. They will afterwards be analysed in detail by the ILAFA Advisory Committee on Marketing, who will co-ordinate the whole work.

74. Insistence on the part of producers in analysing and continuously revising their planning and production control systems may contribute significantly to raise their plant operation levels, particularly at the rolling departments. Such an analysis may reveal, for example, the usefulness of electronic data computing elements.

75. All emphasis placed by producers and pertinent organizations in the solution of their technological problems will surely result in a greater equipment utilization by enabling them to produce articles of more complex

manufacture or more advanced design. It is to be desired that new developments in this industrial sector will serve to stimulate the area's weak scientific and technological infrastructure.

76. Lastly, a study to readapt equipment rendered obsolete due to having completed its useful life cycle, to more advanced designs or to more modern techniques seems desirable. Such a readaptation would permit the use of this equipment for the manufacture of certain steel specialties or its utilization to produce other industrial articles. In the face of Latin America's traditional scarcity of capital resources it has the added advantage of postponing its dismantling.

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