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ANALYSIS OF THE PRESENT AND FUTURE SITUATION OF THE OIL
AND FAT INDUSTRY OF VENEZUELA

por

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ANALYSIS OF THE PRESENT AND FUTURE SITUATION OF THE OIL AND FAT INDUSTRY OF VENEZUELA

INTRODUCTION

Since the time of the discovery of Latin America this continent was mostly used as a source for agricultural and raw material needs of its mother countries and later on it served the same purpose for the developed continents: Europe and North America. At the same time it was a giant market for their more elaborated industrial products. It is generally accepted that the welfare of a nation depends part on its natural resources but more than that on the degree of industrialization, as the finished products have usually more added value than the raw products and therefore they add more to the national income per working hour than the raw materials, especially the agricultural products. This prejudice against agricultural production originates from the time when agricultural work was carried out only with the help of animals and required many and very hard working days by the farmer. During the last 50 years a great number of agricultural machinery was developed, simple enough to be handled everywhere and at a relatively low cost, in the reach of the middle farmer or even, with the help of credits or co-operatives to the small farmer. During the last 10 or 20 years chemical products, herbicides and defolliants were added to the instrumentarium of the farmer allowing him to use the machinery also for works in the field and for those which before had to be accomplished by hand. So, it happened that he abandoned crops which are difficult to mechanize and preferred others for which he could carry out the works with little help. The working days and the result of his effort is very different today compared with what it was at the beginning of the century, and it will be developed even further in the same direction towards the industrialization of the farm. The basis of the oil and fat industry is the production of the oil seeds, as it is generally impractical to import oil seed to a developing country and then to reexport it in form of oil and meal. Therefore, when

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analysing the possibilities of development of the oil and fat industry in Latin America more than it is now, we have also to preview the possible production of oil seeds in that area within the next 10 to 30 years as a basis of the development of this same industry.

As I know the goals, possibilities and problems of Venezuela more specifically than the ones of the other Latin American countries, I will analyse the foreseeable development of the coming decades, trying to find the benefits, constraints, necessities and limits of the further industrialization in this part of the subcontinent. Looking at Latin America from outside, one would think that all its countries have a similar economic and political pattern. In reality they are very different politically, on the social and educational level, in the riches of their natural resources and in their economy. Therefore, one could easily find that what is true for Venezuela will not necessarily apply to other countries, not even neighbouring countries. There are, however, some common parameters, as for example the high population increase, with more than 50 per cent share of the under 25 year olds, which in turn assure the continuing increase in population in the period to be treated, especially as generally speaking Latin America has the space available to accommodate several times the population of today. The climate is generally tropical or sub-tropical with mountains, but huge plains still unused. The standard of living of the big masses is generally low, although in different degrees, so that an increase in income will mostly exchange in food, hence the per capita consumption of vegetable oils and fats will increase in an accelerated rhythm. Therefore, the first aim of the development will be the independence of imports of oils from abroad and only then one can think of exporting vegetable oils. This progress can be very rapid in some of the countries, as in Brazil that is currently exporting soya bean oil and cake outside Latin America after only a few years of intensive cultivation. Other countries require more incentives to reach the same level.

/Since 1973

Since 1973, Venezuelan economy has undergone a radical change. The multiplied mineral oil prices, also multiplied the quantity of foreign exchange and the monetary resources at the government's disposal is spent mostly in the national economy. The disposability of more money than before resulted in a big demand of goods overcharging the national production capacity, the transport system, the ports, the commerce and produced together with the worldwide inflation a national inflation, which the government tried to control by fixing the prices for most of the important products of daily consumption, between others the price for edible oils and oil products. At the same time and in order to stimulate the agrarian production, the government increased the prices of oil seeds. As the fixed consumer price needs subsidy the import of oil and oil seeds was taken over by the government, changing the commercial pattern of the oil industry considerably. The private industry does not always react in the way the government would like it to do. Therefore, the near future of that industry depends partly on the political situation, but in the next future, the development as seen by the government and the private industry as logical consequences of facts, will converge again. The future is only to some extent formed by elaborate projecting but on the other part it is the result of the past and present. Therefore, we have to briefly examine the actual situation of the Venezuelan production of edible oils and fats, before taking a view of the future.

THE INLAND MARKET

The population of Venezuela increased about 41 per cent from 1956 to 1966 and another 37 per cent from 1966 to 1976. That means that in 20 years the population has about doubled. For the next 10 to 20 years the increase will be somewhat lower because of family planning, but nevertheless an increase of about 30 per cent can be estimated for each of the coming decades. We also have to take into consideration the immigratory forces exercised by the wealth of the nation, but this should not change our estimation too much, i.e. instead of 30 per cent, the

/increment in

increment in population could be 33, may be 35 per cent. The population of Venezuela is rather young. About 72 per cent is under 30 years old. Compared to the increase in population, the consumption of oil, fat and margarine has doubled since 1972. In 1976 the consumption of oil, fat and margarine was 34 per cent higher than in 1972. The per capita consumption increased from 9 kg to about 11 kg. At the same time the production of cooking oil reached 60 per cent, shortening remained the same and margarine increased 19 per cent. In consequence, the share of oil on the total of fatty material produced increased from 52 to 62 per cent. The years 1973 and 1975 were especially successful. These were the years of the price increase in petrol and the ones when big amounts of monetary injections were felt in the entire population. 1976 and the present 1977 seem to show some saturation. Traditionally, shortening made from coconut oil and hydrogenated cotton seed oil or soya bean oil was cheaper than the sesame seed oil, groundnut oil and maize oil, and was therefore used by the poorer part of the population. Today prices for oil and fat are about the same but oil is preferred. This is mainly the result of publicity, claiming the cholesterol forming of fat. The same trend can be observed in other Latin American countries. In Brazil, for example, even soya bean oil is preferred to groundnut oil and in Mexico the more unsaturated safflower oil has a higher price than sesame oil because of the same belief about arteriosclerosis.

The fat intake in Europe and the United States is much higher, but one has to take into account that the climate there is much colder. Dishes are on the other hand more complicated than in Latin America and require more oil and fatty ingredients. The trend in Latin America is still towards a higher oil and fat intake per capita, and therefore a more than proportional increase of consumption compared with the size of population can be anticipated, but in the relatively rich countries, as Venezuela, it is not as pronounced. In poorer countries where the make up of the demand is larger, the interannual increase in consumption may remain at 5 to 6 per cent. In times of special prosperity it could jump to 10 per cent or more. For Venezuela I would

/estimate an

estimate an average increase in oil consumption of about 4 per cent for the next 10 years and may be 3 per cent for the following years until 2000. If this comes true the consumer market for oil and fat in Venezuela will about double in the forthcoming 20 years. By more optimistic estimates the 200 per cent level of production could be reached within about 16 years in Venezuela, which would mean that in 20 years Venezuela would consume around 230 per cent of the quantity consumed today. In 1976 it totalized about 140 000 tons. More than 2/3 of the raw material was imported, mostly from the United States and Africa, by the state-owned company Corporación de Mercadeo, who distributed the seeds and the oil in accordance with the market share of each individual producing company. The imported raw materials were groundnut and groundnut oil, cotton seed oil and copra. For animal food also soya beans were imported, but the corresponding oil which was extracted in Venezuela went to the industry and a smaller part was used in the preparation of mayonnaise. Another small part was hydrogenated to shortening and margarine.

RAW MATERIALS IN VENEZUELA

Traditionally the edible oil in Venezuela was sesame oil, which is still preferred by the population. The seed is grown in the central part of the country, with a characteristically tropical climate: a dry or almost dry season from October to April and a rainy season in the second part of the year. If there is no rain at the time of sowing and harvesting, the average is about 700 to 800 kilos per hectare. The 1976 crop was a little more than 80 000 tons for 150 000 hectares. During the past 10 years many improvements took place in the treating of the fields and the genetical and agricultural investigations of the past 20 years have accelerated these results. The whole work on the bigger farms is now mechanized due to the improvement in the use of herbicides at the beginning of the season, which eliminate the quicker growing weeds and the defoliation before harvesting and make a mechanical

/harvest with

harvest with newly developed machines possible. In that way a modern farmer does not need more than 4 to 5 working days per hectare. The possibilities for the future are the use of fertilizers, which even fertile soils begin to need, improving the general use of mechanical means, and chemical products, further the development of the seed, all of which would increase the crop from 150 000 to 200 000 tons only in the part of the country where sesame seed is presently grown. Apart from that, in the oriental part of Venezuela, there are possibilities to use more than 200 000 hectares for growing sesame seed. There are already 20 000 ha under cultivation in order to try the soil, the somewhat distinct climate, the type of seed to be used, etc. One does not have to be very optimistic to estimate, that in 10 years or so, Venezuela could produce 300 000 to 400 000 tons of sesame seed per year. The Venezuelan edible oil industry knows sesame seed very well and is equipped to process it. The oil is easy to refine and the meal has about 40 per cent protein. For a long time, the possible use of the meal for human consumption has been investigated, but so far with very little success. This is probably because the efforts made in that direction are not sufficient and perhaps because the meal has a ready sale for animal food. On the other hand, the vegetable oil industry was too occupied in the past few years by modernizing and transferring its equipment out of Caracas to the central part of the country.

The second raw material for edible oils is groundnut. The local production of groundnut, being 6 to 8 years old, is still somewhat experimental. The main problem is the slow adoption of modern methods and the need of capital. Especially the controlled irrigation would help to make the crop more economic. With irrigation the yield would be 1 400 kilos per ha against 800 kg without irrigation, which alone would make the crop highly profitable. The actual harvest is estimated at 20 000 tons, but it would not be very difficult to reach in the future 100 000 tons a year. Again the manpower required is not high if the North American methods are used.

/The industry

The industry also processed groundnut in the past, when it was imported from Africa. In planning the new equipments during the course of modernization the necessary machinery for groundnut crushing was taken into consideration. Groundnut oil poses no special problems in the refinery, as it is refined with the usual equipment. The cake is absorbed by the animal food industry, which grows much faster than the oil industry. The production of concentrated protein from the meal is not yet investigated, as the crop is still small.

There were several attempts to grow soya beans and sunflower in Venezuela, but without success. Soya beans are imported and extracted here but only part of the oil is used for edible purposes.

Cotton seed is produced in Venezuela with a result of 30 to 40 000 tons a year. The whole amount is delinted, dehulled and crushed but the resulting amount of oil is far too small. For the crushing cotton seed was treated in two factories, to which a year ago was added a new one, specialized in cotton seed, and which is located in the cotton growing area. Cotton seed is a by-product of the cotton production, which again is used entirely in the very modern Venezuelan textile industry. Therefore the production does not depend on the need of the edible oil industry but on the use of the cotton in textile and on the competition between cotton and synthetic fibres. Until now cotton seed oil was not allowed to be sold as edible oil. It was mainly imported, and was not meant to compete with the higher price of the protected national sesame oil. Only now, a limited quantity is allowed to be sold as edible oil. Before that it was only used for the production of shortening and margarine after hydrogenation and after winterization for mayonnaise.

Venezuela produces about 150 000 tons of corn, but the import of corn reaches 200 000 tons per year. 34 000 tons are processed to precooked meal for human consumption, replacing partly the wheat, and as grist for the brewery industry. As a by-product of the industrial production about 4 000 tons of maize oil are refined, which sell to a premium price. The oil is clearly a by-product, but one can

/estimate that

estimate that the consumption of precooked meal and grist will more than triplicate. Estimates are even going to quintuplicate in two decades. As the industry is relatively young the consumer always finds other applications for it and more and more becomes used to replace bread by corn products. Even if the yield on oil is little, due to the higher volume of corn to be processed, it would contribute to the oil market by about 10 000 tons at the end of the century.

Venezuela, being a tropical country naturally also has coconut plantations. The low prices for coconut oil in the sixties hindered the development and the necessary care of the plantations in the past. Since 1973 prices are soaring and in spite of regression, they are still high, even taking inflation into account. Many efforts have been made to improve production and a lot of projects prepared for new plantations, but progress is rather slow. A coconut plantation needs several years to pay back investment and at the actual stage where high profits can be obtained in other fields in a much shorter time, there is absolute need for governmental help and pressure to make plans for the coming years. On the other hand investigations also in Venezuela, but mostly in other parts of the world, such as in West Africa, showed that by using hybrids, artificial irrigation and fertilization, fantastic yields on oil were reached, i.e. around 6 000 kilos of oil per hectare, against 1 200 in Venezuela. Actually on 10 000 hectares there are 20 000 tons of copra produced, as irrigation makes the plantation independent from a seashore location. The size could be increased to 30 000 ha with a yield of at least 90 000 tons of copra or roughly 60 000 tons of coconut oil. From the actual production only 1/3 is going to the edible oil industry, the remaining 2/3 being used for the cosmetic industry and is, mostly illegally, exported because of higher prices on the world market. The manpower required is surprisingly low and used mainly in the preparation of copra from coconut. It is doubtful whether the by-products, shell and fiber, can compete with synthetic materials, but the high yield on oil will pay the cost, especially if at the beginning low interest and long-term credit have been obtained.

/Coconut oil in

Coconut oil in Venezuela is very little used as oil. Practically the only amount goes into shortening and margarine. The use of margarine, contrary to other countries, is not very popular because of the specific marketing conditions of this product. As soon as these marketing conditions will improve, more coconut oil will find its way into the growing market of margarine.

There is one palm oil plantation (2 500 ha) which was founded some 25 years ago. There would be enough space and appropriate climate in Venezuela for even 10 000 to 15 000 ha and projects are being studied for new enterprises. The success of the new plantations in Colombia, Panama and Ecuador shows that the yield per hectare can be improved, in fact almost doubled in comparison with the quantity obtained in Venezuela. But the long term of the project, the number of years without financial return, the high investment and, last but not least, the labour required, made investors shirk from new projects. Manpower in Venezuela is scarce and expensive. The new laws in favour of the workers, which have also been extended to agriculture, and which certainly were necessary, make it that a Venezuelan plantation cannot compete with plantations in other countries with lower wages. It would neither be the aim of the future Latin American industrial society to provide a lot of unskilled jobs, which can only quite logically be poorly paid. Latin America should presently aim at an industrialized and mechanized production, also in the agricultural field. The reserves of unemployed labourers seems high and with the increasing population it seems to have a tendency to grow. The Venezuelan history of the last few years shows how quickly this situation can change, when industries are spreading over the country, and that in a short time there can be an acute scarcity of workers instead of labour availability. Taking all these factors into account I doubt that there will be more than one new plantation to be created in the next years. I do not therefore think that the Venezuelan palm oil production will reach more than 20 000 tons at the end of the century.

/The use

The use of palm oil in the Venezuelan industry is limited to some industrial shortening and a small part is going into margarine. The new equipments installed recently allow the distilling and refining of the palm oil, but up to now there have been no facilities for separating the liquid and solid phase of the oil. To my knowledge there are several processes used in the world for the separation, but a universal method has not yet been found which would be really economic and could be applied on a big scale. There still remains the question of what to do with the solid part, especially considering the growing need of oil and the declining consumption of shortening.

Other important materials which are used for edible oil in other Latin American countries like safflower, babassu, sunflower and soya bean are not cultivated in Venezuela. Safflower could replace part of the sesame seed, but on the other hand, it does not offer enough advantages. Babassu is replaced by coconut. The climate of Venezuela is not appropriate for the cultivation of sunflower and soya bean as it is in Argentina and in the South of Brazil. Animal fats, tallow, lard and fish oil are practically not used for cooking but find their application in the elaboration of soap.

To summarize the Venezuelan situation we can estimate that until the end of the century, when Venezuela will need about 300 000 to 330 000 tons of edible oil, fat and margarine, this will be provided by

300 000 tons of sesame seed	yielding	145 000 tons of oil		
100 000 tons of shelled groundnut	"	45 000	"	" "
60 000 tons of cottonseed	"	12 000	"	" "
60 000 tons of maize germs	"	10 000	"	" "
90 000 tons of copra	"	60 000	"	" "
palm oil	"	20 000	"	" "
		<hr/>		
		292 000		

/Even to

Even to obtain these insufficient results the crop has to be increased from

90 000 tons of sesame seed to	300 000 tons
20 000 tons of groundnut to	100 000 "
40 000 tons of cotton seed to	60 000 "
25 000 tons of maize germs to	60 000 "
20 000 tons of copra to	90 000 "
and 5 000 tons of palm to	20 000 "

It seems to be quite clear that during the following 20 years the import of oil or seed will be necessary.

To obtain better results it is necessary that the farmers receive more incentives from the government. These incentives should not be paid in the form of an initial credit as the debtor could well use them for other purposes. A better solution would be to allow higher selling prices. If the policy of subsidies remains and the government continues to control imports, exports and the distribution of the raw material to the factories, it should be kept in mind that it would be advisable to change the relatively expensive oils like sesame against cheaper ones like soya bean or cotton seed oils. It would even be better to increase imports of soya bean from outside the area as animal food production and the use of soya protein for human consumption will increase much faster than the edible oil industry. As it can be seen an intelligent control and guidance by the government and a very close co-operation between the edible oil and animal food industry and the farmers' organization could improve substantially the profitability of the sector for the benefit of the nation.

BY-PRODUCTS. MEAL AND SOAP-STOCK

At present 1 200 000 tons of animal food is produced annually in Venezuela. It is mainly used for cattle and pig food and also for the industrialized chicken production. The value of the ingredients employed in the feed is thus raised not only in cash, but also in the /form of

form of protein for the human consumer. The chicken industry is already highly industrialized, but cattle farming is still using the huge pastures available in the country. The consumer is asking for meat of better quality and for more milk and milk products. Cattle raising must therefore be modernized and the number of cattle and pigs must be increased considerably. All this requires a more sophisticated feeding of the animals, hence the accelerated increase of animal food production.

Looking at the amount of oil seeds required to satisfy the edible oil and fat consumption, one can see that the need is of about 270 000 tons. Calculating a fourfold increase in the animal food production for the next 20 years the amount of oil meal to be produced will be only about 5 per cent. There will be no problem to use the meal coming from the oil factories. Here one has to raise the question whether it is economic to import seeds, extract them here, use the meal and export the oil. One glance at the prices of seed, oil and meal indicate that the transportation cost, together with the cost of extraction will be higher than the possible profit from the whole operation. Only in the case, as mentioned above, that higher value oil is exchanged against lower value oil, a continued import-export could be made possible. If for example sesame oil is exported, using the sesame meal in the country and soya bean imported using the oil as well as the meal in the country, the result will be positive. In such a case, the solvent extraction capacity will have to be increased considerably.

When refining 300 000 tons of oil some 10 000 tons of acid oil is produced after splitting off the soap stock. Part of the acid will be used for the rubber, plastic, paint and cosmetic industry - after upgrading by distillation, hydrogenation, liquid-solid separation. A second part will be used for laundry and for toilet soap preparation. The actual capacity of fatty acid distillation is about 3 000 tons per year. As years go by the distilling refining will become more familiar and the oil factories will obtain better grade fatty acids instead of acid oil, so that a second simple small fatty acid distillation will be sufficient for the future.

/THE ACTUAL

THE ACTUAL CAPACITIES OF THE OIL MILLS

At present there are 16 oil mills working in Venezuela, 5 of which are of a bigger size producing more than 10 000 tons of oil per year. The others are smaller and some of them are not distributing directly to the consumer but supply the other factories with crude, refined or hydrogenated oil. Besides the oil mills there are four solvent extraction plants for animal food or maize meal factories. The total capacity of solvent extraction of the oil mills is somewhat less than 1 000 tons per day and that of the other factories around 350 tons. The capacity of the low pressure presses is similar and therefore the installed capacity is sufficient for the next 15 to 20 years if there is no massive import-export exchange between soya bean and sesame oil. In that case more solvent extraction capacity will be required but not before 10 years. The refining capacity is also high and could be calculated around 1 300 tons daily. It is clear that the industry is working with a low factor of utilization of its machinery, but this is due to the fact that recently a number of new factories have been set up and the older companies moved out of Caracas, nearer to the seed production centres and to the most important animal food producers, and took advantage of the move to install new plants of higher capacity, keeping at the same time the old ones. The processes of the edible oil industry are changing very slowly and the equipment installed today will not be obsolete even after 10 or 15 years. The oil is neutralized everywhere by centrifuges, the more modern equipments are also previewing the distilling deodorization, which later on might become the generally utilized process. Bleaching is continuous in two factories, but the other companies, not having a very high capacity can compete without any problem with the more modern process. Deodorizing is carried out in the new installations in stainless steel equipment and at higher temperature than before. The installed hydrogenation capacity is enough for at least 10 years, and as the new companies will also install their own equipments within some years

/there will

there will be enough hydrogenation capacity for the next 20 years. With time interization and interesterification will also be more familiar, but the cost of the new, as yet non-existent corresponding equipment is not very high. I would estimate that the whole industry will not have to spend more than 100 million bolívares (some US\$ 22 million) for the next 20 years, at present prices. The situation can be somewhat changed if palm oil from South Asia becomes available at a low price and in big quantities and if at the same time an effective liquid-solid separation is developed. In that case the Venezuelan oil factories could be obliged to install these separation equipments. There is also a market for margarine producing equipment, as the consumption of margarine will increase with the increase of the standard of living. But even taking all this into consideration I do not think that the total investment would exceed 150 million bolívares, i.e. about US\$ 35 million in 20 years.

It is not the investment cost which will cause financial problems to the industry, but the increased working capital as a consequence of the increased selling volume. The leading companies will certainly have in the future the required financial capacity to cope with the increase, but smaller companies may have difficulties to follow the rhythm, and may lose a share of the market. In Mexico the very big companies lacked flexibility and also had too high management costs. On the other hand, the small companies are domestic in scope, so that the really leading companies are those with about 200 tons of oil production a day. Brazil is producing large quantities of soya beans and soya bean oil for export, which involves enormous storage requirements and large amounts of capital for the storage of oil and meal to wait for the right time to sell. This is a policy which only companies with very solid financial background can afford. The big exporting enterprises also control their home market as their production costs, thanks to the big volume processed, are lower than the ones of their smaller competitors. The medium size oil industry could not follow and declined so that nowadays we find in Brazil big companies, with solvent extraction of 1.000 and more tons of soya bean per day as well

/as the

as the small family companies with local interest. This type of development would even be more pronounced if a vertical integration took place including the seed producing farm, the oil mill, the animal food factory, the chicken factory and the cattle farm. In a really organised way such a conglomerate could produce optimal results, but the question is whether it is politically the right solution in the relatively small countries of Latin America. Instead, a very close co-operation of the interested parties, which could eventually include mutual shareholding, would probably be the best solution. At another level the extended co-operatives could be efficient if their leaders were as efficient as the private enterprise leaders.

MARKETING

The distribution of oil and fat products in Venezuela is usually provided by oil mill enterprises. The financial burden is quite high, as retailers usually pay their bills after 30 or 60 days. Considering the necessity to buy the raw material in 2 or 3 parts during the year, storing raw material semi-finished and finished products during several months, this means that the oil mill has to dispose of cash or credit, at least half the amount of the sales volume per year. I cannot see in what way the actual payment system could be changed radically. The problem is independent of the political situation, as it has its reasons in the discrepancy between the continuous consumption and the spot type harvest. Changing the mode of payment of the retailer would only shift the working capital requirements from the factory to the retailer.

One measure could bring some help: the reduction of the number of packaging sizes. At present there are 16 different types of packaging for vegetable oil alone, the size of the package and packaging material (cans, plastic, glass) varying also. A reduced number of packaging will enable smaller storage capacities in the factories and in the retailer shops and will favour the development of higher speed machines,

/reducing the

reducing the cost of packaging. It is logical that this is a development which should take place in the next years, and that high velocity filling machines will then be required in the area. It is not quite certain whether these sophisticated machines could be developed for the reduced South American market. Oil presses, solvent extraction plants, centrifuges, bleachers and deodorizers are all produced in Latin America and it is now unnecessary to import them from other parts of the world. As the industry is just starting, there is some prejudice against it, but their increasingly good reputation and the usually lower prices will help them to get better known and better considered. More publicity and more exchange of experience between the factories of the different countries is what is really needed.

The distribution of margerine has its own problems. Distances in South America are great, the climate is warm and the transportation system is far less developed than in Europe or in the United States. Margerine, as a substitute for butter, should have the same physical characteristics, especially the same melting behaviour. To transport a product with a 37° melting point on a sunny highway, to store it without sufficient care, and to leave it on the rack of a supermarket for months, will result in something rancid and unpalatable. The solution is therefore to produce a margerine with a high melting point, but then it is no longer a better substitute. On the other hand margerine with added proteins and vitamins would be a very important part of the diet, also for the poorer part of the population. It could be produced relatively cheaply by using animal food, coconut oil and the solid part of palm oil. In my opinion margerine is a fat product which is not enough developed in Latin America. The transportation system is responsible for this and not the oil factories. Once the production of margerine is developed, which represents about 11 per cent of the total fat market in Venezuela, sales should increase very rapidly. The corresponding machinery requirements would not be very high for Venezuela, since much unused capacity is still available, but in other Latin American countries the per capita margerine production is low and the installations are frequently inadequate.

/PROTEIN EXTRACTION

PROTEIN EXTRACTION FROM OIL-CAKE

There is a possibility of development in the field of oil milling mentioned above. To upgrade the by-product meal and, in an indirect way, to lower the price of oil, the industry should concentrate on the extraction and purification of protein for human consumption. Laboratories and also factories are working on that process, but their efforts have not yet been noticed satisfactorily by the owners and managers of edible oil factories, especially seed crushers. In my opinion it would be of great importance if UNIDO, or another international organization, could prepare detailed information on the state of industrial protein extraction out of soya beans, which is quite well known, and also from sesame seed or other oil seeds. This information should include process, equipment and approximate price, operational costs, value of the protein obtained compared with other proteins and finally suggested applications. This information would have to be distributed by the national oil mill association to individual oil mill factories and also to competent governmental departments. Such information would certainly arise interest and result in the near future in a protein production facility which would benefit the oil industry and the consumers.

TECHNICAL CO-OPERATION AMONG LATIN AMERICAN COUNTRIES

In principle, oil milling in Latin America is not any different from what it is in other parts of the world. However, the other tropical countries are far away in Africa and Asia and technical and human connections are not as easy as in the Spanish speaking countries and in Brazil, where Spanish is well understood. Usually the companies of the various countries are not competing on the same market, therefore, they can be open to the exchange of ideas. Congresses are helping to know each other, but their programmes are naturally very compressed, and the problems discussed or solutions offered are possibly not reaching them at the right moment when they are needed, and therefore forgotten. I think it would be quite helpful if UNIDO

/or some

or some other international organization would have a small institute, more an office corresponding library than a laboratory or technical institute. This office could inform associations of oil millers of the different Latin American countries about the improvements made in installations offered, about experiences regarding new processes or new materials, as well as machinery and raw materials. This would help the members to find a solution to their various problems. I am not thinking so much of scientific research, but more of the practical side of the factories and enterprises' every day life. New technological know-how usually arrives through equipment manufacturers, who are quite open with their sometimes too optimistic comments, but it would be interesting to distribute this knowledge faster. Scientific literature is also contained in periodicals, but laboratory research, important as it is, is still far away from technical realization. I could imagine, that it would be a great help if before deciding on a new installation, an acceptably objective portfolio referring to the different possibilities offered could be available, may be mentioning the places in Latin America where the process or installation is in use.

Travelling as a member of an UNIDO mission to India, I was impressed to see how many different inedible oil and fat is used there for industrial applications, such as soap, greases, chemical products, leaving all the edible oil and fat for human consumption. Up to now the corresponding raw material is harvested in the free nature, their importance is naturally not very high, but one or the other of these raw materials could be grown industrially and be used in higher scale operations. This type of investigation should remain in the universities, which should have much more contact with the industry than they have today. In India the co-operation is quite close and the results are important. Naturally a co-operation between the universities of the various Latin American countries would help to avoid a duplication of the work.

/CONCLUSION

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- +. The development of the Latin American oil and fat industry and self-sufficiency of these countries in that field depends on the development of agriculture in each country.
2. Development of agriculture can be achieved by government measures and also by the close co-operation of agriculture and industry.
3. Co-operation involving mutual share holding or similar co-operation between the seed growers, oil mills, animal food factories and chicken and cattle farms would accelerate development and increase production.
4. In order to improve the population diet protein extraction of oil-cakes should be investigated more specifically. Distribution, a basic knowledge of the corresponding processes and other relevant facts among oil millers are necessary.
5. A central institute would be helpful to inform the industry about new technical developments, processes, machineries and for the exchange of information.
6. Closer co-operation between universities and the industry in the area, again with exchange of information could promote the utilization of new raw materials.

