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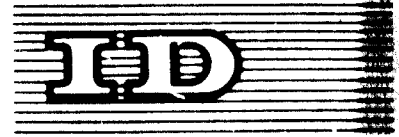
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Reference to the Automotive Industry

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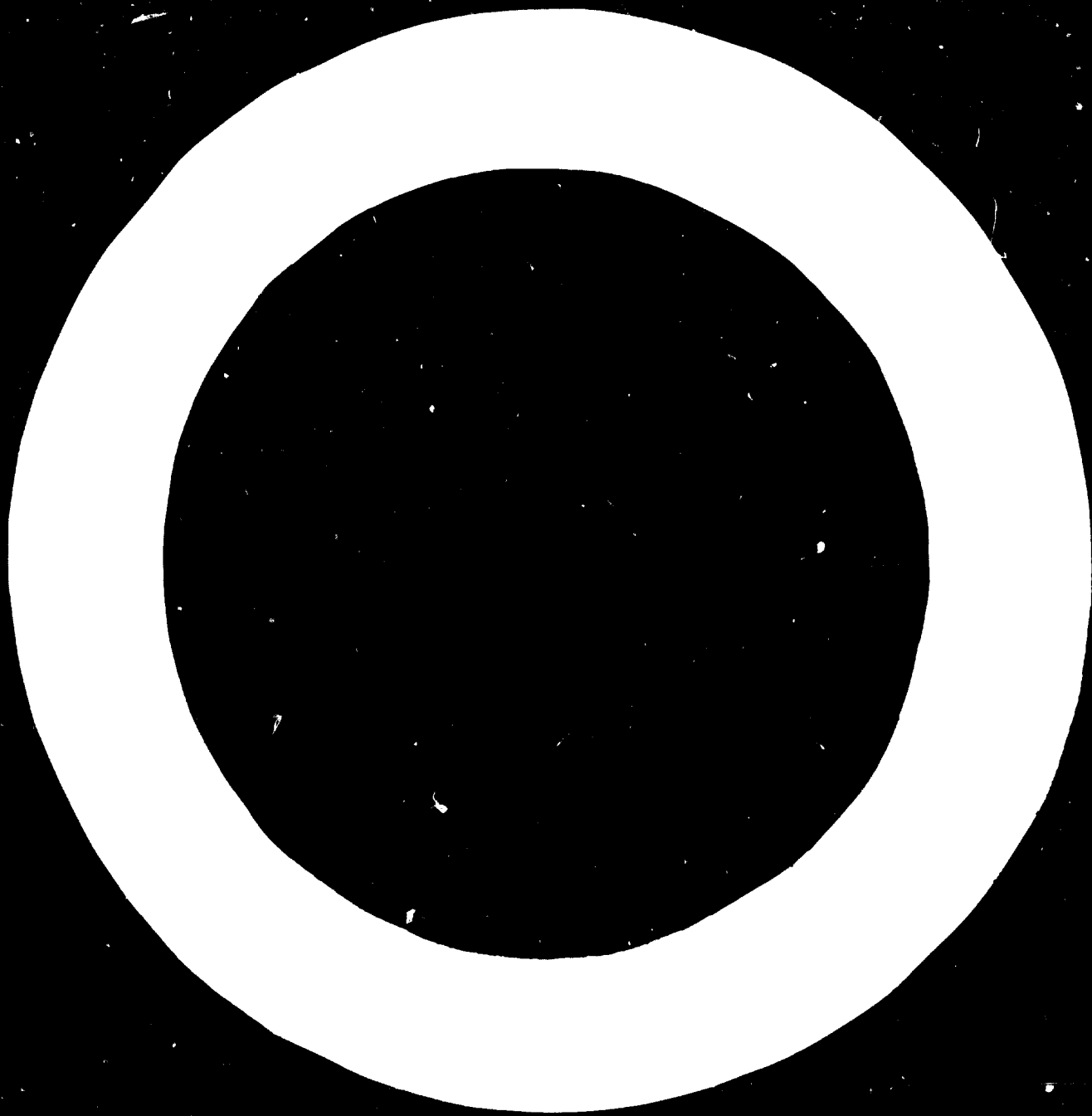
REPORT ON DYNAMIC DEVELOPMENT OF  
AUTOMOTIVE INDUSTRY IN DEVELOPING COUNTRIES<sup>1/</sup>

by

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I. Basic Necessary Factors for Establishment of Automotive Industry

- 1 The basic aim of this report is placed in the pursuit of ways and means for the development of a sound automotive industry in the developing countries under the cooperation of automotive industrial sectors of the industrialized nations.

The automotive industry is an extremely comprehensive industry of market oriented and monopolistic type, and highly dependent upon the development and technical level of all the related industries including the required raw materials, machine tools, machinery industry, etc.

It is the general view among the professionals and experts in the industrialized nations relating to this subject of item 1 that from the fact that the automotive industry is an assembly industry of extremely high precision and accuracy dependent on the industrial structure of a nation, particularly on the outcome of the allout efforts of the high degree of industrial technologies, it would be extremely difficult for the developing countries with their current industrial capability to domestically turn out complete passenger cars provided with an internationally competitive performance.

- 2 Such a view is introduced from the contention that the current status of industrial structure in the developing nations is not up to the level of producing home-made automobiles yet. That is, for the production of a completed automobile, an enormous and extensive supporting industries are required since a completed passenger car is an assembly of approximately 5,000 kinds of components and parts consisting of about

20,000 pieces.

Even in the industrialized countries, the items to be produced by the manufacturers of completed cars are mainly such major components as the body-chassis, engines, transmissions, cylinders, cam-shafts, etc., while other items are mostly manufactured on subcontracting basis by the parts manufacturing industry. Thus the minor items are entirely dependent upon an ancillary structure.

Taking Japan's case as an instance, under each so-called automobile manufacturer there are the primary, the 2ndary and the thirdly subcontractors numbering in total some 6,000 companies, and the percentage of the outside processing cost against the total cost of a completed car has reached a level of between 50% and 80%.

In Japan, the reciprocal relation between the automobile manufacturers and the subcontract parts manufacturers is consisted of the following manner:

Fig. 1 Reciprocal Relation between Automobile Makers and Subcontract Parts Makers

Automobile makers

Subcontractors

\* Note 1.

- (1) Business tie-up  
Technical and sales tie-up for the completed parts and certain specialized products.
- (2) Merger  
The automobile makers take over the subcontract parts makers.
- (3) Alignment in group  
An automobile maker aligns the subcontractors in its own group by letting them have its own equity.
- (4) Formation of a joint venture company  
An automobile maker and one or several major parts makers form a joint venture company to specialize in the manufacture of certain parts.

The main reasons for the development of such an ancillary structure in Japan are that the automobile manufacturers are in pursuit of the advantages of the division of labor for the purpose of reducing the cost of the completed cars and at the same time to secure the supply and delivery of certain pre-determined volume and quantity of parts by certain pre-determined timing, and thus, they have taken positive participation in the organization of parts manufacturing industry in Japan on the basis that (1) which will save their own capital investment, (2) which will serve the role of cushion or shock-absorbent in case of an adverse business cycle, and (3) which will enable them to indirectly use the low-wage labor.

-3 The major components and parts which are required for the completed automobile cars including trucks and buses.

- |                                  |                      |
|----------------------------------|----------------------|
| (1) Electric wiring and lighting |                      |
| (2) Castings                     | (6) Finished parts   |
| (3) Forgings                     | (7) Various supplies |
| (4) Machining                    | (8) Press-working    |
| (5) Springs                      | (9) Jigs             |

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\* Note 1: The automobile parts subcontract manufacturers are classified in the following three major categories:

- 1) Independent parts makers  
They are completely independent from any of the automobile makers, and neither under the control of, nor affiliated to, any of them.
- 2) Non-independent parts makers  
They supply parts to plural number of automobile makers under contract.
- 3) Affiliated parts makers  
A : Those affiliated to a specific single automobile maker each.  
B : Those who manufacture and supply parts under subcontract.

- (10) Tires and accessories
- (11) Bearings
- (12) Batteries
- (13) Other types of processing (14 types of works)

These components and parts require certain specific accuracy, quality, and durability, and must have certain standardized specifications for the sake of mass production and mass assembly for cost saving. Therefore, for the domestic production of a 100% completed automobile car, it is the minimum essential requisite to have these related industries thoroughly organized.

In the case of Japan, her automobile production first started in 1904. But it was from 1950 to 1955 that the 100% completed automobile cars except those of military vehicles began to be domestically produced, and that the foundation of Japan's automobile industry was thus established. It has, in fact, taken such a long time, almost half a century since the birth of the first automobile in Japan.

For a developing nation to promote an automotive industry in a healthy, sound form, it is necessary that she will formulate in the first place a long range planning of development and expanding the automotive related industries within the framework of a synthetic and comprehensive industrial development plan.

- 4 It also will be necessary to study the following basic factors to evaluate whether or not such a synthetic industry which pursues profit by adopting such a large mass production system as the automotive industry could really be feasible or viable as the nation's industry



- an integrated automotive industry.

- (1) Population size, market potentiality, and demands.
- (2) Per-capita income level.
- (3) Industrial technical standard, and the level of standardization.
- (4) Financial mobilization capability for industrial and sales financing.

The population size has a relation with the automobile demand and the production size to meet with such a market demand. The income level is important for determining the models and types of cars, while the industrial technical level is important in considering or determining the priority order of the types of industry to be promoted for the fostering of the automobile parts industry. The problems of finance is also essential for the financial support to upbringing not only the automobile manufacturers but also the parts makers and the dealers as well.

It is not desirable for a country of small population to have an integral assembly plant, even though it may be allowable to have certain parts manufacturing industry, from the standpoint of an effective utilization of her national resources and for the benefit of her national economy.

For a country with a large population, it is advisable that if her present per-capita income is below US\$200, she should start from such types of automobile as trucks and buses which will play a higher strategic role for the development of her national economy. Even in the case of production of several types of automobile by a complete knock-down system, a deliberate consideration should be taken as to the

selection of car models or types, and especially for the introduction of a production line, after having made a thorough investigation or a realistic grasp of the current status of the industrial structure and the level of the technical system and standard of the country.

In the development of not alone the automotive industry but also a specific industry, it is important to select the industry of the highest economic efficiency in the mobilization of a nation's bestowed resources. This matter has a direct bearing with the nation's industrial policy for the selection of promising industries which is her basic national economic development strategy.

There has been reported up-to-day no case of global and extensive investigation conducted by any single automotive promotion project as to the problems conceived by the automotive industry in any of the developing nations, specifically from the viewpoint of "transfer of technology."

Assuming that if UNIDO would develop in the future a survey to analyze in depth the outward and inward details of both successful and unsuccessful projects by taking, for instance, the achievements of the domestic production of automotive parts in those developing countries which have already started automobile production, it would be possible to classify by country and draw out which countries are appropriate for automotive industry and which countries are not. And through this type of survey, it would be likewise possible to find out the practical measures for a smooth development of the automotive industrial project in the developing countries and at the same time the most effective was

of international cooperation in this respect.

## II. Various Bottlenecks Obstructing Development of Automotive Industry in Developing Countries

- 1 It is a fact that not only the completed cars but also the industrial products of the developing nations are inferior comparing with those of the advanced nations in (1) cost, (2) performance, and (3) durability. To use the more extreme words, it is all because that these countries' industrialization history is yet very short and shallow. Namely, it is originated in their weak financial strength and technical basis. The most urgent and essential for today's developing nations is the necessity to systematically improve and consolidate their own position and capability to quickly absorb and divert the finance and technologies which are provided from the developed nations.

To grasp and determine the causes and reasons for why the cost, performance, durability, etc. of the completed cars of the developing nations have such weak points will be the clue to finding out the means of improving or correcting these weak points.

- 2 The automotive industry project of the developing nations are in most cases except for India, where a basic national model car "Ambassador" has been determined, managed and operated by some specific method such as C.K.D method under business tie-up with certain major automobile producers in the developed nations.

The elements incentive to a developing nation for desiring to have

an integrated automobile production project may be summarized as follows:

- (1) Foreign exchange saving by switching to domestic production from importing foreign cars.
- (2) Creation of employment opportunities.
- (3) Fostering and upbringing of the maintenance parts industry for the existing cars including the imported cars.
- (4) Enhancement of the nation's industrial technical level and the promotion of modern business management mind.

The following reasons may be cited for the incentive by which the major automobile producers in the industrialized countries advance into the developing countries.

- (1) Maintenance of the acquired overseas market and expansion or creation of new market shares abroad.
- (2) Effective and profitable utilization of their surplus and accumulated funds and their technologies.
- (3) Indirect utilization of the cheap labor.
- (4) Market share competition with other major producers.

As the result of the concordance of interest between the developing nations and the major automobile producers in the developing countries, an automotive industry project in the form of C.K.D. method has been formulated and applied to the interested developing nations.

-3 The models or types of automobiles currently produced in the developing countries, except for certain cases as India, are all certain specified models with the brand names of those in the industrialized countries, and therefore, the automobile production in the developing countries is in

the form of subcontract production under the major international car producers.

The major parts for these specific models and the designing of these models which are made and produced in these developing nations are all established and specified by the issued patents owned by the major automobile producers. Notwithstanding this fact, the reason for the higher cost, inferior performance, and lower durability of these cars produced in the developing countries under the introduction of technology from major car producers in the industrialized countries compared with those counterparts produced in the plants of the licensor-car makers in the advanced countries lie in the lower productivity and the technical weak points of their plants and of the parts manufacturing industry of the developing nations. This may largely dependent upon the short history of automobile plant management, but the management ability as well as the workmanship standard may as well constitute an important deterrent factor.

For instance, as to the higher cost, the problematic point is, as claimed generally by the developing countries, due to the "know-how fees" and/or the "brand fee" which are paid to the licensors under the license agreements between the major automobile makers providing the technologies and the developing nations paying such fees.

Even a minor problem which may constitute no trouble in the case between the licensor and the licensee in the developed nations will pose a serious obstacle between the two parties of the developed and the developing nations.

In the transfer of technology, it should be that the more attention be attached for evaluation of how effectively the transferred technology is absorbed and availed by the beneficiary party. But in the actuality, the controversy is apt to be focused more on the determination or adequacy of license fees. In the case of the overseas project of the major Japanese automobile makers by C.K.D. method, the know-how fees are, generally speaking, about 3% of the total annual sales in average.

Between the technology granted licensee and the technology granting licensor, there is a certain type of license is exchanged under a license arrangement. But how to make an effective use of the granted know-how on the part of the licensee depends of course on the technology transmitting capability of the licensing party, but in the final end, it is on the technology digesting capability of the license receiving party. Naturally, as the contents of the licensing terms and conditions; (1) type of technology, (2) its scope and level, and (3) determination of consideration amount will be determined and agreed in details. However, the importance may lies in the point how and at what stage the technology in question can be met and settled down in the context of the needs and capability on the part of the licensee.

In the induction of technology, the most appropriate technology must be selected in consideration of the actual status of the licensee's technical digesting capability. Otherwise, the seed of technology will take no root. In this sense, the program for selecting technology to be introduced must be formulated scientifically.

-4 For instance, in the cases of Japan and West Germany, which are the most conspicuous examples of having demonstrated an eye-catching industrial development not alone in the field of automotive industry by introducing technologies from abroad. Both nations (1) made payment of the considerations for the technologies introduced without causing any bad effect upon their respective international payment balance, which both nations have improved by export in the product of the introduced technologies. Looking at the volume of consideration payments made by the United Kingdom and West Germany for the technologies imported in and around 1957 when the development of the two nations had just got under way, West Germany was paying about US\$100 million against only US\$29 million of the UK. Of course, the national industrial investment policies were not the same, but it may as well be said that in the case of West Germany, she cleverly avoided the risk of research and development failure which is inherent to any self R & D efforts, and instead she introduced the already developed and proven excellent technologies and continued and accumulated her efforts for the thoroughgoing productivity improvement. Japan likewise followed the same process. (The volume of Japan's technology consideration payments in 1959 when her economic rehabilitation was on its right track was equivalent to the level of 1.7% of her total foreign exchange payments).

Viewing from the fact, the above cited examples have provided a sufficient proof that the technology introduction is not at all prejudicial to the interest of a nation nor detrimental to her national

economy so long as her social and industrial environments are well prepared and adjusted for the support of such an introduced technology. Needless to say, the contrasting differences in the international environments in which the developing nations and West Germany as well as Japan are respectively placed are not necessarily disregarded, but the fact evidently indicates that in addition to the target mindedness of the management, the abilities of the employees, the sales capability, etc. the clear establishment of the goals for the nation's economic activity, and the basis on which the various factors subordinate to such national economic goals are able to function systematically are the most inherent and essential conditions for the enhancement of the technology absorbing capability.

- 5 In order to adjust and settle down the conflicting interest arising from a license arrangement relating to automotive industry between a licensor of an industrialized country and a licensee of a developing nation, a thorough re-investigation or re-evaluation should be undertaken in relation to the type, level and scope of the technology which the licensee of the developing nation is required to introduce, as well as to the capability on the part of the licensee.

In formulating a technology introducing plan or program, a deliberate consideration must be given to make it a practical and reasonable one avoiding any processing which may require a high level of complex precision so that it will start from a lower level of processing such as parts manufacturing.

In other words, even in the effort to remove and solve the problems



which are currently faced by the developing nations as the bottleneck in their industrialization efforts, without this deliberate planning, it will result in a vain use of various resources and a duplicate spending of efforts.

In order to promote and develop a high efficiency industry not alone with the automotive industry, the following elements must be thoroughly reviewed as the criterion of development investment relating to technology introduction by a nation or by an industry.

- (1) Selection of products to be manufactured.
- (2) Recoverability and profitability.
- (3) Business capacity.
- (4) Financial capacity for equipment investment.
- (5) Capability to absorb the introduced technology, and the period for applied development.
- (6) Technical level and organizational ability.

In the attempt at raising the ratio of domestic production of automobile parts, no thoughtless idea should be conceived to try to domestic produce all kinds of parts. It should be well planned that every single part which is domestically produced should enjoy the benefit of international competition.

In the development of an integrated synthetic industry like the automotive industry, the adjustment of nationalism, regionalism and internationalism has an important significance in the industrial policy. This must be taken seriously from the standpoint of effective utilization of the world resources.

III- A Consideration Relating to Dynamic Development of Automotive Industry  
in Developing Countries.

- 1 For the nationalist desire of the developing nations to have an integral automobile industry from the reasons as cited by items from (1) to (4) under II-2, and for the accomplishment of their such desire on the basis of their national economic position in the future, a model for an dynamic development of the automobile manufacturing industry in the developing countries with an international cooperation as a prerequisite is hereby suggested as follows:

There are two alternatives which can be considered for the settlement of the automotive industry in the developing countries

The one is that firstly by introducing parts manufacturing technology in cooperation with a certain foreign parts manufacturer, start with the parts manufacturing industry. Then, when the manufacture and supply of parts for certain proposed models of the imported cars have reached the minimum of 20%, an automobile producing plant may be introduced and erected. In this case, in consideration of durability, economics, and low price tag appropriate as a national basic model, some 1000 cc class automobile car should be selected.

The other one is that firstly starting from the complete knock down system depending on 100% imported components and parts, gradually enter into such fields as domestically manufacturable and labor intensive such as interiors, low level processing electrical wiring and lightings, etc. For this, the parts manufacturing industry will be started and developed under cooperation with major foreign auto-makers.

These are the conceivable alternatives for development of automotive industry in the developing nations, but in these cases, the basic design of the car models is completely dependent upon the engineering of the major foreign car manufacturers and can not be free from the disadvantage of being a new comer in this industry.

Whereas, the writer of this report would like to make the following suggestion of the modeling of his conception which may be devoid of actuality.

-2 This model hypothetically presents a population above 1.5 million, per capita income of about US\$300 - 500, a nation with sufficiently capable industries of machine tooling, foundry, forging, weak electricity, etc. for supporting an automobile production industry.

(1) Selection and determination of basic national models of passenger automobile cars.

With regard to the determining of car models, 1500 - 1000 cc type models are selected in consideration of (1) economy, (2) durability, (3) simple mechanism. For example, it is said that Ford has spent about 72 million dollars for the R & D of its compact car "Marvelic" (1500-2000 cc.) But instead of such a high performance car, and not considering of exporting but only for the substitute of the imported cars, the model is far more simple. For the time being, the dies are ordered from abroad, and the insufficiency of designing capability may be supplemented by recruiting some experts from abroad through the arrangement by the competent UN organization.

- (2) As for the major components such as engines and transmissions, these will be imported on unit basis selecting the models which may be closest to the types which are planned to be employed for the future domestic produced cars. Even in Japan, the parts of high precision or sophisticated specifications were imported on unit basis in the past. (The complete-car manufacture was achieved by Nissan in 1956, Isuzu in 1957, and by Hino in 1958.)
- (3) Preparation of list of parts manufacturing industry by type for development of parts industry for the basic model cars and formulation of parts industry development plan.

by conducting an analytical study of the industry and the related technology, formulate a general development aid program for those parts required for the basic model cars which are domestically producible (a national level aid program both financialwise and technicalwise will be arranged for such industry which requires both quantitative and qualitative improvements.) those which are required to depend upon a long term importation, and those which are planned to be domestically produced in the future. For the latter two, a certain type of preferential treatment, for instance, for the former in terms of import duty and for the latter in terms of corporate tax, will be provided.

For the preparation and formulation of this program, a cooperation of consultants who are expertised in the actual situation of international automotive business will be provided. The consulting fees may be appropriated from the country program project

funds of UNDP.

- (4) Determination of production cost of the national model cars and the automotive industry protection policy.

As to the ex-work price of the basic national model cars, the target shall be placed at about 20% higher than the import price of the imported cars of the same exhaust volume. This cost calculation will become the basic design concept of the basic national model cars. For the purpose of upbringing of the domestic produced cars, this national model cars will fill the entire governmental and military needs of vehicles.

In relation to the imported automobiles, for the purpose of strengthening the domestic supply system of passenger cars, a gradual import restriction will be imposed. The government, in order to stimulate the purchase demand in the end-users market, will establish and arrange an installment sales financing system by making an effective use of both the official and private financial system and institutions such as the agricultural cooperative unions, etc.

- (5) Construction and management of a completed automobile production plant.

The presses and machine tools will be purchased from the industrialized countries, while for designing and layout of the plant, the domestic engineers are mobilized, or the assistance and cooperation of the experts from the senior developing nations such as India will be sought.

For the type and system for the management and operation of the automotive industry project, initially, a system of state managed automobile plant will be adopted, and for its actual management, some able and competent persons who are recruited extensively from the private quarters and having, if possible, studied automobile industry management abroad.

(6) Development of regional cooperation possibility.

As shown by the Asian car concept advocated by Ford, the system of international division of labor should have been considered from the outset in such an area where a certain type of regional cooperation is possible. The idea of this model, however, will lack its rationality in such areas as the Southeast Asian countries where the maritime transportation cost will cause a multi-angle cost dispersion.

(7) Cooperation from the governments or major automobile producers of the advanced nations.

For such a basic model car concept of the developing nations, the following type of cooperation may be expected from the governmental quarters and the major automobile producers in the advanced countries.

(a) Governmental base cooperation.

Establish a R & D cooperation for automotive industry development as part of the industrial cooperation. More concretely, R & D cooperation, training of technical persons, sending abroad of the automobile related engineers of the Ministry of

Industry as cooperating experts, etc. All these will be undertaken on a grant basis.

Also there can be considered of an establishment of a financial aid system to help promote the overseas advancement of the parts manufacturers of the advanced countries, or the governments of the industrialized countries buy up some developed technologies in their countries which are not too expensive and grant them to the developing nations.

(b) Cooperation of the major producers.

For the purpose of upbringing of the basic model cars in the developing countries, an enlarging of the framework of the number of persons to be trained at the respective plants of the major producers of the industrialized nations, or man power cooperation by sending technical and managerial experts to the plants of the developing nations may be other effective alternatives.

Also it may be necessary to consider about one-set pattern cooperation by improving the present form of business advancement to the form of taking with it the subcontractor parts manufacturers to the developing countries to directly contribute to the development of the part industry there.

-3 Due to the limitation of the pages, this report has failed to cover all the individual details of the analysis in the lateral facet. However, the automotive industry project development cooperation that Japan is currently providing to Burma is of comparatively an ideal concept closer to the desirable pattern of international cooperation.

As to the basic model cars produced, trucks and buses have been introduced from Daimler-Benz AG, and for the jeeps and passenger cars, the most economic models of 360cc and 1000cc have been introduced from ISUZU. They have concluded their respective technical assistance agreements with Burma's Ministry of Industry. The noteworthy points of this international cooperation are that the Japanese Government has furnished to Burma the assembly plants supplied from those two automakers under the Japan's war reparation plan (automobile production plants including large capacity presses,) and that the parts and the raw materials were supplied under Japan's yen credit, and also that this form of cooperation has contributed to a great degree to the development of the automotive related technologies in that country. In other words, for the sake of accomplishing the text of the technical assistance agreement between the Burma Government and the two Japanese private companies, that Japanese Government had participated in this technical cooperation with its financial back-up. This is a characteristic difference from the ordinary form of cooperation which is undertaken in a form of business advancement. In the case of Burma, where, from the specific problem of war reparation arrangement, there has been existing a historic situation whereby Burma has been given the production assets of which size Burma can be rightly proud as the largest automobile plant in all Asia. If expressed in today's term, it is a "grant". If this form of cooperation initiative is taken up into a serious consideration on the part of the industrialized nations, the concept of the basic model for national model cars shall by no means any unrealistic idea nor any difficult plan.



IV. Environmental problems related to "technology transfer" and technology induction -- for the purpose of effective "technology transfer"

- 1 While the technology structure system depends upon the industrial structure system of the pertinent country. In the case of the developing countries, where their history of modernization is not long enough and their industry is still immature, the technology and the industry do not necessarily agree. While considering not only the technology associated with the automobile industry but the operative technology about it, if the component factors for "technology" is classified, they can be divided into (1) production technology, (2) products technology, (3) New products development and improvement technology, and in addition to these, in its soft aspect (4) management technology. However, when the "technology" environment problems are considered at the stage of present days, we have to find that it is impossible to handle "technology" only in the aspect directly related to the production.

For, the technology, which has attained an level of higher degree and accordingly is provided with a wider range of activities than previously, is understood to have such a depth as related with the social environment and cultural environment in particular, so that the domain of ideas as represented such words as socio-technology and socio-science has been formed. In respect to the developing countries in particular, the "operative technology", which is being inducted to these countries, refers to the way in which the social and cultural factors as well as the manpower factor that is most important factor for "technology transfer" are related with each other. and such

technology in many case affect the "effect of induction".

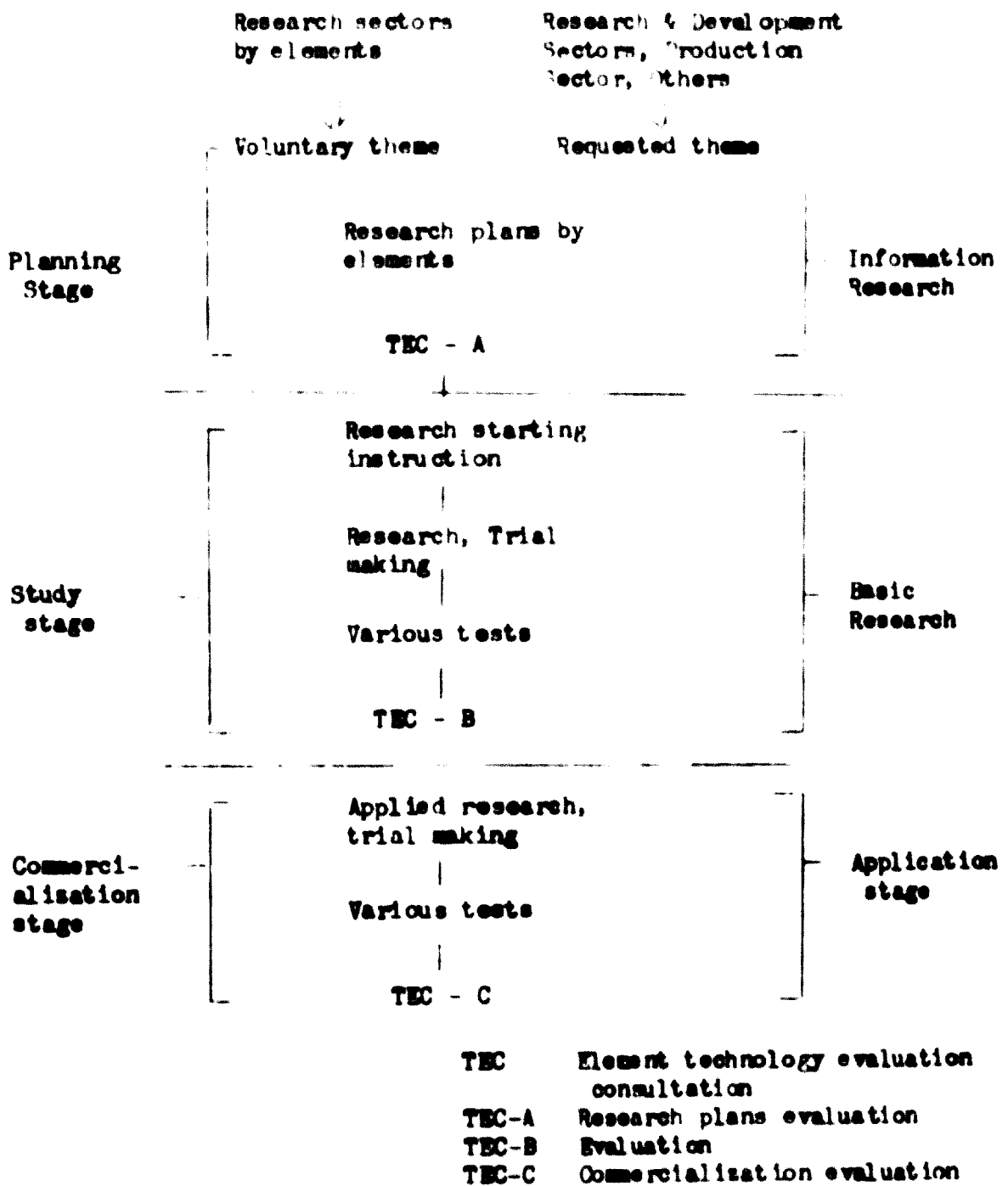
- 2 The conditions for supporting "technology" constitutes all the conditions supporting location of the industry. And, these conditions, as the environmental problems inside enterprises, will include (1) degree of the necessity of technology induction. (2) comprehended extent and absorption capacity as to "inducted technology", (3) target and contents of the payment of "consideration" for "inducted technology" and (4) capacity for applying the development. At the same time, such conditions will also, as the problems outside enterprises, include (1) the requirement degree for new products and their marketing and (2) the levelling up of technology associated with the new products in pertinent countries -- for instance the sub-contracting enterprises in the developing countries must be improved in their technology.

On the side of the licensee, a rapid absorption reaction will be caused by the "inducted technology", and when the induction target was accomplished, the profits far above payment of the "consideration" will be obtained. It must be emphasized here that the effective deployment of technology by Japan was brought about by that fact that the absorption reaction took place just in the way as expected in target previously set and was able to achieve a higher productivity than that of enterprises in the technology supplying countries.

- 3 The following chart, which is indicated hereunder, is to be applied to the programming, which is taken into consideration, when enterprises in Japan is about to develop new products or induct the technology of

foreign countries. However, it will be able to accomplish the role of a check list, when the "technology transfer" between advanced countries and developing countries is considered.

The chart is as follows when classified by stages.



(1) Information collection stage

The information and ideas are analysed and this result is plotted on the information map, so that they are able to supply to each sector.

(2) Target searching stage (assumed trial making)

According to instruction in respect to the survey on research and development, the market research and technological research are conducted. Manufacture of the assumed trial items are conducted.

(3) Enterprise formation deciding stage (Basic trial making)

The marketability is made clear, measurement as to the demanding quantity is conducted and the development to be made is decided. On the basis of the sales plan and also considering the load state in the production and development sectors and so forth, overall project is established and this constitutes the basic production schedule.

(4) Project stage for the enterprise (initial actual trial manufacture)

The technological guide line for realizing actual manufacturing of new products is firmly established. The manufacturing is made on some hand-made trial items. The pre-production, analysis by the analysts and design for the production are started.

(5) Commercialization stage (increased manufacture of trial items)

The decision is made on the metal mould, testing, preparation of the process list, and production.

(6) Introduction stage (manufacture of trial items for the production)

In respect to the metal mould and manpower distribution, the same system is taken as is the case with regular production. Such is followed by the evaluation consultation and testing about them.

(7) Production stage

With respect to the production as well as the factors for checking and improving the sales sector and other sectors, feedback process is conducted on the production.

(8) Production stopped

In reference to the sales achievements, the production is stopped as the case may be.

Reference List

List of evaluation factors for deciding the commercialization of new products

| Major factor    | Pri-<br>ority | Minor factor           | Pri-<br>ority |  |
|-----------------|---------------|------------------------|---------------|--|
| Market          | 0.4           | Necessity              | 3             | Degree of the necessity for customers            |
|                 |               | Competitiveness        | 3             | Whether any competitors exist or not?            |
|                 |               | Continuity             | 2             | Life time and demanding quantity of the goods    |
|                 |               | Growth rate            | 2             | Growth of the demand for goods                   |
| Tech-<br>nology | 0.3           | Difficulty or easiness | 3             | Technological difficulty or easiness             |
|                 |               | Required period        | 2             | Period required until the completion             |
|                 |               | Research expenses      | 2             | Expenses required for the study and development  |
|                 |               | Load state             | 2             | Reception state viewed from the problems on hand |
|                 |               | Correlative goods      | 1             | Relation with the goods from previously          |

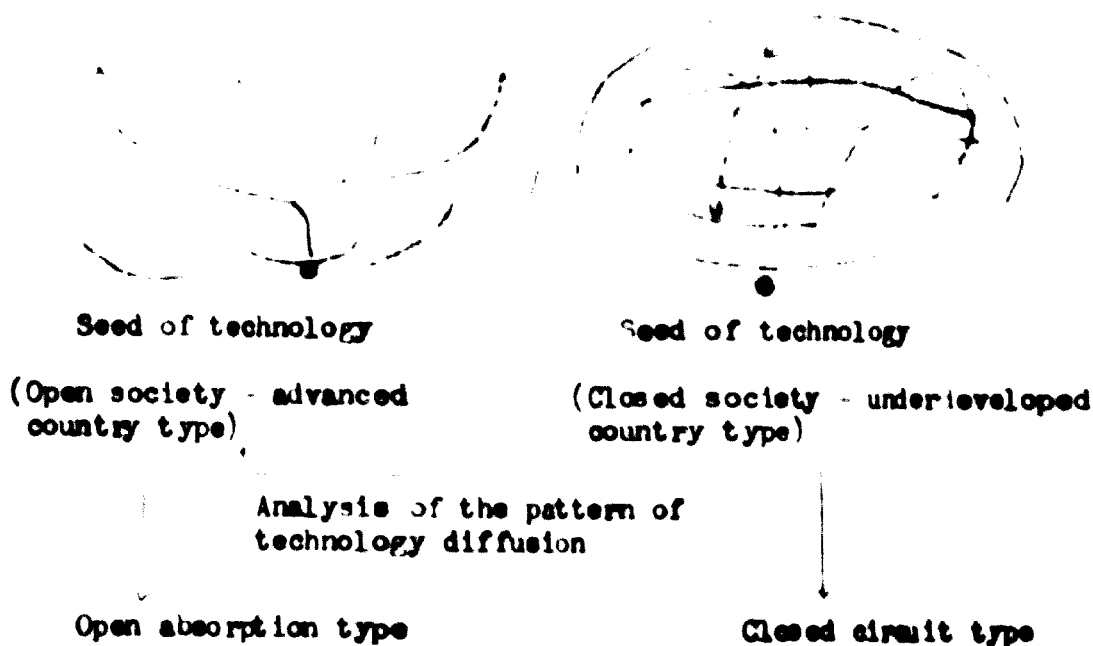
|            |     |                        |   |   |
|------------|-----|------------------------|---|---|
| Production | 0.1 | Difficulty or easiness | 4 | Degree of difficulty or easiness on conducting the production |
|            |     | Member material ratio  | 3 | Ratio of the member material expenses versus sales price      |
|            |     | Load state             | 2 | Reception state towards the production line                   |
|            |     | Facilities expenses    | 1 | Facilities expenses required on conducting the production     |
|            |     | Difficulty or easiness | 2 | Degree of difficulty or easiness on conducting the sales      |
| Sales      | 0.2 | Sales route            | 5 | Sales route required  |
|            |     | Load state             | 2 | Reception state towards the sales line                        |
|            |     | Sales expenses         | 1 | Expenses required on the sales.                               |

In the case of enterprises in the developing countries, since there have been many cases in which the factor state either inside or outside such enterprises was immature in the course of the items (1) to (7) above, many cases is known in which "technology" was inducted at the stages of the items (6) to (7) above. It is also informed that large problems exist for them in lack of the system for feeding back overall proschedule for the enterprise activities.

With respect to "technology transfer" within the frame work of assistance, except for part of the comparatively advanced developing countries, for the most part the stages of the items (1) to (5) above used to being pre-set by enterprises of the advanced countries, and as the result they have been just accorded "know-how" at the stages of the items (1) to (5) above by the above partners of theirs, with simple

briefing being given prior to starting of these stages of items (1) to (5). Moreover, since the capacity represented in the items (1) to (3) above is lacked in enterprises of the developing countries, this work is taken over the consultant service of foreign countries, and as the outcome the capacity at these stages will not be fostered.

In respect to the problems after the stages represented in the items (5) to (6) were entered, they are found in the fact that some strata-like hierarchy emerging from the social customs exists between the upper managing staff and the lower technical workers and that information for operation of the enterprises does not flow smoothly. According to the research by Land Corporation and Stanford Research Institute, the bottleneck for "technology transfer" caused from such a system of the closed society is illustrated as follows:



What is indicated in this illustration is just an inefficiency in the process of "technology absorption" as shown by the structural socio-cultural environment in the developing countries, and actual aspect of the rapid type process in the advanced countries.

- 4 In order to account for the extent of improvement as to the efficiency within the frame work of south and east problems, first of all, it is necessary to establish a "strata like time process" in the transfer process. As the standard for this, it will be necessary to place measurement of the fixity of any "transfer red technology" at the starting point of this work. The fixity of any "inducted technology" must be measured by the capability in each stage, such as comprehensive knowledge on the products, capability for repairing and assembling them, the capacity from assembling to dismantling and production, the capability from development to basic research and so forth. As it is always emphasized in respect to the problems attributable to the capacity of "men", the "manpower training" in the technology must be pursued not only at the level of the government but at the level of enterprises by the developing countries. The fact that the education investments have made the motive power for elevating all the potentiality of the country in Japan, Korea and Singapore is a very important reference for the developing countries.

- 5 **Technology transfer, enterprisership and financial aspect**

With respect to the induction of "technology for renewal and improvement" as necessitated for the production of new products, an



important role is played by the research and development policy of the country. When observed from the view-point of operative technology, the role of the government is important in the aspect of financing.

However, only the aiding measures on the part of the government is not sufficient, and when observed from the ultimate view-point, it is important for enterprises in the developing countries that they have the basic way of thinking as regards "technology" which is based on their "pursuit of profit". At the same time, with respect to "technology induction", it becomes necessary for the government to provide appropriate financial backing to the enterprises.

When observed within the frame work of assistance, nowadays, it is noted that sometimes too much attention has been paid to the aiding mechanism and the quantitative expansion and contrarily the systematic approach in such aspects as the basic "technology fixity" and "absorption" has been insufficient.

It will be necessary for the United Nation's organizations that they would examine creation of the system for fund pool as a matter of facts, in the aspect of payment of the "consideration" by the developing countries.

However, whatever easily "technology" is available, it should be avoided by all means that the evil of making light of the self-helping efforts on the part of the developing countries, which is mandatory for them in order to eliminate the progress blocking factors as mentioned various items above, would be generated.





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