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No 24, 16 December 1959, Peiping

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GUARANTEE THAT INDUSTRIAL PRODUCTION WILL RISE IN BALANCE WHILE DEVELOPING AT HIGH SPEED

Pages 21-23

Hsu Hsin-hsueh

Since August 1959, a trend toward rapid, balanced and steady development in industrial production has appeared on the industrial battlefront in the new hightide of the mass movement to increase production and to practice economy. The total value of industrial production throughout the country has been rising steadily every month. It is particularly noteworthy that many enterprises have boasted higher volume of production during the first half of every month than during the second half of the previous month. It is therefore a sharp contrast to the previous tendency toward relaxation at the beginning of the month or season and redoubled effort by the end of the month or season in our industrial production. A new outlook resulting from the continued leap forward every month has thus begun to emerge.

The emergence of such a new outlook has freed the people, by virtue of facts, from various superstitious beliefs. It has proved that relaxation at the beginning and intensification at the end is by no means an objective law and that such a tendency can be completely eliminated if we are determined to do so. It has also proved that launching a bustling mass movement in our industrial enterprises will not lead to a state of instability in production, but on the contrary, it can facilitate the steady rise in production in the course of its rapid development. The situation is this: In the mass movement to increase production and to practice economy, many advanced units and advanced producers have taken the lead in overfulfilling the established targets, thereby stimulating other units and workers in a like effort and resulting in the further leap forward in production. By the time this is accomplished, many advanced units and advanced producers have overfulfilled the newly established targets, thereby once again stimulating other units and workers in a like effort and resulting in a new level of production. In this manner, one wave is higher than another and the new outlook of continued leap forward has emerged. Such a phenomenon has actually demonstrated that the mass movement on our industrial battlefront has grown increasingly healthy and that the managerial level in our industrial enterprises has been steadily improved.

The arrangement of a balanced production in the rapid development of our industrial enterprises has contributed materially to the national economy. It avoids the phenomenon in which the masses of workers have to work overtime at times or to relax their effort, even to a standstill, at other times, thus increasing labor productivity and economizing the employment of the labor force. It also avoids the phenomenon in which machinery and equipment is used in excess of their capacity at times and idle or partly idle at other times, thus increasing the utilization rate of the equipment and keeping the equipment in good condition at all times. In this way, we may not only increase the volume of production but also improve the quality of products, lower the cost of production and minimize accidents in the employment of manpower as well as equipment, thereby rendering an orderly pace of production possible. Balanced production will also better guarantee the workers' political, technical and cultural training.

The task confronting us at present is to sustain such a trend toward a balanced and continuous rise in our industrial production. Generally speaking, all industrial enterprises throughout the country should endeavor, in the course of the rapid development of production, to achieve higher production during the first half of every month than during the second half of the previous month or during the first month of every season than during the last month of the previous season. Right now, our task is to endeavor to achieve higher production during the first quarter of 1960 than during the last quarter of 1959, or at least to equal the production during the last quarter of 1959.

It is entirely possible to fulfill such a task. The most fundamental guarantee lies in the fact that in the wake of the recent anti-rightist struggle, the general line of the Party has further oriented the minds of the people and won the more vigorous approval of the broad masses of workers. The broad masses of workers have realized that the exercise of political leadership and the enthusiastically launched mass movements may accelerate the pace of socialist construction. Under the banner of the general line of the Party, we may translate such a possibility into reality, if only we intensify our effort.

To intensify our effort, there are the following ten central measures:

First, make a determined effort from the very beginning. Emphasis must be placed on the first quarter of the year, the first month of the quarter, and the first ten-day period of the month. Effort must be sustained to the end.

Second, strive to fulfill the targets ahead of schedule, not behind schedule. Preparations must be made well in advance, and current production must be well coordinated with the preparatory work for the next stage of production. In the current year, preparations must be made for the next year; in the current quarter, preparations must be made for the next quarter; and in the current month, preparations must be made for the next month. What is important is to fulfill the tasks of production, to order the goods and to organize the supply of raw materials and materials at the earliest possible date.

Third, initiate socialist cooperation on a grand scale. By doing so, we may generate new strength and overcome difficulties that could not be overcome by any single unit. Wherever possible, the cooperative relations between the various production departments must be stabilized. We must continue to launch a "one-dragon" cooperative movement to coordinate transportation with production.

Fourth, submit production plans of the enterprises for each quarter, month and ten-day period to the masses for discussion. The implementation of such plans must be reviewed at the end of each shift, day, 10-day period and month.

Fifth, organize the employment of the labor force reasonably so that labor intensity is well adjusted. At the end of each month, quarter or year, additional shifts and overtime work should, wherever possible, be avoided. In the absence of additional shifts and overtime work at the end of the month, quarter or year, there will be no relaxation or rest at the beginning of the following month, quarter or year.

Sixth, institute a periodic examination of equipment to regulate production. We should not adopt remedial measures only after complications are detected in the equipment; nor should we inspect the equipment only at the beginning of every month, quarter or year.

Seventh, store up sufficient quantities of raw materials, materials, and semi-finished products and retain sufficient reserves of tools, parts and attachments.

Eighth, continue to champion technical innovations and technical revolutions to resolve the key problems in production and to strengthen the weak links. By means of technical innovations, we will fully develop man's active function in production.

Ninth, sponsor labor emulation drives by establishing advanced targets and by holding periodic sessions for mutual criticism and comparison. Such activities are to be regarded as important political tasks so as to combine political education and material reward.

Tenth, insist that the cadres participate in labor, that the workers participate in the management of production, that unreasonable regulations and systems be abolished, and that the leadership cadres, workers and technical personnel work in concert.

All the above-enumerated measures center around one point and that is to launch mass movements and to strengthen management work simultaneously. We should neither stress only mass movements while neglecting the management work nor grasp only the management work while neglecting the mass movements. The one essential link in the union between mass movements and management work is the masses' participation in management work; the union between the masses and the administrative leadership thereby strengthens the management of the enterprises. We must, while launching the bustling mass movements, strengthen the management of the enterprises and improve the managerial standard in the enterprises. The current mass movements are launched for the central purpose of technical innovations and technical revolutions. Our management work should greatly facilitate the enhancement of all the workers' activism and creativeness in the course of technical innovations; it should not prove otherwise. The uneven pace in our industrial production--relaxed in the beginning and intensified at the end, or relaxed at times and intensified at other times--has long been known. Some enterprises have tried to solve this problem by adopting various measures but none has been really successful in such an effort. The fundamental reason lies in the fact that they have failed to thoroughly implement the policy of uniting centralized leadership and mass movements, regarding the launching of mass movements and the strengthening of management work as two unrelated tasks. Either they have tried to strengthen the management work from top to bottom, without developing the activism and creativeness of the masses from bottom to top, or they have exercised general leadership in the mass movements, without reviewing the experiences in such movements with the view of improving the managerial level. Facts have proved that if only we refrain from committing the error of onesidedness and instead place equal emphasis on the launching of mass movements and on the strengthening of management work, production will steadily rise at an even pace.

The fundamental problem that we must solve in order to strengthen management work in the enterprises is to sustain the maximum enthusiasm of all the workers. Having successfully solved this problem, we shall find it very easy to solve all other problems in our industrial production. In the course of our great leap forward in 1958 and the continued leap forward in 1959, we accumulated rich experience in solving this problem. We should systematically review our experience so that the management work in the enterprises may be well adjusted to the rapid development of mass movements.

OVERCOME THE WEAK CYCLES, REALIZE AN ALL-AROUND LEAP FORWARD IN INDUSTRIAL PRODUCTION

Pages 23-28 Sun Hung-chih

To promptly overcome the weak cycles and to constantly readjust the relations between various industrial departments in the course of their development are important to the organization of industrial production and to the realization of an all-round leap forward.

The various industrial departments are interrelated and interlocked. Theirs is an extremely intimate relationship of cooperation and interdependence. The development of production in any one department demands the corresponding development of production in other departments. For example: the development of the metallurgical industry demands that the mining industry produce enough ores; that the coal industry supply it with enough coke; that the machinery industry supply it with enough equipment; that the electric power industry and the communication and transportation industries guarantee the adequate supply of electric power and transportation facilities; etc. Industrial production can achieve an all-round leap forward only if the various departments attain mutually harmonious development.

However, this does not mean that in the course of their development, certain ill adjustments of a temporary nature may not emerge between the various industrial departments. In his article entitled Concerning the Question of How to Correctly Deal With the Internal Contradictions Among the People, Comrade Mao Tse-tung points out: "From time to time we have to use the national plan to readjust the contradictions between social production and social demand that are likely to remain objectively for a long time to come. Every year this country formulates an economic plan that determines the proper ratio between accumulation and consumption and thereby maintains a balance between production and demand. By balance is meant the temporary, relative unity of contradictions. In the course of the year, the balance thus achieved is on the whole disturbed by the struggle of contradictions and the unity thus achieved no longer prevails. Instead of balance, there is lack of balance; instead of unity, there is disunity. We need therefore to work for the balance and unity in the second year. This is the superiority of our planned economy. As a matter of fact, the balance and unity thus achieved are disturbed in part every month and every quarter and we need to make localized readjustments accordingly." (See Note) These words of Comrade Mao Tse-tung pertain to the over-all task of national econmic plan; they are completely applicable to the readjustment of internal relations between industries.

([Note] Concerning the Question of How to Correctly Deal With the Internal Contradictions Among the People, The People's Publishing Company, 1957, 1st ed., p. 12.)

It often occurs that in the course of industrial development that the production of some departments cannot for a limited period keep pace with the demands of the over-all development of production, thereby contributing to the emergence of some weak links. For instance, some departments develop their production at a very high speed and in that light some other departments may appear to lag behind; some departments do develop their production at a very high speed but because of their lamentably weak foundations they may find themselves likewise unable to keep pace with the over-all development of industrial production for a limited period; or as a result of the development of technical innovations and technical revolutions in the various departments, a particular department may be called upon to develop its production at a particularly high speed and as long as the products of this department cannot satisfy the demands of the various departments it may also become a weak link; etc. Particularly in the wake of the great leap forward, it is all the more likely that the lack of balance of a localized and temporary nature may appear in individual cases and certain weak links may thus emerge.

In the face of such temporary lack of balance and such weak links, what attitude and what measures should we adopt? Should we adopt a positive attitude and so long as the objective conditions permit, fully develop the subjective capacity of the masses, and try every means to exploit the potentials of productivity and to overcome the weak links in order to reach a new balance? Or should we bow to the difficulties at hand, "be afraid of wolves in front of us and tigers behind us, seek comfort in inaction, and try to reach a balance by adopting the improper method of reducing speed?" (See Note 1) Quite obviously, we should adopt the revolutionary attitude and revolutionary measures, "aim at the over-all balance as well as high speed," and "try to achieve balance at high speed." (See Note 2)

([Note 1] See Liu Shao-ch'i: The Triumph of Marxism-Leninism in China, The People's Publishing Company, 1959, 1st ed., p. 24.

([Note 2] Ibid.)

Since the second half of 1958, industrial production in Liaoning Province has been bigorously leaping forward, led by the steel output, as a result of the faithful implementation of the Party's general line for socialist construction and a series of policies of "simultaneous development." In the course of the leap forward, there have been cases wherein mutual adjustment was not completely harmonious, as between the processing industry and the manufacture of raw materials and materials, between production and the supply of electric power, and between production and transportation. That the supply of raw materials, materials, electric power and transportation facilities could not fully satisfy the demands of steel-iron production revealed in succession such weak links within the industrial sector in the course of our leap forward. By adopting the positive approach to balance, we studied the production characteristics of the various departments and their objective conditions, fully mobilized the masses, and adopted the policy of uniting centralized leadership and mass movement, thereby promptly overcoming the various weak links as were exposed during different periods and guaranteeing the realization of all-round leap forward in industrial production, centering around the steel production.

So far as Liaoning Province is concerned, the first outstanding problem it has confronted since the great leap forward was the failure of the production of raw materials and materials to keep pace with the leaping development in the production of the processing industry. Since the fourth quarter of 1958, the production tasks of the machinery industry, particularly those tasks related to the manufacture of heavy products, has been repeatedly increased; in the meantime, however, the production and supply of raw materials and materials has not been able to keep pace with the demands of the development of the machinery industry, thus directly affecting the fulfillment of production tasks of the machinery industry. And the failure of the machinery industry to manufacture these heavy products on schedule may in turn affect the over-all leap forward in such industries as steel and iron, electric power and mining exploration, among others. It follows, therefore, that one of the important tasks in the current industrial production is to solve the problem relating to the production and supply of raw materials and materials. There are two methods for solving this problem: One is to petition government, hopeful that such raw materials and materials may be appropriated by the higher authorities; another is essentially to rely on the masses, in an exhaustive effort to overcome the difficulties. The broad masses of workers of Liaoning have, under the leadership of the Party, adopted the latter method. Mukden and Dairen--the two major centers of the machinery industry--first launched a vigorous mass movement on the industrial battlefront to overcome the difficulties arising from the shortage of raw materials and materials. The people were called upon to attack the steel mountains (i.e., to dig into the heaps of steel and iron scraps) and to fish in the iron sea (i.e., to salvage the ships sunken during the Chia-wu War and the Russo-Japanese War). The movement was first launched in the enterprises and then promoted in the government agencies, organizations and schools, until it finally permeated the entire province. In view of the fact that Liaoning has a fairly long history of industrial development as a base of the steel-iron industry as well as the machinery industry, it has a good supply of steel and iron scraps scattered throughout the province. It was impossible to exhaust the search in a single drive and the province had to generate several hightides of such a mass movement. According to incomplete statistics, some 10 million persons participated in this movement between July and 20 December 1958, and during the said period several hundred thousand tons of steel and iron scraps were gathered, thus effectively supporting the fulfillment of production tasks of the machinery industry.

In the beginning of 1959, the province launched another movement to inspect and readjust the inventories of various warehouses. It was an important task of organization to transport the long accumulated, unused supplies to the most active production front. It was also a dependable measure to promptly solve the problem arising from the shortage of raw materials and materials. In the discharge of this task, we exercised political leadership and adopted the method of mass movements as in other instances. During the first 9 months of 1959, the various municipalities and enterprises throughout the province inspected their inventories 28 times and transferred the supplies in 54 cases. During the same period, 4 province-wide conferences on the transfer of supplies were held, resulting in the transfer of more than 140,000 tons of dark metals, more than 1,300 tons of nonferrous metals and more than 12,000 t'ai of equipment of various sorts, thereby not only overcoming the then existing difficulties arising from the shortage of raw materials and materials but also contributing in no uncertain measure to the regulation of supplies.

To solve the problem relating to the shortage of raw materials and materials, one important aspect of our task involves the coordination between the economization of raw materials and materials and the improvement of product designing as well as work procedures. In the process of solving this problem, we succeeded in overcoming some comrades' tendency to remain loyal to obsolete practices and conservative thinking in the designing of heavy, precision and quality products as well as in their work procedures, and promoted the revolutionary spirit combining boldness in thinking, in expression in action and in realism. On the major premise that the function and quality of the products be guaranteed, we were actively engaged in technical innovations and technical revolutions. By improving the impractical designs of products and work procedures, we have greatly curtailed the consumption of raw materials and materials.

To solve the problem relating to the shortage of raw materials and materials, we have established a number of factories that produce the needed raw materials and materials. In addition some enterprises have established "satellite" factories to meet actual needs.

Since the great leap forward, Liaoning has confronted another outstanding problem on its industrial battlefront, i.e., the inadequacy of electric power for the satisfaction of industrial needs. To solve this problem and thereby insure the adequate supply of electric power for the production of various departments and various enterprises, we have adopted such measures as mobilization of the masses in the establishment of electric power industry, economization of the use of electric power, the substitution of various kinds of motive power for the electric power generators, the exploitation of the potentials of electric power-generating facilities, the manufacture of electric power-generating facilities and the expedited construction of electric power stations. In the meantime, we have implemented the policy of simultaneous development of "large, foreign group" and "small, foreign group" as well as the policy stressing key points as well as over-all mobilization. With the energetic support of the Central Committee and as a result of one year's sustained effort, we have succeeded in harmonizing its supply-demand relationship.

In order to effectively promote the mass movement to economize the use of electric power, we launched an intensive as well as extensive campaign among the masses, particularly among the workers of large enterprises, to the end that every household was aware of the significance of the movement. All enterprises considered the economization of electric power as one of the central items of their technical innovation and technical revolution. No excessive amount of motive power was to be wasted on small equipment and not a single t'ai of machine tool was to be used wastefully. As a result of one month's effort, most enterprises succeeded in curtailing their use of electric power by more than 10 per cent.

Proper distribution and regulation of electric power is another important link in our task of economizing the use of electric power. Insofar as the distribution of electric power is concerned, we have adopted the policy of general accommodation, with particular emphasis on the key points in the light of the urgency of the needs. While adopting this principle, we have also considered, in specific cases, the possibility of varying degrees of urgency in one enterprise. For instance the An-shan Steel Works is the most important large enterprise in the country and its demand for electric power must of course be insured first of all; but the use of electric power by its subsidiary paper mill and printing plant must be brought under proper control. We must also insure the adequate supply of electric power to those plants of light industries and the textile industry, which render direct service to the major products. Insofar as the regulation of electric power is concerned, we must maintain at once a high degree of rigidity and a certain measure of flexibility. We must guarantee that the electric power generated by the electric power network be systematically supplied to the various enterprises in accordance with the established quotas; we must also constantly review the electric power consumption of the major consumers and their plans for inspection and repair and during the low-consumption period of inspection and repair supply the unused electric power on a temporary basis to the other enterprises. We did do so during the New Year, the Spring Festival and other holidays and such a systematic arrangement was found to have contributed significantly to the increased production in the light industries, in the textile industry, and in the local small enterprises.

Not only must we economize the consumption of electric power, but more important, we must explore new sources of electric power. With the view of exploiting the potentials of large enterprises, we have adopted the policy stressing not only safety but also the generation and supply of more electric power. On this problem, opinions appeared to be divided: Some comrades were inclined to place one-sided emphasis on safety, their contention being that any effort to increase the capacity for electric power generation would necessarily affect safety. They were not prepared to actively exploit the potentials of the enterprises and they thus favored the maintenance of the status quo. Some other comrades were inclined to place one-sided emphasis on the generation of more electric power. They failed to pay adequate attention to the need for adopting corresponding safety measures after the capacity for electric power generation was increased. Neither of these tendencies would facilitate the further exploitation of the potentials of the large enterprises.

At present, the large electric power plant of Liaoning is generating more than 12 per cent of the electric power above the established capacity of the power-generating facilities, while safety is insured. We have accomplished this only as a result of great exertion on our part. For a short period during the early stages, the generation of more electric power resulted in more accidents in electric power transmission. Thereupon, we launched a general safety inspection movement to mobilize the masses in the various plants and mines in a free discussion of safety in production, thereby eliminating the many erroneous tendencies. In the course of the movement, more than 360 items of equipment were found in defective condition. Of these, more than 320 items wererepaired by the masses in an organized effort, which contributed materially to the safety in electric power generation. As a result of such organized effort, we have fully demonstrated the potentials of the large enterprises, afforded more reliable guarantee for safety in production, laid the foundation for future maintenance work in the power plants, to be based essentially on planned inspection and repair, and thus inaugurated an active instead of passive approach toward our entire effort to supply the needed electric power.

The fundamental remedy for the lack of electric power sources is to expedite the manufacture of electric power-generating equipment and to establish more electric power stations. In this respect, we have adopted the policy of simultaneous development of large, medium and small enterprises, simultaneous development of foreign and native method production and simultaneous development of state-operated and locally-operated enterprises. While concentrating our effort in the manufacture of such heavy equipment for electric power generation and the construction of electric power stations as are determined by the central government, we have launched a mass movement to inspire interest in electric power enterprises, with emphasis on the small native-styled enterprises. After the people had been fully mobilized, after targets had been established, and after emulation drives had been sponsored, we quickly engineered the movement to a high pitch. Wherever possible, all the idled electrically powered machines in the enterprises were converted into electric power generators, thus realizing the maximum utilization of all power equipment and electrically powered machines. Wherever practicable, all enterprises engaged in the manufacture of electric power generators and steam turbines, regardless of their size or method of production, proceeded with such operations at full speed. We are anxious to achieve self-sufficiency in the supply of electric power for general civilian consumption and for the industrial consumption in the small enterprises, small plants, repair shops and other subsidiary departments. Although the above-enumerated small, native-styled electric power-generating facilities can hardly be used in the production of large enterprises, they are quite adequate to meet the needs of general civilian consumption as well as light industries, the textile industry and medium and small enterprises. The greatest advantage in stimulating the mass interest in electric power enterprises is the promise of high speed output, economy of materials, and wide geographical distribution. In such a movement, the measures adopted are as varied as the needs are divergent. It is intended to make full use of all available sources of power, e.g., sea water, used water in industrial operations, sewage water, processed drinking water, heat-generating steam, marsh-gas, gas, wind, etc., and to exploit the function of all power-generating equipment available, e.g., gas-engines, diesel engines, tractors and unused automobile engines, boilers, tanks and airplane engines. While the masses are engaged in the manufacture of various native-model equipment, plants with the necessary facilities are also engaged in the manufacture of some "small, foreign-model group." For instance, the Dairen Shipbuilding Yard has built a 6,000 kilowatt electric power station, which is capable of supplying more electric power than is necessary for its own operations. By doing so, this shipbuilding yard has freed itself completely from the threat of the shortage of electric power.

As the capacity for electric power generation has increased, so has the demand for electric power. Contradictions have thus emerged between the capacity for electric power transformation and the needed equipment for the transformation of electric power. The Mukden Municipality has solved this contradiction by readjusting the load of electric power, by exploiting the potentials of available transformers, by improving the existing supply routes in the electric power network, and by building more transformer stations.

We must constantly watch over the balance between industrial production on the one hand and communication and transportation on the other hand. The communication and transportation facilities in Liaoning are not quite equal to the transportation tasks assigned them. Since the great leap forward, the volume of cargo has increased materially, but the capacity for transportation has not improved correspondingly. At the beginning of 1959, the available transportation facilities could only handle 64 per cent of the volume of cargo. At the same time, there were still some problems between the railways and the enterprises. In particular, the obsolete regulations and systems were ill-adapted to the demands of the new cooperative relations. It is quite obvious that we must solve the problem of transportation before we can insure the continued leap forward in industrial production.

In the process of overcoming transportation difficulties, two red flags have emerged in railway-mine or railway-plant cooperation, i.e., at Fu-hsin and at Peng-ch'i. The Ministry of Railways, in conjunction with the Ministry of Coal Industry, the Ministry of Metallurgical Industry and the People's Council of Liaoning Province, sponsored two popular meetings to promote such an experience, thereby resolving the three major problems long outstanding in railway-mine or railway-plant cooperation. First of all, a series of fairly effective systems and methods governing railway-mine or railway-plant cooperation were devised, including such cooperative measures proposed by Fu-hsin and Peng-ch'i as ideological unification, the unification of leadership, the unification of organization, the unification of production, transportation and sales, the unification of planning, the unification of distribution, the unification of scheduling, the unification of targets, the unification of statistics, the unification of equipment utilization, the unification of signals, the unification of work inspection, etc. Of these, the most important are ideological unification, the unification of organization and the unification of production, transportation and sales; and ideological unification is the most necessary of all the aspects of unification. Next is the construction of simple coal storages (See Note 1), thereby solving the long standing contradiction between coal production and transportation. By building simple coal storages, we may avoid ground transportation of coal and accelerate the schedule of transportation. This is the most effective method to increase the coal transportation rate under present conditions. Next is the fact that the workers at the Fu-hsin railway-mine, in the mass movement for the cooperative effort in production, transportation and sales, invented the "red flag train" (See Note 2), which proved of enormous vitality, thereby greatly shortening the time required for the dissolution, assembly and grouping of vehicles and greatly increasing the transportation efficiency of the vehicles. For instance, the Fu-hsin Mine operated 48 such red flag trains in December 1958, with a monthly average operating time of 7.4 hours. In January 1959, as a result of poor coordination between production, transportation and sales, only 39 such red flag trains were in operation, with a monthly average operating time of 8.2 hours. Having reviewed their experience and improved their performance, they put 161 red flag trains into operation in February and thus reduced the average operating time to 3 hours on each trip, thereby reducing the monthly average to 6 hours. The workers said: "The red flag trains are like a red thread that links the workers of the railways and the mines together." By placing particular emphasis on the cooperative effort in production, transportation and sales, we have raised the transportation efficiency significantly.

([Note 1] The characteristic feature of the simple coal storage is to link the storage to the high platform. The workers of the Fu-hsin railway-mine built a sloping platform between 2 and 3 meters in height on both sides of the railway track. A movable door is installed on the side facing the track. When the train reaches the loading station, the movable door is opened to let the coal into the train on the slope. The structure of such a simple coal storage is simple; relatively little material is used; and it is easy to operate and to promote.)

([Note 2] The characteristic feature of the "red flag train" lies in the accelerated operation throughout the process of transportation. By using these trains, we may accelerate the loading operation at the initial station, group them in a trip toward the same destination, accelerate the speed and regrouping in transit, accelerate the unloading operation at the final stop, and reduce the no-operating time of these trains to the minimum. At Fu-hsin, the operating time required in a single operation (from the time when the train reaches the station to the time when it departs from the station fully loaded) does not exceed 4 hours.)

In the light of Liaoning's experience during the past year or so in organizing its industrial production, it is proved that in the course of developing industrial production the balance is often disturbed and a new balance is reached. And every time an old balance was disturbed and a new balance was reached, production was pushed ahead one significant step further. "It is the dialectical law governing the development of events that contradictions continually emerge and are continually solved." (See Note) Comrade Mao Tse-tung's analysis of the law governing the development of events is most inspiring to our effort to organize production. Not only in the formulation of our annual plans and long-term plans must we stress the positive approach to balance but in the process of organizing production we must always adopt an over-all approach, establish advanced targets, mobilize the masses and strive to overcome the weak links in order to reach a new balance. Such an experience is applicable not only to the relationships between the various industrial departments but also to the relationships between the various production links within each enterprise; not only to the large modernized enterprises but also to the medium and small enterprises; and not only to our present effort to organize production but also to our future effort to organize production. Of course, the concrete conditions in the various industrial departments and enterprises and in our future production may not be completely the same. We must, therefore, grasp the characteristic features of the various departments and enterprises, analyze the concrete conditions at different stages of the development of production, locate the weak links and try to overcome them. In this way, we shall be able to achieve the over-all balance based on a positive approach and realize the continued all-round leap forward in our industrial production.

([Note] Concerning the Question of How to Correctly Deal With the Internal Contradictions Among the People, The People's Publishing Company, 1957, 1st ed., p. 13.)

([Editor's Note] The author of this article is the Chairman of the Committee on Industrial Production of Liaoning Province.)

MATHEMATICS AND THE REALITIES OF PRODUCTION

Pages 35-40 Kuan Chao-chih

A. The Object of Investigation and Characteristic of Mathematics as a Science.

Mathematics occupies a unique position in the sciences. It is a science that studies the quantitative relations in the realistic world. In order to study such quantitative relations in a vacuum, it dismisses for the time being the concrete contents of things in the realistic world and confines itself to the study of quantitative relations. For instance, three cows added to five cows make eight cows; 3 hoes added to 5 hoes make 8 hoes; etc. If we are to dismiss the concrete contents of such things as "cows" and "hoes" and to confine our study to the quantitative relations, we shall reach a kind of abstract quantitative relationship: 3 added to 5 makes 8. Of course, in the case of more complicated quantitative relations, the degree of abstraction is higher and it would not be so simple to express them; but the general idea is the same. Mathematics is thus different from the various natural sciences and social sciences. It does not choose a particular kind of concrete natural phenomena or social phenomena as its direct object of investigation; instead, it chooses the abstract quantitative relations as its object of investigation. It is to be noted, however, that such quantitative relations are by no means imaginary and that they do exist in the realistic world. In the realistic world, quantity and quality are inter-related. Quantitative changes lead to qualitative changes. And qualitative changes can be effected only as a result of the increase or decrease of the quantity of matter or movement. "It is impossible to change its quality without the corresponding change in the quantity of the matter." (See Note) It follows, therefore, that not only can we not in reality completely dismiss the study of the quality of things in our study of quantitative relations but we must, in our investigation into the qualitative changes of things, first understand their quantitative changes. We may thus reach the conclusion that although mathematics is not intended to be a direct investigation into certain kinds of natural phenomena or social phenomena, yet the quantitative relations as its object of study are generally in existence in the various kinds of phenomena in the realistic world, abstracted as they are from the various kinds of natural phenomena and social phenomena. For this reason, mathematics is applied in various fields.

(Engels: Natural Dialectics, The People's Publishing Company, 1955, 1st ed., p. 40.)

It is its object of study that determines two fundamental characteristics of mathematics: a high degree of abstraction and the broadness of its application. Any science has the characteristic of abstraction, but the high degree of abstraction of mathematics is different from that of other sciences in the sense that it dismisses for the time being the concrete contents of things and confines itself to the pure investigation into the quantitative relations. Any science has its multiple application, but mathematics can be applied in a particularly broad sense. For the quantitative relations exist not only in a particular material form or in a particular form of movement but quite generally in all kinds of material forms and all kinds of forms of movement. Whenever we talk about mathematics, we must stress its characteristics in these two aspects. For instance, the relationship between the quantitative changes of many natural phenomena may be expressed by differential equations in mathematics. The same differential equation may describe different phenomena. For instance, the differential equation used to describe the phenomenon of heat transmission under given conditions may also be used to describe the phenomenon of liquid movement under certain conditions or the phenomenon of static electricity under certain conditions. In mathematics, while studying this equation, we are to dismiss the physical meaning represented by the various quantities in the equation and to study their changes purely on the basis of abstract quantitative relations and then to explain such conclusions in physics as may be derived from the association of the abstract quantities with the physical meanings that they represent. Such conclusions may pertain to heat transmission, or to liquid dynamics, or to electro-magnetism, etc. The fact that phenomena of different nature may be expressed by the same mathematical equation illustrates that phenomena of different nature may have the same quantitative relationship, thereby reflecting the unity of the material world. This fact not only facilitates our study of various kinds of phenomena by the unified mathematical method but also enables us to compare one kind of phenomena to another. The basic theory of copy computers is exactly based on this.

B. The Development of Mathematics Ultimately Depends on Productive Experience of Mankind.

"Marxists maintain that the productive activities of mankind are the most fundamental practical activities and that such activities determine all other activities. It is chiefly based on the material productive activities that man gradually learns to understand the phenomena of nature, the nature of Nature, the pattern of nature and his relationship to Nature. It is also in the process of productive activities that he gradually learns to understand, in varying degrees, his relationship to other people. Such knowledge cannot be acquired in the absence of productive activities." (See Note). Mathematics, as one branch of man's knowledge, is of course likewise dependent on the productive experience of mankind. However, scholars of the capitalist class often try to exaggerate and twist, quite one-sidedly, the above-enumerated characteristics of mathematics, in the opinion that mathematics is an "exception," as if mathematics were the free creation of the human brain, unrelated to productive experience. There are also people who maintain that although ancient mathematics was born of the productive experience of mankind, yet modern mathematics is no longer related to the productive experience of mankind, as if it has "liberated" itself from the realistic world. For this reason, even though the relationship between the natural sciences and productive experience has been clearly stated in many academic treatises, there is still need for a particular analysis of the relationship between mathematics and productive experience. What we must pay attention to in this connection is: that in view of the characteristics of mathematics, we must discuss not only the direct relationship between mathematics and productive experience but also the indirect relationship between mathematics and productive experience through the various natural sciences and other sciences. With the view of refuting the "theory that modern mathematics is an exception," we find it imperative to cite several examples in modern mathematics.

([Note] "On Practice," Selected Works of Mao Tse-tung, Vol. I, The People's Publishing Company, 1952, 2nd ed., p. 271.)

1. Productive experience is the fountain of mathematical knowledge. The development of production furnishes mathematics with increasingly enriched data for research and opens up an increasingly broadened sphere of study. It is to be particularly noted that in the productive experience various kinds of problems have emerged, which must be solved by the new mathematical methods, thereby facilitating the formulation of new mathematical theories. In the meantime, productive experience is also the standard by which mathematical knowledge is to be tested.

In the course of productive experience, mankind first learned such simple numerical concepts as 1, 2, 3 and 4 and such simplest geometrical concepts as point, line, square and circle. For instance, in order to know the quantity of products to be distributed, we first learned to compare the quantity of things and then to derive the numerical concepts therefrom. In the course of productive experience, mankind discovered the various functions of instruments of a particular shape; also in the course of productive experience, mankind observed many static shapes in the world of Nature (stars, mountains, rivers, etc.). Thereupon mankind learned the concepts of geometrical forms. Such knowledge, once accumulated and gradually systematized, became mathematics and elementary geometry.

In spite of the fact that since the 19th century mathematics has assumed an increasingly abstract form, we should not neglect that productive experience has always been the basic motivating force behind the development of mathematics. As a matter of fact, many branches of modern mathematics that have progressed the fastest and have exercised the greatest influence, e.g., the theory of differential equations, the theory of the mean and mathematical statistics, computing mathematics, mathematical logic and the theory of logarithms were born of the demand of productive experience. For instance, the mixed type of quasi-differential equations was inspired by the study of flying across the sound barrier. (See Note) The theory of mathematical signals was inspired by communication techniques. In our economic life, we studied such problems as the distribution of materials which inspired the formulation of the theory of mathematical regulation. Automation has facilitated the development of electronic computers. Computing techniques have inspired the revolution of computing mathematics. As a result of the invention of the high-speed electronic computers, some problems in classical computing mathematics have been relegated to secondary importance and some new problems have appeared on the agenda Computing techniques have also facilitated the development of mathematical logic and some other branches of mathematics.

([Note] For the purpose of high-speed flying, we must study the changing conditions from sub-sonic to super-sonic speed, i.e., the conditions "across the sound barrier.")

In this connection, we must specifically point out the falsehood of some people's imagination that with the invention of the computer any problem may be solved by means of complicated computation, and that mathematical theories seem no longer necessary. If we do not study methods, many complicated computations may not be done even in several hundred years even if the computer may do 10,000 computations a second. On the contrary, it is exactly because of the invention of the high-speed computer that many problems that we dared not attempt to solve mathematically before have been brought to the presence of mathematics. In other words, we now demand more, and not less, of mathematics.

It is completely groundless to think that the development of mathematics is purely the free creation of a few gifted mathematicians and as such unrelated to productive experience. The emergence of calculus is one example that may most clearly refute this viewpoint. In spite of the fact that the rudimentary concept of modern calculus was recognized in the computation of quadrature in ancient times, calculus as a branch of study was not born till the 17th century. The productivity of the ancient states remained very low. Also such mathematics as was necessary for the study of motion had not been developed; the pre-requisite to the birth of calculus. Even though a few great mathematicians of ancient times might have some ideas about calulus, they could hardly go beyond the limits of historical conditions. After the 15th century, capitalism made gradual progress in Europe. In order to meet the needs of navigation, mining exploration and the construction of canals, the people had to study various kinds of dynamics, which dictated the mathematical expression of the law of motion and accordingly the birth of calculus.

Productive experience has not only directly facilitated the development of mathematics but also indirectly through its facilitation of the development of natural sciences. For instance, the study of liang-tzu dynamics and basic elements has facilitated the development of some new branches of fanhan analysis. The study of atomic physics and some other natural phenomena has inspired the development of some new directions in the kai-lieh theory. It may be said that after the 17th century the formulation of a greater part of mathematical theories cannot be separated fundamentally from the demands of dynamics and theoretical physics.

2. By saying that the development of mathematics is in the final analysis dependent on productive experience, we do not mean that the development of mathematics has been at every stage facilitated by productive experience. At a certain stage of historical development, a rich knowledge of mathematics had been accumulated and in view of the large quantity of data it was necessary and possible to formulate new theories. At the same time, some theoretical contradictions had emerged from the accumulated quantity of knowledge in the course of theoretical synthesis. Such contradictions have likewise inspired the formulation of mathematical theories.

For instance, the solution of algebraic equations was inspired by the demand of several thousand years of human productive experience. In the case of simple and quadratic algebraic equations, we may reach the solutions by the general formula consisting of addition, subtraction, multiplication, division and evolution. In Wang Hsiao-t'ung's Chi Kuo Suan Ching, published during the T'ang dynasty, there are actual problems involving a third or fourth power of unknown quantity. Later, as was demanded by such actual work as the compilation of the calendar, Chinese mathematicians have always been interested in the solution of algebraic equations. They reported phenomenal progress in the Sung dynasty. By the 16th century, methods for the solution of algebraic equations involving second or third power of unknown quantity had been generally developed in Europe, but many scholars remained seized with the general formula for the solution of algebraic equations involving the fifth power of unknown quantity. In the 19th century, French mathematician Chia-lo-wa studied the following theoretical problem of fundamental nature: Which algebraic equation can be solved by the general formula consisting of addition, subtraction, multiplication, division and evolution and which cannot? Accordingly he introduced a new mathematical theory, the theory of group, which has a significant influence on the subsequent development of mathematics. At first glance, the search for a general formula to solve the algebraic equations is a "purely theoretical" problem; but it was inspired by the many concrete problems involving the solution of various algebraic equations that arose from several thousand years of experience.

At certain stages of its development, mathematics established a system of its own and within such a system many new problems of importance emerged. For instance, Euclidean geometry was a system formulated by the Greeks, who summarized the geometrical knowledge of ancient Egyptians and Babylonians derived from their productive experience. However, not too long afterward, people discovered problems in this system. The problem was: Is it possible to derive the 5th hypothesis (the so-called parallelism hypothesis) from other theories or hypotheses? This purely theoretical question arose from within the geometrical system. It was in the 19th century that mathematicians like Lo-pa-ch'i-fu-ssu-chi and Po-yuch freed themselves from the thousand-year-old traditional thinking and established the new geometrical system.

That the development of mathematics is relatively independent of productive experience manifests itself only at certain stages of its development. Under these circumstances, the development of mathematics may be ahead of productive experience and natural sciences, thus furnishing them with theoretical preparations. At the time of their formulation, some mathematical theories appeared of only purely theoretical significance; later, however, they proved to be fine instruments for the explanation of new discoveries in natural sciences or fine methods for the solution of actual problems involving engineering techniques. For instance, Euclidean geometry, as discussed above, later became an extremely appropriate mathematical instrument for the explanation of many natural phenomena. The plural number was originally a new concept resulting from the extension of the concept pertaining to the solution of algebraic equations; but later it developed into an effective instrument in the theory of analytical logarithms, liquid dynamics and elastic dynamics. Lu-k'o-fu-ssu-chi's theory concerning the wings of the airplane was derived from such a theory of the analytical logarithm. The theory of numbers has always been regarded as related to purely theoretical study; some scholars have recently derived from the methods used in the theory of numbers some good methods of computation, which are useful in the solution of actual problems.

Suffice it to show that when we say that the development of mathematics is in the final analysis dependent on the productive experience of mankind, we would have oversimplified the process of development of human knowledge if we maintain that every stage in the development of mathematics was possible only after our productive experience had so demanded. On the other hand, it would be worse than erroneous to conclude, on the basis of the above argument, that the development of mathematics does not have to depend on productive experience. When we study any particular stage of understanding as an isolated case, it seems that theory leads to theory or that theory is only later applied to reality; but if we examine it in terms of the entire process of the development of knowledge, the process is invariably from experience to theory and then to reality, the formula of the Marxist theory of knowledge.

C. The Application of Mathematics in Various Fields

The development of mathematics is dependent on production experience or the study of natural phenomena; in return, its new findings are applied in many fields. Inasmuch as there are quantitative relations in all aspects of the realistic world, the application of mathematics is extremely broad in scope. In the study of natural sciences, in engineering techniques, in our national economy, in our everyday life, and indeed in many other fields, there are always many mathematical problems that await solution.

Speaking of the contribution of mathematics to the natural sciences, let us first cite several significant events in the history of science. It was by mathematical methods that Newton derived from K'ai-p'u-le's observation of the pattern of planetary movements the quantitative relations of mutual gravitation between two bodies. This was one of the greatest achievements in the natural sciences at the time. Later, Le-wei-li-yeh figured out, in accordance with the law of universal gravitation and the numerical data of astronomical observation, that there must be another planet beyond Uranus in the solar system. He also figured out how to compute its position at any given time. This prophesy was later verified by astronomical exploration, as another planet, now known as Neptune, was discovered to be actually in existence. Ma-k'e-ssu-wei-erh introduced the mathematical theory on electro-magnetic phenomena and proceeded to predict that the vibration of the electro-magnet might generate a kind of wave transmitted at the speed of light. This prophesy was verified by the experiment with radio waves and furnished the theoretical premise on which radio techniques are based.

We are firmly opposed to the fantastic opinions that "there must be phenomena in the world of Nature that conform to various mathematical formulas," that "the Lord of Creation was a mathematician" and that "there is pre-determined harmony." We are of the opinion that exactly because mathematics is the study of quantitative relations in the realistic world and a certain kind of quantitative relation is discovered in a certain kind of phenomena, it is later discovered that such quantitative relations exist likewise in other phenomena. It is exactly because the quantitative relations under study are derived from the realistic world that we are able to derive from such quantitative relations other phenomena that the realistic world has not yet discovered. Exactly as Engels said: "Like all other sciences, mathematics was born of man's actual needs: born of the measurement of area, the measurement of volume and the computation of time and dynamics. However, like all other fields of investigation, the laws derived from reality is separated from the realistic world at certain stages of development and moreover it is regarded as something which is seemingly independent. It seems that this law from without is opposed to the realistic world and unreasonable as it may seem, the world should adjust itself to this law. This is so in a society or a state; this is likewise true in pure mathematics. It is also later applied to the world, although it is derived from the same world and it reflects only part of the form of world relationship--and for exactly the same reason mathematics can be finally applied." (See Note)

([Note] See Engels: Anti-Duhring Theory, The People's Publishing Co., 1956, 1st ed., p. 38. The quoted passage has been edited in the light of the original German version.)

Mathematical methods have exercised an increasingly important function in the study of modern natural sciences. This is particularly true in the study of wei-kuan world in modern physics. In the absence of modern mathematics, it would not be able to proceed further. As Engels said long ago, atoms and elements cannot be observed under the microscope and they can be grasped only by reasoning. (See Note) To apply scrupulous mathematical methods is to apply an effective instrument "for such grasping by reasoning." Since the beginning of the 20th century, it has been discovered in modern physics that light is not only undulatory but also atomic in nature. It was later discovered that the electrons are likewise both undulatory and atomic in nature. It was therefore ascertained that there are these two contradictory characteristics in the wei-kuan world. The previous mathematical formula that describes only the undulatory phenomenon is therefore no longer applicable; so is the previous mathematical formula that describes only the atomic movements. And unfortunately, it is also impossible to mechanically combine these formulas into one. On a higher level, people have found the common characteristic of these two mathematical formulas of description and thus discovered the new appropriate mathematical formula for the description of the wei-kuan phenomenon. The liang-tzu dynamics thus armed by this new mathematical formula has become a good instrument for explaining many wei-kuan phenomena. In the absence of such new mathematical methods, the development of the liang-tzu theory is hardly imaginable.

([Note] See Engels: Natural Dialectics, The People's Publishing Co., 1955, 1st ed., p. 168.)

So far as engineering techniques are concerned, not only can the most advanced techniques not be divorced from mathematics, but the various engineering designs also cannot be divorced from mathematics. There was a period when the engineers regarded the study of advanced mathematics as useless, for after their graduation they could not even use their knowledge of calculus in engineering assignments. It is to be pointed out, however, that that was the period when China remained a semi-colony with no industry of her own and as such she knew nothing but the purchase of foreign machinery and the use of them in accordance with the accompanying instructions. That period is now a thing of the past. The engineers of today have to develop designs independently. Take modern large-scale construction for instance. The design is very complicated; the demand for the quality of the design is exacting; and at the same time, economy must be considered. The problem therefore cannot be solved by simply applying the great safety index formula as was previously done. It is necessary to make detailed calculations in the course of designing and the newest findings in mathematics have to be used frequently. At present, the many problems in our socialist construction demand that we made a great effort in our mathematical research. This is true in the case of many new techniques too. In order to achieve economy, we must avoid blind experimentation. It is necessary for us to reach accurate estimates, wherever possible, on the basis of theory before experiments are conducted. In so doing, we often have to use profound mathematical methods. Of course, this involves eventually numerous processes of computation; with the facilities of modern computation techniques, we are already able to do so.

During recent years our attention has been directed toward the direct application of mathematics in our national economy. Mathematical methods may contribute much to the solution of such problems as the distribution of supplies. In the course of the great leap forward in 1958, the mathematical workers of this country reviewed the practical experience of the departments in charge of the transportation of food supplies and mathematically offered the undeniable theoretical verification of their "work method on maps," which was to be used in the formulation of the plan for food distribution, thereby promoting the popularization of this method and saving the government a large amount of money. We are just beginning to apply mathematics to such problems in our national economy. In our socialist planned economy, guided by the Marxist-Leninist theories, it is highly possible to apply mathematical methods in the solution of some technical problems in our national economy. Greater effort is yet to be made in this direction.

Under the guidance of dialectical materialism and historical materialism, we have recognized the object of study and characteristics of mathematics and we have recognized the relationship between mathematics and productive experience. We have thus realized not only that the policy of uniting theory and practice points out the only correct road in the development of mathematics but also that we should consciously and correctly apply mathematical knowledge to various fields. In our great socialist state and under the leadership of the Party, we shall witness the most healthy development of mathematics as a science and the demonstration of its greatest function in the construction of the fatherland.

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