

THE THEORY OF A SIZE OF MANUFACTURING BUSINESS

By TOKIJIRO MINOGUCHI*

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In regard to a size of manufacturing business, in our country prevails the theory that a cost of production decreases with the growth of business in size, because the "advantage of large business" called usually the "economy of scale" has been believed to be realized unlimitedly. However, the actual size of manufacturing business can not be explained by this theory. For while if the unlimited realization of "advantage of large business is true, there should be only one business in one industry or in one country in cosequence of the defeat of smaller businesses in the competition with larger businesses of lower cost of production as insisted by Marx and Oppenheimer, nevertheless for instance our official "Statistics of Manufacture" in 1962 show that there are industries in which there is no business employing more than 50 persons, as the scarf and muffler industry, the leather products for footwear industry etc., industries in which there is no business employing more than 100 persons, as the industries of miso, string, wooden footwear, wooden ship, physical and chemical appliances, secondary smelting and refining of zinc and other smelting and refining of non-ferrous metals, and at the same time so numerous small manufacturing businesses exist still in the United States, Great Britain and West Germany as in our country.

The actual size of manufacturing business can be explained most well by arguing that both larger and smaller business has respectively its own advantage and disadvantage and a larger business maintains its existence in competition with a smaller business where the advantage of larger business is realized more than its disadvantage and a smaller business maintains its existence in competition with a larger business where the advantage of larger business is realized less than its disadvantage or the advantage of a larger business is realized in a smaller business in the same degree as or more than in a larger business so that only the disadvantage of larger business is realized in a larger business.

The decrease in efficiency of management and the increase in the cost of management with the growth of business in size has been indicated by Chamberlain, Schmalenbach, Florence, Robinson and many other men as the disadvantage of a larger business. For instance Florence indicates that the growth in the size of plants and firms accompanies the growth in the proportion of salaried staff to operatives and explains this fact on the examination of three kinds of organization as follows.

"The system of organization which has grown up with the growth of most industrial firms may be called hierarchical, since its prototype may be found in Church organization.

* Professor (*Kyōju*) of Population Policy.

But this system is also known as the military system, until recently it was the form of organization found pre-eminently in the army and navy. In all these systems the relation between ruler and ruled is more important than division of work. One or more persons are placed under a superior, that superior under a super-superior and so on, and each of these superiors exercises a rule over their subordinates that extends to all types of work.

Hierarchical structure lightens the load on top-level government by certain rules of communication which must be obeyed on pain of uncertainty and confusion in all executive rule and work relations.

(1) Commands should only be given to (and information received by) subordinates through their immediate superior. There should, be by-passing or skipping of links in the chain of command.

(2) Command should only be received by subordinates from (and information given to) one immediate superior. There should, in short, be only one chain or line of authority, and a unity of command.

(3) There is a limit to the number of subordinates that can be directly commanded by one man.

The number of ranks in the hierarchical system must then be increased with the total size of the organization, just as in the army, given a definite number of men in the platoons, companies, battalions, brigades, etc., these men must be commanded by officers of a definite number of ranks. In a fairly typical large organization a hierarchical system gives command to the works manager over four superintendents each controlling five foremen. Foremen usually control a varying number of men according to technical requirements: but if we suppose forty men to be an average number under one foreman, it follows that five foremen will control two hundred men, and four superintendents (under one works manager), each with five foremen, will control eight hundred men. Thus the employment of eight hundred men in the productive department implies four ranks, and if the number of men were doubled, a further rank would have to be added to avoid the overloading of any officer in the superior ranks.

It is only by adhering strictly to these three rules—the chain, unity of command and the span of control—that the hierarchical system can so lighten the load on the top government that it can efficiently execute large-scale industrial operations, and industrial firms have been slow in realizing this necessary logic of the hierarchical government of large-scale operations. But there are sources of inefficiency logically inherent in the pure form of the hierarchical system, and however closely hierarchical principles may be adhered to, a limit will be placed to large-scale organization if reliance is placed solely upon a hierarchy of command. These inherent inefficiencies in the hierarchical system may be summed up under three headings:

- (1) Failure to get correct information and to act upon it.
- (2) Red tape and bureaucracy.
- (3) Lack of specialized skill of experts.

(1) While commands go down the line under the hierarchical system information is supposed to be coming up the line. Thus, while the sales manager gives orders to the travelling salesmen under his command, these salesmen, in direct touch with the retailers or customers, should be giving the sales manager information as to the difficulties in selling the various lines. But the main defect of the hierarchical system is that such information tends to be neglected for the very reason that it comes from a subordinate.

(2) Red tape and bureaucracy are words often flung in the teeth of hierarchical organization but seldom actually defined. When these words are used they seem to refer to such rigid adherence to formalities that rules become masters rather than servants. The result is a certain imperviousness to changing circumstance and technique, a fatal flaw in industries depending for progress on investment in new inventions: and an exceeding roundabout method of making decisions. That decisions can only be reached by long-drawn-out correspondence and negotiation, would follow strictly from the principles of hierarchical organization. Thus if foreman A under superintendent I wishes to consult on business with a foreman under superintendent IV, he would have to approach the works manager, and not till then could the works manager give orders to superintendent IV to order the foreman under his command to meet foreman A. This procedure is found to occur in practice all over the world and in all walks of life where the hierarchical and military principle flourishes unmitigated.

(3) The lack of specialized skill is inherent in the leading characteristic of the hierarchical system, namely, that each executive is responsible for all subjects in his department. Thus, the head of a factory department would buy his own material, design his own products, engage his own labour, keep his own records, and set his own standard of output and costs: while the foreman in any one shop might set the wage rate, train new men, supervise the quality of the work, keep the plant running, and determine the speed and feed of the machines. In short, each commander is inclined to be a Jack-of-all-trades and master of none.

Because the hierarchical system failed to give top-level government expert management or advice, a new principle in organizing industry (stressing work rather than rule relations) was advocated by such men as Frederick Taylor, the founder of scientific management. The leading characteristic in the new organization is that at each hierarchical level specific functions common to all or several departments are each placed in the hands of a man specifically qualified, and instead of giving attention to all the factors in one department, he gives attention to one factor in all departments.

Under this functional system, the work of government is divided in each rank so that there is not merely a system of superiors and subordinates, but a series of posts of co-ordinate authority and differentiated functions. These functions are different in respect of work performed, not merely as travellers under the sales manager in respect of territory covered.

The functional system has logical rules for the efficient relief of large-scale top level government, no less than the hierarchical system.

(1) The functions into which the work is split up should be collectively exhaustive: there should not be gaps, where no one is told off to function.

(2) The divisions of the work should, for the sake of economy of effort, be mutually exclusive: that is to say, there should be no overlapping, poaching and duplication of work.

(3) Each division should contain related subjects. The work required of each division should be fairly similar so that the differences in the work within each division should be less than the differences of the work in different divisions.

Many firms, particularly in America, have moulded their organization upon this system but yet they have often found in the functional structure some logically inherent inefficiencies. In the first place, much that was efficient in the hierarchical structure for executing efficiently the commands of top level government had been swept away. The functional foreman idea clearly contravenes the law of unity of command. The operative takes orders not from one foreman, but from several, whose orders might well conflict, and Taylor's plan was soon

found to be unworkable. It is clear that if decisive action is to be taken at least a backbone of authority must be left. The hierarchical line of command cannot entirely be abandoned, and there must be some superior to whom every man in an executive or operative capacity can look for definite orders. In the second place, with division of functions and specialization has come a certain loss in co-ordination. Apart from the friction, jealousy and rancour that are apt to spring up between departments, there is an inevitable getting out of touch. This is particularly clear in the division between sales managers and works managers. Orders may be booked by salesmen that owing to overloading of productive equipment can only be produced at great cost and with little or no profit, while conversely, articles may be produced that can only be sold at a loss or not at all. Under a purely hierarchical system, where one top level individual attends to both selling and producing, he will produce with a definite knowledge of the possibility of the market, and he will market with a definite knowledge of the possibilities of production. But a division of function (for instance different men doing the designing and the making) may result in demarcation disputes to be adjudicated by the top authority thus further over-loading him, or entail the creation of a further job, that of co-ordination or liaison. In the former case there is additional inefficiency, in the latter additional expence.

There has been a gradual trend from the hierarchical system of delegation, to a functional system of division of labour in management. Both systems of organization, however, have been faultily applied, or even when logically applied have been found to possess inherent sources of inefficiency. The hierarchical structure, so well suited for the efficient communication of commands, limits the use of expert management and advice: the functional system, allowing the use of expert managers and advisers, divides up the execution of commands too much for effective large-scale operation. A system is thus sought which will relieve top government by striking an efficient balance in the division and concentration of rule and work. Such balance applied in industry is probably nearest approached, logically, by the line and staff system.

The conception of a staff first arose in the army as a result of the need of the top command for information. Information, if it comes from the lower ranks, is inclined to be neglected. To remedy this source of inefficiency, military commanders gradually delegated power to certain persons to specialize in giving information. Thus, the quarter-master found places for an army on the march in which to camp or "quarter." Information had to be collected and inferences drawn from it in the form of recommendations. In addition to informing the commanding officer, these specialists would draw up an assessment or appreciation of the situation and tender advice accordingly. Gradually the advisory function of the staff was developed so that its advice was expected to be acted upon, and plans were prepared to facilitate the necessary action. Thus, Mooney and Reily point to information, advice and facilitation as the three purposes of a staff system. The staff works out plans for various contingencies upon information acquired, and devises the detailed methods of carrying out these plans. In short, though the staff forms no part of the hierarchical "line" system of command, and is only attached to it as line-and-staff suggests, it influences the policy of executive officers within that system at various points.

Thus the general managing director may have a staff that advises him as to the design of product, and the method of producing it, by undertaking research, planning, costing and statistical control (i.e. comparing or checking the actual achievement as against the plan). In

the second rank, the sales manager may be advised as to advertising methods, or price and output policy, by a staff specializing in market research, and the labour manager may be advised as to the selection of labour by a psychologist, and as to piece-rates by a time and motion expert. In the third rank there may be a staff for market research attached to each area sales superior and this local staff may be advised by the central market research staff. It is to be noticed that none of these staff officers are part of the hierarchical back-bone formed by the managing director and his subordinates and foremen, nor part of the functional division of powers seen in the division between sales, works, and labour managers. The staff are specialists in research, planning and checking of results, in which much statistical control and paper work may be involved: but they do not directly command on their own authority.

The staff system and its paper-work (if not overdone and merely idle overhead) corrects the inefficiency of a pure hierarchical line organization which excludes experts and specialists: it may also avoid in the form of a general rather than a specialized staff the lack of co-ordination and the violation of unity of command implied in the functional system. Knowledge will be divided up among several persons, but supplied by a general staff to one central authority, and this central authority will have unity of command. Additional co-ordination may, however, be obtained either by giving the staff a part in the general executive line work, or by a system of committees, where the staff advisers may meet all the functional managers whose activities need correlation.

Inefficiencies adding to top rule's load are logically inherent in the staff and line, as in other types of delegation. A staff officer may have been a successful empire-builder, or the top authority may have been seized with over-enthusiasm for the principles of scientific management and organization, or cleverly sold on the subject. In consequence over-elaborate systems certainly have been set up in some firms, in which the increased number and expense of staff and unproductive labour goes far beyond the increase, if any, in output and therefore becomes inefficient. Part of the increase in staff to operative ratios, though certainly not all, may have been this futile overhead.

The danger is also inherent in staff and line organization of creating back-room boys or a superior highbrow set who may further increase the "idle" overhead. Certainly the staff have been pictured as sitting at headquarters devising paper forms and questionnaires to annoy the executive line officers and the men doing "donkey work" at the actual front.

Wherever the pure line system of command is abandoned and co-ordinate officers are created either for functional, or advisory or executive staff purposes, it is essential to mutual understanding and aggregation that a common meeting-ground be found for ideas and complaints. The logical meeting-ground is a committee where the functional executives on the same level authority (e.g. sales, works and personnel managers) can co-ordinate their policies, or the advisory or executive staff and the executive functionaries may get together as a body to discuss plans and difficulties of their execution and achievement. Under the staff and line system committees are particularly important. By this device, headquarters thought and front-line action may be harmonized, opinion and experiences pooled, predictions and complexes ironed out and what Mooney and Reiley have called a common "indoctrination" achieved. The executive "line" gets to understand and feels identified with the work of the "line".

Committees in an industrial firm, as elsewhere, raises of course new possibilities of inefficiency. Where two or more persons have to be gathered together time will be lost by the

mere need of gathering them and, when gathered, by the slow progress of deliberation and arriving at a decision. And when the number of persons on the committee are more than a certain modicum, not only are a great aggregate of man-hours lost to productive work, but the actual efficiency of deliberation may suffer through "too many cooks spoiling the broth", and through the need for greater tact and secrecy. Though a certain number of persons are usually required on a committee to ensure all sides to a problem being heard (otherwise there is no point in the committee), a rule of optimum size of committees may be advanced (like the maximum span of control) that there is some maximum number of members of a committee, above which efficiency is "lost".

It is a well-known fact that with the growth of a business in size, not only the method of management changes gradually from that wholly dependent on the single judgement and action of an individual manager to that dependent on the rule or system, but also the complexity of that rule or system itself gradually increases. This is naturally the consequence of the fact that, because "there is a limit to the number of subordinates that can be directly commanded by one man", as indicated by Florence, the increase in the work of management which accompanies with the growth of business in size makes the management wholly dependent on the single judgement and action of an individual manager increasingly difficult or impossible, so that the management is possible only by the increasingly more complex rule or system. It follows from this that, with the growth of business in size, as suggested by Florence, the evils expressed by the name of "red tape and bureaucracy" increasingly appears and the personnel employed in management increases relatively, because not only the work of management increases relatively but also its efficiency decreases in consequence of the evils of "red tape and bureaucracy".

For instance the result of the "Fundamental Census of Medium and Small Business" in 1957 shows that the proportion of the number of officer in the total number of regular employee is 4.3% in the business employing 1-3 persons, 11.4% in the business employing 4-9 persons, 15.5% in the business employing 10-19 persons, 17.0% in the business employing 20-29 persons, 17.6% in the business employing 50-99 persons, 18.9% in the business employing 100-199 persons, 20.4% in the business employing 200-499 persons, 23.0% in the business employing 500-999 persons, 23.7% in the business employing more than 1000 persons, namely that it increases with the growth of a business in size and nearly one fourth of the total number of regular employee is employed in the work of management in the business employing more than 1000 persons. In so far as it increases, evidently the cost of management in a larger business must be relatively higher than that in a smaller one, besides it must be relatively higher than that in a smaller one because the higher-paid staff of higher ability is required to perform a more difficult work of management.

It is certainly a doubtless fact that the mechanization of the work of management by applying an electronic computer and many other machines and implements for office work prevails in order that this disadvantage of an increase in the cost of management due to the relative increase in the work of management and the decrease in its efficiency will be offset or at least mitigated. However, this disadvantage of a larger business can not be offset at least sufficiently by this mechanization. For this mechanization of the work of management through the application of these machines and implements for office work, on the one hand, though the cost of management is decreased by the relative decrease in the personnel required for the work of management in consequence of its increasing the efficiency of that work, on the

other hand, increases that cost in consequence of the additional expense due to the application of these machines and implements. When the increase in the cost of management due to the application of these machines and implements is equal to the decrease in the cost of management due to the application of these things, the mechanization of the work of management does not decrease the cost of management. When the increases in the cost of management due to the application of these things, as we often find it, larger than the decrease in the cost of management due to the application of these things, the application of these things, though it increases the productivity of labour, rather increases the cost of management. The disadvantage of a larger business to increase relatively the cost of management can be sufficiently offset only when the net decrease in the cost of management, detracted the increase in the cost of management due to the application of these things from the decrease in the cost of management due to the application of these things, is so large as—if we assume that, as the above-mentioned “Fundamental Census of the Medium and Small Business” shows, the proportion of the number of officer to the total number of regular employees is in the business employing more than 1000 persons is 5.3 times or 2.1 times that in the business employing 1-3 or 4-9 persons—the application of these things decreases the cost of management of larger business to 18.5% or 48.0% of it, besides it compensates the increase in the cost of management due to the employment of the higher-paid staff of higher ability required to perform a more difficult work of management.

Moreover this is never the sole disadvantage caused by the growth of a business in size. When in this way with the growth of a business in size the system of management becomes increasingly more complex and the management is performed more and more by rule and system, a change in the relation of connection between employer and employee who connects in the business will arise and the degree of prevalence of the relation of connection as a person depending on the principle of personal connection will gradually decrease and in its place the degree of prevalence of the relation of connection as a function depending on the principle of functional connection, namely, the unhuman relation of connection will increase.

The result of the above-mentioned “Fundamental Census of the Medium and Small Business” shows that the proportion of the number of employer who perform both clerical and manual work in the total number of employer is 89.9% in the business employing 4-9 persons, 74.0% in the business employing 10-19 persons, 36.7% in the business employing 20-29 persons, 12.0% in the business employing 30-39 persons. This fact implies that, while in a small business the employer himself performs together with his employees manual work or at least personally contacts with his employees almost every day, this employer’s performance of manual work and daily personal contact with his employees decreases gradually with the growth of a business in size. Therefore it is evident that with the growth of a business in size, the intimateness and the understanding between the employer and his employees gradually decreases and as a result of it increasingly arises the disadvantageous influence on the relation of connection between the employer and his employees and the willingness to work of his employees.

Naturally in this case also it is certainly true that there are various conference systems aimed at the mutual understanding and co-operation between the employer and his employees in the business. However, these systems can not at least sufficiently prevent the occurrence of the above-mentioned disadvantage. For these systems are usually established and conducted by the rule and their conduct is apt to be formal and consequently in these systems the

employer and his employees can not contact and talk each other so frankly and frequently as in the smaller business. Florence talks about this disadvantage of a larger business as follows.

"The stimulus most directly affected by the large-scale organization is clearly that of the social relation of employer and employee. The incentive to work, that is, the willingness of the worker to increase or even maintain output at lowest cost is checked at the outset as soon as he finds himself divided off as a mere employee, from ownership of the products of his labour. The hard work of the peasant proprietor who is independent and his own employer and who makes his own profit grubbing up his probably ill-situated and infertile patch of ground is a commonplace: and it is held true as a general rule that the more a mere employee loses personal contact with the ownership the more indifferent he will become to the efficiency of the industrial organization and the more he will stick to habits, customs and conventions and resist the innovations characteristic of modern industry. Even if he is induced to adapt himself to a new technique by a higher pecuniary payment, psychological "unrest" (now called low "morale") will supervene and rob that new technique of much of its superior efficiency. The employee's sense of fraternity and social equality with his employer and the sense of his own dignity and self-respect tend to be lost as the size of the group enlarges and subdivides: he identifies himself less and less with the interests of the firm.

In the plant or organization, such as a small house-building firm employing less than 5 persons, the employer is, like the medieval master-craftsman, working side by side with his employee: he is co-worker and "mate" and all may identify themselves with the business. In the plant employing 6-20 labourers, the employer may not actually work with his sleeves rolled up among his mates—he is more in the position of a supervisor: but at the same time he probably knows all his employees by their first names, is on familiar terms with them and there is a certain give and take. In the next biggest size of plant employing from 21 to 50 men, the group is no longer the size of any "team" known to sport and the team-spirit is difficult to keep up. The employer may be designated by the American term "boss" or the British "gaffer". He has become a sort of army sergent, discipline takes the place of community of interests, and more stress must be laid on the pecuniary incentive of the wages. At the next biggest size of plant, where 51 to 100 persons are employed in a smallish factory, the employer may possibly have attained a different social class and may be compared to a lieutenant in the army. The incentive to efficiency of the feeling of "being in same boat" is lost, and the ordinary employee can no longer regard his own interests in the business as identical with his employer's.

There are by now probably three ranks, since a sergent grade of foremen comes between the officer-employer and his men. The employer, though possibly regarded as a friend and knowing every employee by his family (if not his first) name, is looked upon as someone not themselves. At best, paternalism and its corollary loyalty, now takes the place of camaraderie and identity of interests: mechanical devices such as "clocking in" to ensure punctuality at the work are usually imposed and "tabs" kept on behaviour in the works by output and idle-time records.

Thus the incentive of identification of oneself with the firm and a feeling that one partly "owns the place" or at least has a stake in the enterprise fades out as the plant or firm gets larger. Where, in a medium-sized plant, 100 to 250 men are employed, the number of an army company under a "captain", a man appears to be a commodity merely placed in a

factory to ensure proper flow of work. The progress of mechanization and power transmission will possibly demand submission to a routine of multiple shifts in which he shares one machine, as Box and Cox did their lodgings, with another worker. Box—and Cox—may, and do, resist this loss of a sense of property by blaming all mechanical breakdowns on Cox—or Box—and refusing to take any responsibility for breakages, waste material or quality and quantity of output.

Where more than 500 are employed, the “major” or “colonel” at the head of the plant, if he is at all logical, will be sitting in an office, have several sub-managers under him and will have to spend a great deal of time remote from the shops occupied with files and clerks thinking out plans. Though there may still be a certain *esprit de corps*, red-tape and bureaucracy creeps in. The employer’s withdrawal will set him off as a person apart and most traces of a busy united family will have disappeared from the plant. The employer may not even recognize his employees by sight but merely have a vague feeling that he has seen that face before somewhere. The process of depersonalization may well be complete and the social atmosphere of -institutionalism in full blast. The same efficiency of labour may be obtained, but only at an increased cost in supervisory staff, complicated accounting methods, precise wage-systems, liberal welfare provisions, checks and balances, scheduling and routine. Direct access of the individual employee to the employer has usually to be abandoned, and the two can only meet through employees’ delegates and representatives.

Finally, in the large plant containing more than 1000 persons, a towering hierarchy of supervisors, works managers and general managers will rise above the individual employees, who may not even know their employer by sight. He may in fact have his office at some commercial centre miles away from the plant, and through departmentalization the employees may have completely lost touch with one another. The incentive of an *esprit de corps* has gone for the plant as a whole, and the worker feels no longer a man but a mere cog in a huge machine, a mere check number filed away in the records.

The direct effect on a man’s efficiency of this mere matter of size is indeed quite tangible. The organization is not his organization and unless he is afraid of dismissal and unemployment he cares little for any disorganization due to his leaving at a moment’s notice or absenting himself without any notice. Measures can be taken to circumvent these natural reaction toward labour turnover and absenteeism and to improve “morale”, but whatever the measures, whether permission to transfer between departments, house organs, welfare work, relentless recording of absence and wastage, suggestion schemes or even Works Councils, they all involve additional cost.

It is, however, in the more indirect effects upon efficiency that the increase in the size of firms demanded by economic logic finds its greatest obstacles. An atmosphere is created in which it is difficult for labour to make the necessary logical adjustments for the sake of general industrial efficiency. It is natural for “employees” who feel they are not identified with the organization for production and are just “hired and fired” like raw material, to form organization of their own in the shape of Trade Unions or just to be members of the unorganized groups or gangs studied by Elton Mayo, or even just to act unconsciously in unison. The trade practices which the Unions defend, if need be by striking, are difficult to adjust to any new requirement of technical efficiency. But it is not necessary for any specific conscious organization to inculcate inertia. I have found evidence of deliberate restriction of output both in Britain and America even where Trade Unionism was excluded.”

Therefore in order that the larger business can maintain its existence in its competition with the smaller business in spite of these disadvantages of it, it is necessary to overcompensate or at least sufficiently compensate these disadvantages by the full realization of what is called in general as the "advantages of a large business". Nevertheless the advantage of employment of "expensive" or "large" machine and that of division of labour which Mill, Marshall, Robinson and many other writers mentioned as the "advantages of a large business" is never realized unlimitedly and also only in the large business as many men believe.

To begin with, in regard to the employment of a machine, as Gottle indicates in his "Principle of Decreasing Quota", the mere employment of a machine does not always decrease the cost of production per one unit of product, even if it increases the productivity of labour. The employment of a machine involves as the cost per one unit of product, the quota per one unit of product of the expense for the purchase of the machine and its maintenance, the expense for the power used to run it, that for the labour used to operate it and, in particular when the machine is purchased by the loan, the quota per one unit of product of its interest. Therefore in order to decrease virtually the cost of production per one unit of product in consequence of the full realization of the advantage of the employment of a machine, the decrease in the cost of production due to its employment must be larger than the increase in it due to its employment. When the increase in the cost of production due to its employment is larger than the decrease in it due to its employment, even if its employment increases the productivity of labour, the employment of the machine does not decrease per one unit of product but rather increases it.

Now, since the total cost due to the purchase of the machine, as Buecher called it the constant cost, is quite constant, whether it produces more or less, that is, whether it is used fully or unfully, as indicated by Gottle, with the increase in the quantity of product in consequence of the increasingly fuller utilization of it, the cost of production per one unit of product decreases in consequence of the increasingly decrease in the quota of the cost due to the purchase of the machine per one unit of product, while, at the same time, with the decrease in the quantity of product in consequence of the increasingly unfuller utilization of it, the cost of production per one unit of product increases in consequence of the increasingly increase in the quota per one unit of product of the cost due to the purchase of the machine. For this reason, in order that the employment of the machine decreases virtually the cost of production per one unit of product in consequence of the decrease in the cost of production due to the employment of the machine more than the increase in the cost of production due to the employment of it, it is necessary that the machine is utilized so fully as the decrease in the cost of production due to the employment of the machine overcompensates the increase in the cost of production due to the employment of it.

Consequently, in order that, as a result of the realization of the advantage of the employment of "expensive" or "large" machine which many writers mention as one of the "advantages of a large business" the employment of such "expensive" or "large" machine virtually decreases the cost of production per one unit of product, it is especially necessary that the demand for the product produced by it is massive, uniform, stable and lasting. For, on the one hand, when the demand for the product produced by it is not so sufficiently massive, uniform, stable or lasting that the machine is utilized fully and constantly during its durable period, the quota per one unit of product of the expense for the purchase of the machine and, when it is purchased by loan, the interest for the loan and consequently the cost of

production per one unit of product increases correspondingly, while, on the other hand the increase in the cost of production per one unit of product due to the increase in the quota is naturally large according to the expensiveness or largeness of the machine.

It is for this reason that, as Buecher indicates that the larger business occupies the first stage of production while the smaller one occupies the manufacturing stage of it, or Bernstein points out that the larger business produces half-made goods while the smaller one produces finished goods, the size of the business on the whole tends to be smaller successively in the process of stages of production in the successive industries, such as those in which in the first stage the synthetic fiber is produced, in the second stage synthetic fiber, cotton, wool and others is spun, in the fourth stage clothings are manufactured, those in which in the first stage iron and steel is smelted, in the second stage the smelted steel is plated, in the third stage steel and iron is forged and casted, in the fourth stage the metal products are manufactured. For, since the demand for half-made goods nearly unliable to be influenced by the taste of final consumers, the change of fashion and others tends to be on the whole so much more massive, uniform, stable and lasting than the demand for finished goods liable to be influenced by those, that in the production of half-made goods, the advantage of a large business to employ the "expensive" or "large" machine overcompensates the disadvantage of a large business, while the demand for the finished goods liable to be influenced by the taste of final consumers, the change of fashion and others tends to be on the whole so much more miscellaneous, fluctuating and unlasting than the demand for half-made goods nearly unliable to be influenced by those, that in the production of finished goods, the advantage of a large business to use "expensive" or "large" machine is not realized and only the disadvantage is realized.

In the second place, in regard to the "advantage of division of labour", which is mentioned by many writers as the second "advantage" of a large business, it is the well-known fact that the division of labour increases the productivity by (1) increasing the skill of the workman, (2) enabling to put the right man in the right place, (3) increasing the degree to utilize the instrument, (4) saving the time which is lost when man moves one work to another work, (5) enabling to use the machine. However, it is never true, as many men believe, the advantage of the division of labour is realized only in the large business. The advantage of the division is in fact fully realized by the social division of labour between businesses. Therefore it follows that the larger business can not maintain its existence in competition with the smaller business only when this social division of labour is impossible. For, when the advantage of the division of labour is fully realized by the social division of labour, the advantage of the large business of the division of labour is realized in the smaller business also in the same degree as in the large business, or when the large business exists because the social division of labour is not introduced still despite its being possible, that advantage is realized in the smaller business more than in the larger business, and consequently in these cases only the disadvantage of larger business is realized. It is for this reason that especially in the so-called assembling industries in which many parts are manufactured and assembled as the ship building industry, the motor car industry, the bicycle industry, the machine industry, the camera industry, the sewing machine industry, the radio and television industry and others, the division of labour prevails between the smaller parts manufacturing businesses which manufactures only one particular part of those many parts and the assembling business which does only the assembling of those parts manufactured by many parts manufacturing

business.

Therefore in such industry on the whole the size of the parts manufacturing business tends to be relatively smaller, while the size of the assembling business depends on the complexity of structure of the assembled goods and the number of operation or process of assembling the parts, as shown by the fact, that the size of the motor car assembling business is large while that of bicycle assembling business is small, that the size of the steel ship assembling business is large while that of the wooden boat assembling business is small, that the size of the radio and television assembling business is large while the electric lamp assembling business is small. For in such industry most parts can be manufactured automatically by machine because the production of parts can be specialized, while the size of the assembling business, at least measured by the number of employee, must depend on the number of operation or process of assembling the parts because not only the assembling processes can not divided and performed in different businesses, but even if the machine is applied, the assembling itself can not be performed automatically by the machine.

II

Now, in consequence of the belief that the advantage of the employment of "expensive" or "large" machine and that of division of labour which is called as the advantage of a large business is realized unlimitedly and at the same time can be realized only in the large business, there is the theory which insists that the maintenance of existence of the smaller business in competition with the larger business is only due to the lower wages in the smaller business. However, the actual size of the industrial business can not be explained. For not only, if this theory is true, it follows that the larger business of higher wages should be destroyed utterly in competition with the smaller business of lower wages, nevertheless many larger businesses still actually exist, but also the lower wages does not always imply the lower cost of production or cost of labour per one unit of product which is the determinant factor of competition.

John Stuart Mill indicated, that wages and the cost of labour are quite different and lower wages never implies lower cost of labour, as follows.

"Wages, and the cost of labour: what labour brings in to the labourer, and what it costs to the capitalist: are ideas quite distinct, and which it is of the utmost importance to keep so. For this purpose it is essential not to designate them, as it is almost always done, by the same name. Wages, in public discussions, both oral and printed, being looked upon from the same point of the payers, much oftener than from that of the receivers, nothing is more common than to say that wages are high or low, meaning only that the cost of labour is high or low. The reverse of this would be oftener the truth: the cost of labour is frequently at its highest where wages are lowest.

We continually hear of the disadvantage under which the British producer labours, both in foreign markets and even in his own, through the lower wages paid by his foreign rivals. These lower wages, we are told, enable, or are always on the point of enabling them to sell at lower prices, and to dislodge the English manufacturer from all markets in which he is not artificially.

Before examining this opinion on the grounds of principle, it is worth while to bestow a

moment's consideration upon it as a question of fact. Is it true that the wages of manufacturing labour are lower in foreign countries than in England, in any sense in which low wages are an advantage to the capitalist? The artisan of Ghent or Lyons may earn less wages in a day, but does he not do less work? Degrees of efficiency considered, does his labour cost less to his employer? Though wages may be lower on the Continent, is not the Cost of Labour, which is the real element in the competition, very nearly the same? That it is so seems the opinion of competent judges, and is confirmed by the very little difference in the rate of profit between England and the Continental countries. But, if so, the opinion is absurd that English producers can be undersold by their Continental rivals from this cause. It is only in America that the supposition is *prima facie* admissible. In America wages are much higher than in England, if we mean by wages the daily earnings of a labourer: but the productive power of American labour is so great—its efficiency, combined with the favorable circumstances in it exerted, makes it worth so much to the purchaser—that the Cost of Labour is lower in America than in England: as is proved by the fact that the general rate of profits and interest is very much higher.

General low wages never caused any country to undersell its rivals, nor did general high wages ever hinder it from doing so."

Alfred Marshall maintains that "low-waged labour is generally dear, if working with expensive machinery" as follows.

"We have hitherto supposed that it is a matter of indifference to the employer whether he employs few or many people to do a piece of work, provided his total wages-bill for the work is the same. But that is not the case. Those workers who earn most in a week when paid at a given rate for their work, are those who are cheapest to their employers (and ultimately to the community, unless indeed over-strain themselves, and work themselves out prematurely). For they use only the same amount of fixed capital as their slower fellow workers: and, since they turn out more work, each part of it has to bear a less charge on this account. The prime costs are equal in the two cases: but the total cost of that done by those who are more efficient and get the higher time-wages, is lower than the total cost of that done by those who get the lower time-wages at the same rate of piece-work payment."

Seligman also insists that "where fine machinery is used and a high grade of intelligence is required to secure the best results, we often find a true economy in high wages" as follows.

"Economic production implies the turning out of the greatest product with the least cost. So far as the wages of labour form an element of cost, it would seem to follow that low wages or cheap labour is a necessary condition of low cost. Before accepting this ostensibly self-evident proposition, however, it is necessary to pursue the analysis further.

In any single industry low wages do not necessarily mean low cost. The real cost of labour is to be measured by its productive efficiency. Just as the hundred-thousand-dollar railway president is cheap because an inferior and low-priced substitute would botch matters and increase expence, so in the case of the ordinary wage-earner the real cost is to be measured by the ratio of wages to the product of labour. In the Philippines the contractors find it in the end cheaper to hire the Chinamen in preference to the natives, although the former command larger wages: in the Southern cotton factories the white labourer is found more advantageous than the negro factory hand, who can be hired at a materially lower wage. Furthermore, in the same industry and with the same workmen neither an increase of wages nor a curtailment of labour time necessarily augments cost. Where a reduction of hours or

an increase of wages succeeds in enhancing energy, care and sobriety, the output may be greater than before. Especially where fine machinery is used and a high grade of intelligence is required to secure the best results, we often find a true economy in high wages and a lower cost in shorter hours.

So far as labour is a factor of production, cost depends not merely upon wages, but upon wages as compared with output. Under certain conditions there is a true economy in high wages: the more a workman is paid, the less he may cost."

Therefore it follows that the lower wages of the smaller business does not always imply the lower cost of labour or cost of production per one unit of product which is the determining factor in the competition. When the productive efficiency of the worker is lower in proportion to the lowness of wages, not only the cost of labour per one unit of product in the smaller business is not lower than that in the larger business, but, moreover, since more equipment of production is required to produce the same quantity of product in inverse proportion to the lowness of the productive efficiency of the worker, and consequently the quota per one unit of product of the expense for the purchase of additional equipment increases correspondingly, the cost of production per one unit of product in the smaller business is rather larger than that in the larger business so much as that increased quota. In this case the smaller business can not maintain its existence in the competition with the larger business in spite of its lower wages.

Therefore, in order to insist that the lower wage in the smaller business is the cause—if not the sole, as believed by many men in our country—of the existence of the smaller business, it is necessary to assume that the productive efficiency of the worker in the smaller business is equal to that in the larger business. However, it can not be explained by this assumption that the smaller business maintains its existence in the competition with the larger business. For, if this assumption is true, the smaller business which pays the lower wage than that in the larger business in spite of the equal productive efficiency, should be unable to employ the workers necessary to it and consequently unable to maintain its existence, because all workers would apply for employment to the larger business and no worker would apply for employment to the smaller business. Therefore, in order to answer to this inference, the argument has been made that the smaller business can employ the workers necessary to it because there are too many peoples or workers to be able to find employment in the larger business. But this argument also can not explain the reason why the smaller business can employ at the lower wages the workers of productive efficiency equal to that of the workers of higher wages. For, if the smaller businesses can employ workers of equal productive efficiency at lower wages because there are too many peoples or workers, then the larger business should employ workers at the same lower wages with those in the smaller business and consequently wages in the smaller business can not be lower than those in the larger business.

Therefore it follows that the larger business pay higher wages than those in the smaller business because it is necessary to pay higher wages on account of the necessity of employment of workers of higher productive efficiency.

When wages are higher in proportion to higher productive efficiency of the worker, not only the cost of labour per unit of product is not higher, but, moreover, since the same quantity of product is produced by the less equipment of production in reverse proportion to higher productive efficiency and consequently the quota per one unit of product of the expense

for the purchase of the equipment is less correspondingly, the cost of production per one unit of product is so much less as that decrease in the quota in spite of higher wages. Therefore it follows that the employment of higher paid worker of higher productive efficiency is more advantageous than the employment of lower paid worker of lower productive efficiency. And it is evident that the more expensive is the equipment of production, the more larger is the effect of this saving in the equipment of production on the cost of production. It is for this reason that Marshall maintains that "low-waged labour is generally dear, if working with expensive machinery", that Seligman insists that "where fine machinery" is used and a high grade of intelligence is required to secure the best results, we often find a true economy in high wages, and that the larger business endeavours to employ the worker of higher productive efficiency at higher wages than those in the smaller business in order to realize the "advantage of a large business" to use the "expensive" machine, apparatus and other equipments of production.

One of the reasons why the larger business endeavours to employ the worker of higher productive efficiency is to make as higher as possible the rate of utilization of the productive equipment by excluding the idleness of it due to the absence of workers in consequence of employing the workers of high discipline. For instance in our cotton industry, since in the larger weaving business in which the massive and uniform cloth is weaved, one female worker operates 80 expensive automatic looms, while in the smaller one in which the unmassive and uniform cloth is weaved, one female worker operates only two or three unexpensive ordinary power-looms, the loss due to the idleness of looms in consequence of the absence of one female worker in the larger business amounts to 27 or 40 times that in the smaller business.

Another reason why the larger business endeavours to employ the worker of higher productive efficiency is the necessity of employing the worker of higher intelligence. For example the cotton spinning factory in Tientsin, China, which I had once visited was that managed by our representative large cotton spinning company and more modern and superior in equipment than that managed by the same company in our country. Nevertheless the productive efficiency of female workers in that factory was so lower than that of female workers in our country that, while in the above-mentioned factory in our country 1,000 female workers operated 50,000 spindles and 1,000 automatic looms, in that factory 6,000 female workers operated 100,000 spindles and 2,000 automatic looms and the three times as many female workers as those in our country were needed to operate the same number of spindles and automatic looms. This is evidently the result of the fact that practically all female workers in our country had more than 8 years' schooling and intelligence accordingly while no female workers in that factory in Tientsin had schooling and shows that the productive efficiency of the workers who had more than 8 years' schooling is three times that of the workers who had not schooling.

However, the most important reason why the larger business endeavours to employ the worker of higher productive efficiency at higher wages is the necessity of the employment of worker of higher technical ability in order to perform most efficiently the work which requires a higher technical ability.

In the above-mentioned cotton industry, as in other textile industries, the work demands less a higher technical ability. Provided they had an ordinary schooling, the workers become skilled in the work and able to operate the machine with a sufficiently high efficiency during two or three months. Therefore in these industries not merely only young unmarried female

workers are working, but also the duration of employment is very short. On the contrary, in the so-called heavy and chemical industries the sufficiently efficient operation of machines, apparatuses and other equipments of production needs the higher technical ability besides high rate of attendance and ordinary schooling. Consequently in these industries not merely mainly young and adult men are working, but also the duration of employment is usually very long. Therefore in these industries the reason why the larger business endeavours to employ the worker of higher productive efficiency at higher wages is not only to operate most efficiently the equipments by employing the worker of high rate of attendance and of high level of intelligence, but also to operate them most efficiently by improving his technical ability by means of longer duration of employment. It is for this reason that wages in these industries in general are eminently higher than those in textile industries.

Therefore it follows that wages in the smaller business are lower than those in the larger business because the productive efficiency of workers in the smaller business is lower than that in the larger business. If so, the maintenance of existence of smaller business in competition with the larger business can not be explained by its lower wages than those in the larger business. For, as indicated before, when wages are lower in proportion to the lower productive efficiency of workers, not only the cost of labour per one unit of product is not lower, but, moreover, the cost of production per one unit of product is so much higher as the quota per one unit of product of the expense for the purchase of the additional equipment of production which increases in reverse proportion to the lower productive efficiency of workers to produce the same quantity of product.