

The Division of Labour and Economic Development: An Evolutionary Approach

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I. Introduction

This paper considers the relationship between the division of labour and economic development from the viewpoint of the theory of economic development or the development economics. Although the relationship between the division of labour and economic development had not been sufficiently discussed since Smith (1776), the roles of the division of labour have been discussed again in recent years while the era of 'the visible hand' (Chandler, 1977) changed to the era of 'the vanishing hand' (Langlois, 2003) (e.g. Jones and Kierzkowski, 1997; Baldwin and Clark, 2000). Although the division of labour has various effects on the economic development of the leader countries and the catch-up process of follower countries, these effects have not systematically been considered in the theory of economic development or the development economics (see Suenaga, 2012a). In this paper, the relationship between the division of labour and economic development is theoretically considered.

In this paper, we adopt the evolutionary approach as contrasted with the orthodox (neoclassical) economics. Although the effects of the division of labour are indicated in a firm's cost curve in orthodox microeconomics, the orthodox macroeconomics such as the theory of economic growth have not sufficiently considered the effects of the division of labour (e.g. Solow, 1956; Uzawa, 1964; Romer, 1986; 1990). Moreover, the boundaries of firms have been argued in the approach of transaction cost or the theory of industrial organization. However, their approaches cannot sufficiently elucidate the reason why the degree of the division of labour between firms or industries has changed in the dynamic process of economic development (e.g. Milgrom and Roberts, 1992). The economic development is not an equilibrium process but an evolutionary process with new combinations as Schumpeter (1934) discusses. The dynamic

approach of evolutionary economics is important in the consideration of industrial development.

This paper is greatly influenced by many studies such as Langlois (2003) or Langlois and Robertson (1995). They discuss the boundaries of firms in the long run from the viewpoints of dynamic transaction cost and dynamic capability. However, this paper considers the division of labour from a broader view, and discusses not only the boundaries of firms but also the boundaries of industries. Langlois (2003) analyzes the boundaries of firms while presenting the hypothesis of 'the vanishing hand' as contrasted with 'the invisible hand' of Smith and 'the visible hand' of Chandler. Although our view does not contradict what they state, the decrease in the inter-firm division of labour in the era of 'the visible hand' is not emphasized because we analyze from a broader view. In the era of 'the visible hand', the intra-firm division of labour by the 'management', which Chandler describes, only increases, instead of the inter-firm division of labour. The intra- and inter-firm division of labour is just a phenomenon of various divisions of labour in the whole economy.

In addition, the discussion of the division of labour of Smith and the new combinations of Schumpeter also build the base of a theoretical framework. Although their views have not been emphasized in orthodox economics, they are of great significance in the consideration of economic development. In particular, the division of labour and new combinations of knowledge have very important roles in economic development, as Smith and Schumpeter mention. We also have the aim of constructing an evolutionary theory of economic development which systematically incorporate the discussion about the division of labour and new combination.

The concepts of the division of labour are extremely important for planning corporate strategy and governmental policy. Although these concepts have not been emphasized in orthodox economics, it is most important for firms and governments to systematically incorporate the concept of the division of labour. We expect that the analysis in this paper will also make a contribution to practical matters.

II. What is the division of labour?

What is the division of labour? The description of Smith (1776) is still relevant. In this section, we consider the division of labour based on his description, and systematize the concepts of the division of labour.

1. Adam Smith's description of the division of labour

In this subsection, Smith (1776), who analysed in earnest the division of labour for the first time, is taken up. As we know, he considered the division of labour in detail from Chapter 1 to 3 of *The Wealth of Nations*. Although one may remember the case of a pin factory, he only uses this for ease of explanation. He discussed not only the division of labour in a factory, but also that in the whole society. Although it is somewhat long, we refer to his description (p.13).

The woollen coat, for example, which covers the day-labourer, as coarse and rough as it may appear, is the produce of the joint labour of a great multitude of workmen. The shepherd, the sorter of the wool, the wool-comber or carder, the dyer, the scribbler, the spinner, the weaver, the fuller, the dresser, with many others, must all join their different arts in order to complete even this homely production. How many merchants and carriers, besides, must have been employed in transporting the materials from some of those workmen to others who often live in a very distant part of the country! how much commerce and navigation in particular, how many ship-builders, sailors, sail-makers, rope-makers, must have been employed in order to bring together the different drugs made use of by the dyer, which often come from the remotest corners of the world! What a variety of labour too is necessary in order to produce the tools of the meanest of those workmen! To say nothing of such complicated machines as the ship of the sailor, the mill of the fuller, or even the loom of the weaver, let us consider only what a variety of labour is requisite in order to form that very simple machine, the shears with which the shepherd clips the wool. The miner, the builder of the furnace for smelting the ore, the feller of the timber, the burner of the charcoal to be made use of in the smelting-house, the brick-maker, the brick-layer, the workmen who attend the furnace, the mill-wright, the forger, the smith, must all of them join their different arts in order to produce them.

Although this description describes how many people participate in the production

processes of final goods, in his next example, he illustrated how many goods were consumed by a consumer (pp.13-14).

Were we to examine, in the same manner, all the different parts of his dress and household furniture, the coarse linen shirt which he wears next his skin, the shoes which cover his feet, the bed which he lies on, and all the different parts which compose it, the kitchen-grate at which he prepares his victuals, the coals which he makes use of for that purpose, dug from the bowels of the earth, and brought to him perhaps by a long sea and a long land carriage, all the other utensils of his kitchen, all the furniture of his table, the knives and forks, the earthen or pewter plates upon which he serves up and divides his victuals, the different hands employed in preparing his beer, the glass window which lets in the heat and the light, and keeps out the wind and the rain...

Although the division of labour in the production process of goods was at the centre of Smith's descriptions, we should also discuss the division of labour as related to the final consumption goods.

2. The construction of the division of labour

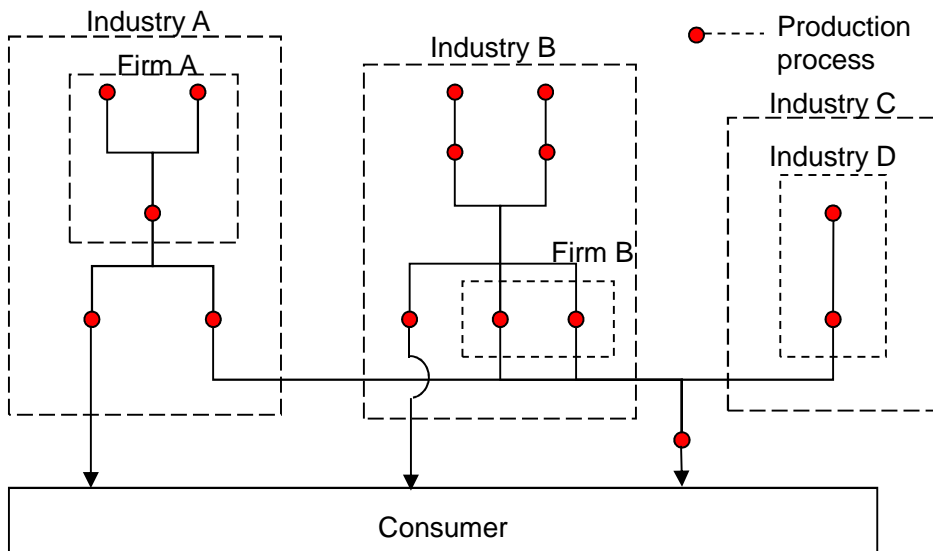


Figure 1 Various production processes and the division of labour in economic activities

Although the division of labour means the separation of economic activities, can we systematically classify the concept of the division of labour? Figure 1 simply describes

the production processes of various final consumption goods.¹ There are numerous final goods in a real economy, and these goods are supplied to consumers through a few thousand, or a few billion (or a few trillion) processes. We can imagine the processes in the pin factory described by Smith, and the processes from processing silicon raw materials to producing the final electronic product. When considered in detail, there are innumerable production processes necessary before final goods are delivered to final consumers. These production processes intertwine with each other, and constitute the whole economy. Some processes are often carried out by one firm, and a series of processes or similar goods are often classified in an industry.

In order to realize these complicated economic activities simply, we use the concepts of verticality and horizontality. These terms are ambiguously used even in academia. In economics, the vertical relations often mean the relationship between the sectors supplying inputs and the sectors using the inputs, and the horizontal relations often mean the relationship between firms which are competing in a market. Although vertical relations are not necessarily the relationship between firms, horizontal relations just mean the relationship between firms. Like Milgrom and Roberts (1992, p.569), our use of the term 'horizontal' conforms to its use in business writing, where it refers to activities that are not vertically related. Therefore, we use the term 'vertical' if the processes of production have a vertical relationship, and the term 'horizontal' if the relationship is not vertical. For example, if we use the concepts of verticality and horizontality to realize Smith's descriptions about the division of labour, the vertical specialization is carried out in the production processes of the woollen coat and horizontal specialization is carried out in the production of many goods which a shepherd uses in his life.²

In addition, we should use concepts such as intra- and inter-firm and industry to

¹ Although there is a problem about what to do with capital goods in the short run, we assume the long run where the volume of all capital goods become variable.

² The term, 'vertical international specialization', is used to describe the division of labour between developed and developing countries. However, in the case where developed country manufactures industrial products and the developing country produces crops (and, if the crops of the developing countries are not materials for industrial products of the developed countries), the division of labour is not vertical but horizontal in this paper.

systematically classify the discussions about the division of labour (Table 1). The example of Smith's pin factory was just the intra-firm (intra-workshop) division of labour. Although the division of labour between sharpening pins and putting them into the paper is intra-firm vertical specialization, the horizontal specialization is carried out if the firm produces not only pins but also screws. The inter-firm division of labour between the spinning and weaving processes is called inter-firm and intra-industry vertical specialization, and that between the commercial and passenger car is called inter-firm and intra-industry horizontal specialization. Moreover, the division of labour between an industry which manufactures machine tools, and an industry which produces airplanes by using the machine tools, is inter-industry vertical specialization, and that between ship and car may be called inter-industry horizontal specialization.³

Table 1 Classification and examples of the division of labour

	Vertical specialization	Horizontal specialization
Intra-firm	Sharpening and packing pins	Pins and screws
Inter-firm and intra-industry	Spinning and weaving	Commercial and passenger cars
Inter-industry	Machine tools and airplane	Ships and cars

Although the concept of the division of labour was very important for Smith, the importance of the concept has declined since his time. It may be because an era of 'the visible hand' had long continued. However, a number of people have recently paid attention to the concept of the division of labour such as fragmentation, out-sourcing, off-shoring, unbundling, spin-offs, module-clusters, open innovation, open source, intra-industry trade, vertical disintegration, selection and concentration, commodity chains, and OEM (Original Equipment Manufacturing).⁴ In the following sections,

³ As a matter of course, because the word, 'industry', is vague, the classification changes by the definition of the 'industry'. Moreover, although we can classify the division of labour by geographical factors such as region and country, for simplicity, this paper does not emphasize those factors.

⁴ Moreover, the topics, such as comparative advantage, dual sector model, north-south trade, forward and backward linkage, and the flying-geese theory, also have an intimate relationship with the division of labour.

while reviewing various studies about the division of labour, we consider the relationship between the division of labour and economic development.

III. The static theory of the division of labour

1. Make or buy? ⁵

Next, while paying attention to the inter-firm (or inter-industry) division of labour we consider in what kind of situation the division of labour happens. This is also the problem of 'make or buy'. In this section, first, we examine whether a firm produces inputs by itself or procures them from other firms in a situation in which the industrial structure does not change.

Whether a firm produces inputs by itself or procures them from other firms basically depends on the cost. That is, if producing by itself is cheaper, it will produce, and if production by other firms is cheaper, it will entrust this to other firms. Through self-production it is also possible to use economies of scale and scope, reduce transaction costs, and expand market control. Conversely, motivation to work efficiently weakens and management costs rise. Milgrom and Roberts (1992, p. 556) describe the conditions under which a firm should outsource to other firms. These conditions include the following:

the use of standard inputs, the presence of several competing suppliers, economies of scale in the supply firms that are too large to be duplicated by the buyer, economies of scope that would force the vertically integrated firm into unrelated businesses, and the absence of specific investments on the part of either the buyer or the seller.

However, in the process of economic development, the proportion of procurement from other firms has expanded, though there have been many situations different from the situation that Milgrom and Roberts described.⁶ Their view is also useful to some degree when considering the process of economic development. However, discussing a long-term process of economic development centring on cost is futile, and the reason

⁵ The discussion of this subsection is referred at a case study of semiconductor industry (Suenaga,2007).

⁶ For example, see Suenaga (2007).

why the degree of the division of labour has changed is hardly discussed.

2. The division of labour on the orthodox economics

Next, we consider the division of labour in areas of orthodox economics such as the theory of economic growth or the theory of firms. The theory of economic growth is called the static theory here because it is based on the mechanism of equilibrium and assumes that the industrial structure does not change. The economic growth theory of Solow (1956) regards the accumulation of capital stock per capita as an important factor in economic growth, and technological advances are considered as manna from heaven. Although the vertical specialization such as the production sector of capital goods and consumer goods is modelled on the two sectors model of economic growth of Uzawa (1964), the economic growth is not given by the division of labour.

Romer (1986; 1990) endogenises technological advances into the theory of economic growth, and the vertical specialization between the R&D sector and the production section is incorporated into the model. However, the factor of economic growth is the R&D based on monopolistic profits, and the rate of economic growth is decided at the beginning (although the uncertainty is often incorporated into the model). In the endogenous growth theory, the horizontal specialization such as variety of goods incorporated into the model, and the increase of the variety of goods often means economic growth. However, the increase of variety is also attributed to the R&D based on monopolistic profits. The increase of productivity by the division of labour, or the evolutionary process by the division of labour and new combinations is not sufficiently discussed in those models. Although Yang (2003, ch.14) sets a model of economic growth through learning by doing based on division of labour, the relationship between the division of labour and economic development is not considered.

On the contrary, the effects of the division of labour have been considered in microeconomics. As we know, the cost curve of firms in the short run becomes an inverted S type by the effects of the division of labour. This reflects the analysis of Smith. However, the effects are only static in the model, and the dynamic effects such as learning-by-doing or invention of machine by the division of labour are not

incorporated into the model. If the dynamic effects are considered, the cost curve shifts downwards, the production volume enlarges, and the division of labour is more pronounced.⁷ However, these dynamic effects are not generally considered in microeconomics.

On the other hand, while trade volume has increased in recent years, the interest in the division of labour has been increasing. For example, in the theory of fragmentation (e.g. Jones and Kierzkowski, 1990), the inter-firm vertical specialization is considered by incorporating the segmentation of the production process and introducing the concept of ‘service link cost’.

However, the dynamic process such as the relationship between the division of labour and economic growth has not been emphasized in the theory of economic growth in macroeconomics and the theory of firms in microeconomics. In next section, we refer to some studies which elucidate the relationship between the division of labour and economic development, and consider the dynamic theory of the division of labour and economic development.

IV. The dynamic theory of the division of labour

This section refers to some studies which analyse the relationship between the division of labour and economic development, and considers the dynamic theory of division of labour assuming a change in the industrial structure. First, the effects of the division of labour, which Smith points out, are discussed, and the views of Smith and Schumpeter are compared. Secondly, the creation of knowledge as the essence of innovation is explored from the viewpoint of the division of labour. Thirdly, while referring to the study of Stigler (1951), the relationship between the industrial life cycle and the division of labour is discussed. Fourthly, we consider the research of Baldwin and Clark (2000) on the computer industry and discuss modulation and industrial development. Finally, while paying attention to ‘the vanishing hand’ of Langlois (2003), the relationship between the division of labour and the development of

⁷ See Young (1991) about learning-by-doing.

institutions is discussed.⁸

1. Smith's division of labour vs. Schumpeter's new combination

Smith (1776, p.9) points out the following three factors as the effects of the division of labour: 1) the increase in productivity, 2) saving time, and 3) the invention of machines. Although his discussion concerns the division of labour in a workshop, the division of labour between factories or industries also promotes the increase of productivity and the invention of machines.⁹ Although the division of labour is limited by the extent of the market, as Smith points out, the extent of the market develops with the increase of productivity by the division of labour. As a matter of course, however, the extent of the market is enlarged by external factors such as the discovery of new markets and the invention of new forms of transportation (and communication) methods.¹⁰ The mechanism of growth of productivity by the division of labour is called 'the Smithian growth' in this paper.¹¹ Moreover, the increase of productivity by the division of labour enlarges the extent of the market, and it promotes the division of labour again: that is, there is a cumulative causation among the extent of division of labour, the increase of productivity, and the extent of the market (Figure 2).¹²

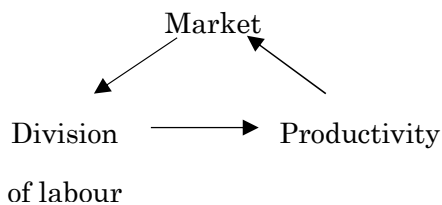


Figure 2 Smithian growth and cumulative causation

⁸ Although the studies of Stigler (1951), Baldwin and Clark (2000), and Langlois (2003) are referred at a case study of semiconductor industry (Suenaga, 2007), this paper examines the division of labour and economic development from a broader view.

⁹ However, when the division of labour is carried out in distinct places, the effects of saving time vanish. On the other hand, time is saved by the invention of new transportation machines and the development of communication technology.

¹⁰ If these inventions are triggered by the division of labour, they are endogenous factors.

¹¹ The definition in this paper may be different from that of Parker (1984) and Mokyr (1990).

¹² See also Young (1928).

In contrast, Schumpeter (1934, p.66) insists that there are five cases of new combinations that are factors of economic development: production of new types of goods, or change of properties of the existing goods; introduction of new methods of production that may be based on new scientific discoveries; opening of new markets; use of new sources of raw materials and intermediate goods; new organization of production. It is very interesting that their ideas are in opposition at first glance: ‘the division of labour’, which Smith emphasizes, and ‘new combinations’, which Schumpeter regards as a factor in economic development. Simply speaking is the factor of economic development a ‘dividing’ or ‘combining’ process? Schumpeter emphasizes the importance of economic development through creative destruction rather than economic growth such as the increase of productivity. Therefore, the invention of machines, which Smith points out, is most important in Schumpeter’s economic development. As Nelson and Winter (1982, p.130) states that ‘innovation in the economic system – and indeed the creation of any sort of novelty in art, science, or practical life – consists to a substantial extent of a recombination of conceptual and physical materials that were previously in existence’, the invention of machines is almost brought about by the new combination of existing materials. In that case, a field of new combinations is built by the division of labour, a few innovators make a new combination, and economic development may be realized.¹³ Therefore, we can think that the views of Smith and Schumpeter are not contradictory but complementary. In this paper, their views are called the ‘Smithian = Schumpeterian development’ (Figure 3): the division of labour promotes the possibility of new combinations, the realization of new combinations enlarges the extent of the market, and there is a cumulative causation among the division of labour, the realization of new combinations, and the extent of the market.

¹³ As a matter of course, this process does not automatically arise. Although new combinations like this are combinations of existing knowledge, new technological paradigms, which have great potential for developing the economy, often arise by the combination of scientific and technological knowledge. See Suenaga (2012b; 2015), about these combinations.

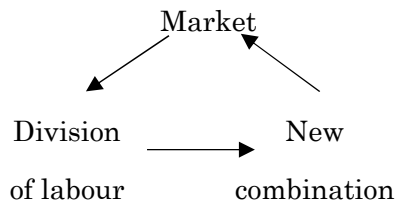


Figure 3 Smithian = Schumpeterian development and cumulative causation

2. The division of labour and new combinations of knowledge

Although we discussed the process by which the division of labour promotes economic growth by the increment of productivity and the inventions of new machines, how does innovation or the invention of new machines come about? It is a new combination as Schumpeter says, and a combination of existing knowledge in most cases. The division of labour plays an important role in the emergence of new combinations. Let us refer to the superior insights of Smith (1776, p.12) again.

Many improvements have been made by the ingenuity of the makers of the machines, when to make them became the business of a peculiar trade; and some by that of those who are called philosophers or men of speculation, whose trade it is not to do any thing, but to observe every thing; and who, upon that account, are often capable of combining together the powers of the most distant and dissimilar objects. In the progress of society, philosophy or speculation becomes, like every other employment, the principal or sole trade and occupation of a particular class of citizens. Like every other employment too, it is subdivided into a great number of different branches, each of which affords occupation to a peculiar tribe or class of philosophers; and this subdivision of employment in philosophy, as well as in every other business, improves dexterity, and saves time. Each individual becomes more expert in his own peculiar branch, more work is done upon the whole, and the quantity of science is considerably increased by it.

The specialization in particular processes such as a new combination of knowledge is made possible by the division of labour, and the possibility of a new combination is born (or promoted). Sometimes the combination of knowledge is realized by the combination of some forms of technological knowledge and sometimes by the combination of scientific and technological knowledge (Yamaguchi, 2006). Although there are various patterns of combination between scientific and technological

knowledge, new technological paradigms and industries may be born if the relevant scientific knowledge, the base of these combinations, has great economic possibilities.¹⁴ That is, the divisions of labour and new combinations of knowledge become significant factors in economic development.

However, while the social stock of knowledge enlarges with economic growth, the realm in which each activity carries out the creation of knowledge is subdivided by the division of labour. Although the division of labour in the creation of knowledge makes efficient creation possible, new combinations which straddle between realms may be hampered.¹⁵ Furthermore, as Chesbrough (2003) points out, the era is changing from an era of ‘closed innovation’ in which research and development take place within a company, to an era of ‘open innovation’ in which there is also collaboration with universities and other companies. Large central laboratories, which used to play a significant role in the basic research, have been reduced, and the division of labour between research and development is carried out by some firms, or by business firms and academic institutions. In recent years, although many researchers have paid attention to institutions such as the collaborative consortium among industry, academia, and government, how scientific and technological knowledge are bound together is a crucial problem while the activity of knowledge creation such as advances in scientific and technological knowledge has been divided.

3. Industrial life cycle and vertical specialization

The research of Stigler (1951) is taken up in this subsection, and the relationship between the industrial life cycle and vertical specialization is considered.¹⁶ He described the relationship between the developmental stage of an industry and the

¹⁴ In Suenaga (2012b; 2015), the patterns of combination are classified into four models. In addition, while paying attention to the hierarchy of scientific knowledge which is the foundation of technological paradigms, the emergence and hierarchy of technological paradigms is discussed.

¹⁵ However, when confronted with the difficulty (e.g. deficit or recession), new combinations which straddle between fields may occur. See also Freeman and Perez (1988).

¹⁶ Although Stigler (1951) uses the term ‘vertical disintegration’, it is a synonym for ‘vertical specialization’ used in this paper.

tendency toward vertical specialization of that industry. Generally, vertical integration is predominant in an early stage of an industry, and vertical specialization advances when it enters a stage of growth. The tendency toward vertical integration is brought about again when the industry enters a stage of decline. When an industry has developed, the production processes which a firm has vertically integrated are carried out by many firms, and a few firms, which develop their own significant processes, may gain large profits.

According to Stigler, a new industry is often outside the norm for an existing economic system and the needed raw materials are often uncommon, so a firm in the new industry has no choice other than to choose self-production. Moreover, special manufacturing equipment might be necessary, along with its design and production. Moreover, the necessity to look for skilled workers who are well-versed in special tasks might arise. It is often necessary to solve technical problems when a product is being used and to persuade users to switch to the new product from older ones. However, it is also difficult to find agencies to take charge of such persuasion work.

As this new industry reaches a steady state and its prospects become clear, other firms enter with their specific businesses. Various companies individually focus their business practices, and the vertical specialization of the industry advances. For example, some firms specialize in the production of special raw materials and manufacturing equipment, other firms specialize in marketing and agency, and other firms specialize in worker training.

Thereafter, when this industry declines, companies that have played a supplementary role will begin to decline. When independent firms go under, the firms that remain will have to carry out the business.

Stigler takes up the case of the textile machine industry as an example, and discusses the relationship between industrial development and vertical specialization. The textile machine industry was born as a part of the textile industry: the textile factories had their own machine sector because they needed to manufacture and repair their own machines. After that, the industry was divided into many departments such as power-driven machines, machine tools, factory construction, and distribution, and

vertical specialization developed. While the market for cotton goods declined after the 1920s, the firms which constructed the machines went on to manufacture new machines such as other industrial machines and refrigerators.

4. Modulation and industrial development

In this subsection, we discuss the relationship between modulation and industrial development, based on a study of Baldwin and Clark (2000). According to them (p. 5), there are two turning points in the process by which an artefact evolves: (1) the point at which an artefact can no longer be made by a single person; and (2) the point at which an artefact can no longer be comprehended by a single person. Crossing into the first region requires a division of labour; crossing into the second requires a division of the knowledge and effort that go into creating a design. Although the division is required when the system becomes complicated, the design rules such as the architecture and interface of the artefact should be clarified to allow this division to happen smoothly.

For example, in the case of a complicated system such as the computer, detailed rules are required for the design. However, in the early stage of development of the computer industry, the design rules were not clarified and the modulation had not yet evolved. The first type of computer to appear as a true module type computer was IBM's system/360, launched in 1964. Before then, computer products were incompatible with each other. If customers wanted to change the systems they had, they could not help but completely rewrite the application software and buy new peripherals. To maintain compatibility between products, IBM adopted the module design, and the series was a great success in the computer market.

It was the quality of the architecture and the establishment of the design rules that made it important to work in this mode of modulation. Because the parameters had been clarified enough, the developer of each module was free to make an effort to improve the functioning of that module. There is also the effect of the intra-firm division of labour: there is an intimate relationship between the division of labour and innovation.

However, firms that manufactured modules compatible with IBM products appeared, and they made the products highly competitive by specializing in specific areas. The industry was changed from a substantial monopoly by IBM to a huge module cluster. As printers, terminals, memory, software, and CPUs came to be produced by special firms, the position of IBM in the computer industry decreased.

That is, when the system becomes complicated with the development of the product (or industry), the incentives for adopting modulation increase. Although the intra-firm division of labour would be promoted if the modulation succeeded, the inter-firm division of labour might be brought about because some firms begin production of specific modules. In addition, there are also cases where firms of follower countries begin production by utilizing their comparative advantages such as low wages.

5. The development of the market and the division of labour

In this subsection, the relationship between the development of markets and institutions and the division of labour is discussed, based on the theory of Langlois (2003). He presented the hypothesis of 'the vanishing hand' as opposed to the hypotheses of 'the invisible hand' (Smith, 1976) and 'the visible hand' (Chandler, 1977). According to Langlois, Smith thought that the division of labour was advanced by the invisible hand of the market as the market expanded, though Chandler thought that the visible hand took the place of the invisible hand. However, Langlois pointed out that the view of Chandler was only valid for a specific historical environment. Moreover, he insisted that the era of 'the invisible hand' had changed to the era of 'the visible hand' by about 1880, and had become the era of 'the vanishing hand', that is the era of the division of labour, by about 1990.

'The vanishing hand' hypothesis of Langlois is as follows. As the population and their incomes increase and the barriers to exchange decrease, the division of labour that Smith indicated progresses. Each role becomes more specialized, and coordination through the market increases. However, the speed of change is variable for the technology, organizations, and institutions that form the basis of this process. The 'management revolution' that Chandler described is a result of this imbalance. That is,

although technology with high productivity makes for the necessity of new coordination, the imbalance increases when the development of the market and institutions that fill such a necessity is delayed. This imbalance causes the ‘management revolution’ that Chandler described. However, as the market expands and the institutions that support exchange develop, centralized management of the process of production decreases gradually, and vertical specialization advances again.

Although Langlois puts forward the hypothesis of ‘the vanishing hand’ because he is interested in firm boundaries, this paper pays attention to the development of the division of labour through the enlargement of the market rather than focusing on whether the division of labour is intra-firm or inter-firm. As the market expands, the division of labour in a firm develops if it is difficult to divide the tasks between firms, and does not develop if this is not difficult. We can also think that, in the era of ‘the visible hand’, the division of labour of intra-firm instead of inter-firm has just developed.

V. Conclusions

In this paper, we considered what is the division of labour and the factors and effects of the division of labour. Although the divisions of labour are, as shown in Figure 1.1, classified into items such as vertical and horizontal specialization, or the intra-firm and inter-firm division of labour, the factors and effects of the division of labour are not simple in the dynamic processes that drive economic and industrial development. Although the division of labour is limited by the extent of the market, as Smith (1776) states, the degree of the division of labour may change according to the stage of industrial development, as Stigler (1951) points out. Moreover, when the technology becomes complicated and modulation evolves the state of the division of labour changes, as Baldwin and Clark (2000) describe. Furthermore, the degree of the division of labour is affected by the development of market and institution, as Langlois (2003) depicts. Although the division of labour gives rise to improvements of a specific process and to economic growth, as Smith or Baldwin and Clark illustrate, it may cause the creative destruction noted by Schumpeter (1934). In particular, the divisions of labour

and new combinations of knowledge play an important role in economic development. Although the relationship between the division of labour and economic development is not simple, it is no doubt obvious that the division of labour affects economic development greatly.

However, it is not important in orthodox theory. In the process of economic development, the proportion of procurement from other firms has expanded, though there have been many situations different from the situation that Milgrom and Roberts (1992) described. Their view is also useful to some degree when considering the process of economic development. However, discussing a long-term process of economic development centring on cost is futile, and the reason why the degree of the division of labour has changed is hardly discussed. In addition, the dynamic process such as the relationship between the division of labour and economic growth has not been emphasized in the theory of economic growth in macroeconomics and the theory of firms in microeconomics.

As we discussed, it is required for properly capturing the structural change of the division of labour and analyzing the effects to industrial structure and corporate strategy. Although the firms and countries, which could not cope with the structural changes, decline, the analytical framework have not been sufficiently supplied in orthodox economics. We expect that the analysis in this paper will be systematically incorporated in the theory of economic development and the discussions about governmental role and corporate strategy.

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