Industries and Global Competition

A History of Business Beyond Borders

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The second decade of the 21st Century seems to be witnessing a turn away from globalization. A buzzword for the past several decades, it is now being supplanted with a dramatic surge in discussion of anti-globalism in world politics. This backing away from the global reveals how fundamentally people had been affected both by the reality and the notion of globalization. The global integration of the market delivered a remarkable expansion of the world economy and the improvement of life in many parts of the world. Although it seemed to offer a promising pathway to overcome nationalism, it has actually provoked a fundamental concern within nations for the future of their economic life and identity. The world-wide technology transfer and the diffusion of knowledge made possible the rapid catch-up by "the rest" (Amsden 2001), turning around the few centuries long trend of "Great Divergence" (Pomeranz 2000). While integration promoted development in some parts of the world, it also caused citizens in once dominant nations to fear they would face competition from lower cost labor and production from the less developed nations. Likewise, global integration of the capital market accompanied the increased inequality in many nations and left many people behind. The transformation of global value chains and the enhanced mobility of corporate activities triggered concerns about the de-coupling between the interest of globalized firms and the priority of local economies. Intensified mobility of a skilled workforce also triggered dread of competition with immigrants in rich countries and, at the same time, led poor economies to fear a brain drain of needed skilled workers.

We can gain a better understanding of these grave and complex issues by examining industrial competitiveness and dynamics of industries. Anxiety toward globalization was provoked especially by a dynamic change of the industrial landscape, where new winners and new losers emerged. These dynamics eventually impacted the employment opportunities and day to day life of people. Since this is a question of how the world was transformed, or not transformed, it should be addressed by historical analysis employing social scientific analytical concepts.

Industrial dynamics in global competition is a fascinating subject that raises a myriad of questions. Why do new entrants from emerging economies catch-up with first movers of rich countries in one industry, while mature economies and established firms remain competitive in others? Why do some industries witness a global scale of integration of markets and a high level of concentration, while others still maintain their national or regional characteristics? If a global value chain emerges and connects multiple locations in the world economy, who is competing with whom, and where and to whom does the competitiveness belongs? Focusing on a specific nation or industry may reduce the complexity to some extent, but may not provide a deep enough answer to these questions. A nation or region may improve its competitiveness in an industry while it loses it in another industry.

We adopt the **industry history** approach to address these questions. This approach uses industry, rather than firm or nation, as the starting point of analysis. This approach is especially useful when we focus on competition in the market because the industry is (a) an arena where the competition and cooperation among economic entities takes place, and (b) a sphere containing a unique set of economic resources and organizational capabilities. Studies focusing on competition among firms (or competition among relevant divisions of firms), or investigating competition among locations to become a home/host of corporate activities, or trying to capture the dynamic transformation of an economy need to take this "industry-centered" view. It pays attention to the specificity of individual industries. Since each industry may have its own unique dynamics, the industry-centered method can reveal industry-specific determinants of competitiveness. In this view, the basis of analysis is not a "one-size-fits-all" theory of competitiveness, but a diverse set of analytical concepts which are selected and customized to the industry specific conditions.

The search for a convincing interpretation of both the industrial and geographical dynamics must begin by asking the right questions. The abovementioned questions on global competition can be summarized into two ways of asking questions. In the first, "industry-centered" way, we focus on a specific industry and ask, "what is the determinant of industrial competitiveness and locations, and how is it transformed over time?" In the second, "location-centered" way, we take one location (or any geographic unit such as nation or sub/supra-national regions) and ask, "what kind of competitive resource(s) does the location have, and in which industry is it exerted?" The combination of these two types of questions may lead us to our key research question: "how do specificities of a given industry and location-specific competitive resources interrelate, and how is the relationship transformed over time?" This book addresses this question from a historical perspective, taking a long-term horizon (from decades to centuries) and comparative and relational perspectives.

This is a daunting challenge, not only because of the complexity of issues and colossal scale of potential research targets, but also due to the lack of

shared methods and the ambiguity in basic concepts and categories. Among many problems to overcome are: 1) concept of industry per se; 2) relationship among multiple approaches/viewpoints; and 3) spatial concepts and geographical framework. In the following three sections, I will discuss these issues to provide a better picture to explain the approaches and challenges of this book.

1 Industry as the Key Category

The primary problem of industry history is ambiguity of concept. Some studies that deal with a specific industry provide their own definition of the industry in question, and discuss general features of industries in some instances. However, surprisingly few works provide a conceptual or analytical framework to understand industry in general, and few scholars have elaborated the concept of industry per se. Unlike the concept of the firm, which has inspired many scholars to address theoretical questions and led to more than one "theory of the firm" (e.g. Penrose 1959), industry has not produced a "theory of industry." Although some pioneering works have addressed the concept of industry (Robinson 1958), and some recent works by historians demonstrated the advantageous position of historical research to reconsider the concept (Stokes and Banken 2015), the potential has yet to be tapped. This section takes up this challenge.

1.1 What Is Industry?

As briefly mentioned above, this book takes industry as the framework of analysis and positions it as the starting point of the study of competitiveness. However, this choice poses a problem. Unlike the firm, industry is merely a collective concept and it usually does not have a clear boundary. Interestingly, while a plethora of works have been published on diverse industries, and many studies on a specific industry define the targeted industry, almost none of these works have discussed "What is industry?" Accordingly, neither methods nor criteria to categorize an industry have been discussed. This section attempts to fill this gap by focusing on the greatest common factor of the concept.

First and foremost, industry is not a concept of actual entities, but an operational concept for cognition and understanding. It is defined and used according to the aim of the analysis. Unlike the term "enterprise" or "state," it does not have a real entity to embody it. Nevertheless, the industry concept is often treated as if it had a concrete reality. By using this concept, an economic entity (e.g. enterprise) understands its position in the economy, and it represents its interest in the society. Industry-wide organizations often transform this analytical concept into "visible" entities with their own will, interest and action. In addition, some legislations specify certain occupations or economic activities, and create an institutional foundation for the reality

of the industry. However, industry is essentially not a subject of action, and it has neither its own will nor unambiguous boundary. Hence, taking this to an extreme, industry is a theoretical construct, if not a fiction.

Second, industry is a medium (meso-) level category, which is positioned somewhere between micro-level ones (individuals, enterprises and individual units of enterprises) and macro-level ones (regional, national or world economy). In the eyes of individuals and enterprises on the micro-level, it is a collective and relational concept to group multiple economic actors/activities according to the homogeneity and/or relationship (competition and cooperation) among them. Conversely, from the view of the entire economy, it is essentially a concept for comprehending the social division of labor (i.e. occupational or organizational specialization). Once a type of specialized economic activity is established as an independent occupation or a specialized business in the market, it becomes possible to categorize it as an industry. This means that, while elements on the demand side also have to be considered, industry is basically a concept focusing on the supply side.

Third, from the perspective of micro-level economic entities, industry is a venue where competition and cooperation take places. A group of firms (or units of them), which are competing, cooperating and trading among themselves form this "arena," where those players get together and play the game. This arena usually does not have a single designer and it emerges evolutionally as an outcome of cumulative actions and reactions by the innovative firms/entrepreneurs, their followers and other related actors. The entry barrier to these activities forms the boundary of the industry. Both the shape of the boundary and its intensity (i.e. difficulty of new entry) constantly transform as a result of entrepreneurial activities in and out of the arena. Creative destruction (Schumpeter 1942) and disruptive innovation (Christensen 1997) make this transformation drastic and fundamental. On the other hand, for most firms and individuals in the industry, except for the very early phase of the industrial emergence or exceptional cases of monopolistic firms, the industry is a "given" condition that appears as the environment for the micro-level economic entities. Hence, the relationship between the industry and individual firms within it is mutual.

Fourth, similar to the firm, the industry can be regarded as a bundle of resources. As the "resource based view" in strategy studies argued, a firm can be deemed as bundle of resources, including capabilities to deploy them (Penrose 1959; Wernerfeld 1984). If so, an industry, a pool of individual firms, can also be positioned as a bundle of resources. If we introduce a longer time horizon, we may also argue that an industry is a bundle of resources guided by the evolutionary process of a specific system of knowledge. Furthermore, the industry is not merely a sum of individual firms. Firms' economic activities usually result in externalities. So an industry contains something additional to the activities of its firms. In fact, a large number of studies on industry and industrial competitiveness have been paying special attention to the inter-firm networks in a given industry, relationships

of supporting and related industries, and regional clustering of firms (e.g. Porter 1990). While individual firms appear and disappear, their resources are usually released to the market when those firms exit and they often remain in the pool of the industry. In that sense, though it may sound paradoxical if we remember the previous assertion on the "constructed" nature of industry, it may have an even more tangible reality and substance than individual firms.

Fifth, the concept of industry has an inherently nested or multi-layered structure (hierarchy), as a logical consequence being a "meso" level category. Official standard industry classifications of major nations (e.g. SIC in the US, UKSIC in the UK, JSIC in Japan) and international organizations (ISIC by the UN) exemplify this structure with digital code systems. Typically, in the case of the Standard Industrial Classification (SIC) of the US, the hierarchy from the first to the fourth digit represents different categories, such as "economic division" (e.g. "Manufacturing"), "economic major group" (e.g. "Chemical and Allied Products"), "industry group" (e.g. "Drugs") and "industry" (e.g. "Pharmaceutical Preparations"). However, SIC is nothing more than one among a countless number of industrial taxonomies. Both differences among national SICs and constant revisions of each SIC suggest this fact. The criteria of hierarchy and grouping can be very diverse. In addition, multiple criteria are used in a single SIC code system: *products category* (e.g. "Food and Kindred Products" [SIC 20], "Beverages" [SIC208] and "Malt Beverages" [SIC2082]); *use, function and produc*t (e.g. "Transportation Equipment" [SIC37], "Motor Vehicles and Equipment" [SIC371] and "Motor Vehicle Parts and Accessories" [SIC3714]): *technological feature, processes and materials* (e.g. "Chemicals and Allied Products [28], "Plastic Material and Synthetic"[SIC282] and "Cellulosic Manmade Fibers" [SIC2823]); *scope of market* (e.g. "Health Services" [SIC80], "Hospitals" [SIC806] and "Psychiatric Hospitals" [SIC8063]); *social function* (e.g. "Engineering, Accounting, Research, Management and Related Services" [SIC87], "Management & Public Relations Services" [SIC874] and "Management Consulting Services" [SIC8742]).

Hence, the study of an industry needs to focus on the appropriate level of the multi-layered hierarchy, according to the aim of its analysis. It is also important to know what kind of factors (i.e. elements to form the boundary of industry) defines the layers of the hierarchy. Discussions on "product differentiation strategy" or "high-value-added product" are good examples. Such an analysis postulates a specific view of the boundary of the segment. One may conclude that the US machine tool industry lost its competitiveness since the introduction of NC-machines by its Japanese rivals during the 1970s, while others may argue that they are still highly competitive in the top niche segment for aerospace products.

In short, industry is an analytical concept to understand the inner structure and dynamics of economy and society. The concept reduces the complexity and groups wide-ranging actors and activities in the market into a

large number of subsets with shared features. Hence, if it is defined in an adequate way, each industry—though it may sound like a tautology—has its own specific features and dynamics ("specificity of industry").

1.2 Specificity of Industry and Its Elements

There is no "one-size-fits-all" criterion by which we can define all industries. As we saw above, the industry concept has an inherent ambiguity; the multiple functions of industry concepts mean that multiple types of elements are actually employed as criteria for the definition of diverse industries. Four elements can be listed: 1) products (goods and services); 2) technology and knowledge; 3) economic function or position in the value chain; and 4) market. These four often overlap, and they are not exclusive to one another. Many industries do not fall into just one, but several of these elements. More importantly, the specificity of each industry can be well described by a systematic study of the nature of these elements.

The primary category for the definition of industry is product (including services). The homogeneity among a group of products forms an arena for competition because the same types of products can usually be substituted for one another. It is also important to note that virtually no product stands alone. Almost all products become commercialized goods or services through multiple processes and inputs of a variety of intermediate goods and services. Therefore, it is meaningful to bundle multiple products and treat them as one group. The economic activities to supply this group of products (e.g. semi-finished products and parts) can be also categorized as an industry, as long as the individual items of the products do not have the versatility to be used for other sectors. Accordingly, not only the competition, but also supply-demand relationship and relatedness among different products are essential elements to form the boundary of industry.

Products have their specific features and these form an entry barrier. Accordingly, both the boundary of an industry and the major determinants of competitiveness are basically defined by the features of the product. Hence, the clarification of the basic features of the product at stake is the first step in the study of an industry and its competitive dynamics. Furthermore, each product category has its own historical context. Some products, especially basic commodities with a long and distinctive history, such as foodstuffs (e.g., salt, sugar, pepper, potato, oil, coffee, tea, etc.), minerals (e.g., oil, coal, iron, etc.), other materials (e.g., cotton, silk, etc.), basic industrial products (e.g., paper, etc.) have been popular targets for the intellectual tradition of commodity history. The systematic analysis of the specific features of the product is an essential part of the study of industries and competitiveness within it.

The secondary category for the formation of the boundary of an industry is technology, including knowledge. To some extent, this is a clumsy tautology, because any product requires a specific technology or knowledge

for producing it. Let's take the examples of "chemical products," "plating products" and "insurance products." We may argue that even in these cases, the category of products defines industries (chemical industry, plating industry and insurance industry). However, in these cases, individual products may have diverse items, designs, shapes, uses and functions. In this case, it is more appropriate to say that "function based on chemical composition," "process of surface covering by thin metal coating" or "application of insurance principle" categorizes these products. Likewise, rather than a tangible or intangible product with specific design, a set of knowledge and/or technology can form the boundary of an industry. In addition, similar to the afore-mentioned "relatedness among products," the versatility of knowledge and technology applied to multiple products makes it possible and indispensable to categorize diverse products into one group. Technology and knowledge often play an important role in the classification of process industries, because a specific process (e.g., forging) is based on a specific technology. A process based on a specific technology or knowledge often becomes an independent sector and forms an industry.

The trajectories of technology/knowledge often differ from those of products. Electronic information and communication devices are a good example. While the mainstream products have been changing almost every decade (radio, TV, VTR, PC, flat TV and mobile phone), this industry has kept its identity over time. In this case, a systematic but sector-specific knowledge based on science, technological experience and related capabilities has served as the thread to connect multiple products over generations. The long-term shift in the actual products on one hand and the continuity of knowledge and capabilities on the other can also be observed in the chemical industry. The heterogeneity of products can be seen not only in the historical transformation, but also in a cross-sectoral application of versatile technology/knowledge into diverse products. Thus, together with the history of commodities, technology history can offer important insights into the history of industry (e.g. Hounshell 1984).

As the third category, the economic function and position in the value chain are used to define an industry. As discussed above, industry is a concept of social division of labor (or specialization). Thus, both specific economic function and the unit of occupational specialization, such as "retail," "finance," "telecommunication," "consulting" or "temporary staffing" form an important basis for a categorization into industries. Especially in service industries, the product is usually not defined by tangible products but by economic or social functions. In these industries, national or regional differences tend to be conspicuous, because the social structure and pattern of social division of labor often have a high degree of geographical diversity. The form of social division of labor is actually the social structure itself, and unlike tangible products or technological knowledge, it is hard to transplant into other societies. Accordingly, a significant part of such industries does not fit with the discussion of international competitiveness. Nonetheless,

these sectors often have close relationships with other sectors with a high degree of global market integration.

The fourth element of the classification of industry is the market. If a market with a specific character creates a common base for diverse and heterogeneous products, technology and economic functions, it is meaningful to classify these economic activities into one group, and such a group is often called an industry. Both geographical scope and social needs are used to specify the market. The diverse business of a regionally specialized trading company is an example of the former. In this case, special know-how about the region (e.g. language skills, knowledge of local culture, the ability to mobilize region-specific economies of scope, etc.) creates an entry barrier. As examples of the latter, "hospitality industry," "beauty industry" and "luxury industry" can be listed. In these cases, specific needs on the demand side, rather than the elements on the supply side define the "industry." Here, the term industry is used in the broadest sense, drifting away from its original use as a concept on the supply side. However, this extended application of the concept of industry has its own merit; it is good at elucidating dynamics and structural changes in the economy.

1.3 Industry Specific Time and Space

Despite the lack of explicit discussion, there is a widely shared understanding of the specificity of industries. Both in economics and management studies, scholars usually postulate that economic and managerial conditions may differ from industry to industry. Studies often use dummy parameters to deals with possible qualitative differences among industries in their quantitative analysis, and some studies try to measure the impact of industrial differences (Rumelt 1991). In the field of business history for example, Alfred Chandler selected cases from different industries (Chandler 1962, 1977, 1990). It is a reflection of their understanding of the specificity of individual industries, though many of them also argued that there are cross-sectoral general patterns or phenomena. As soon as one starts to apply general analytical concepts, such as economies of scale, transaction costs, stickiness of knowledge transfer, types of architecture design to actual economic activity, it becomes obvious that there are none-negligible differences among industries. Furthermore, once observers carry out empirical studies, significant differences among industries often emerge based on many criteria, such as growth rate, profitability, degree of concentration, level of entrance barrier, intensity of international penetration, etc.

However, can we go beyond a mundane statement, "all industries are different in many aspects" and obtain a clearer way to comprehend more generally the individuality of each industry? Considering the aim of our research, namely the investigation of the dynamics of competition among diverse locations and their historical transformation, the specificity of industry can be paraphrased: "***each industry has its own time and space***" or

"there is ***industry specific time and space.***" In other words, economic entities that belong to the same industry live in the same temporality, and those that belong to a different industry live in a different temporality. In the same manner, economic entities of an industry are sharing the same type of spatial condition as other entities in the same industry, while such conditions are likely to differ in other industries. If the time horizon differs from industry to industry, the pattern of industrial maturity or catch-up may differ, accordingly. The difference in the constraints of distance may result in a different intensity of global competition.

This is a very simple argument. However, both social scientists and historians have been engaged in diverse types of temporality or concepts of time (Wadhwani and Jones 2014), and it is worth making at least a minimum inquest. For research on industry history, it is possible to list multiple categories, such as *absolute age* (time arrow), *stages, cycles, generations, life cycles, longevities, speeds*, etc. (e.g. Abernathy and Utterback 1978). For each of these, one may find industry-specific features (Kurosawa 2012).

In history, all events are unique and no event will be repeated in the same manner. Thus, historical study has to pay enough attention to the absolute age. Any industry is born at a specific point in the time arrow, and it is marked by its age. Thus, the pattern of industrial development of an industry born in the 19th century may differ from the one in the 20th century. Different industries experienced historically unique events, such as the World Wars, the Great Depression, urbanization, demographic transitions, and the emergence of mass production or IT technology at different stages of their development.

Likewise, in other types of temporality, such as *life cycle, speed* and *longevity*, significant differences among industries are likely to be observed. For example, the product life cycle theory (Vernon 1966) postulates a certain tempo and patterns for the development and maturity of products, and it is not applicable to industries with fundamentally different tempo and patterns. The silicon cycle of the semiconductor industry typically shows the industry-specific speed and cycle and exhibits a remarkable difference from other industries with a slower tempo and smaller fluctuations. Many elements constitute the industry-specific temporality: speed of innovation, usable life of production facilities, period of product development, life of product models, durability (turnover) of product items, speed and fluctuation of demand, etc. In most cases, all of these elements show considerable differences industry by industry.

We can make the same argument about the spatial dimension. Each industry has its own space, reflecting the feature of its products, technology, social function and markets. On the spatial dimension too, diverse elements produce industry-specific conditions: required space and locational condition for facilities, transportation cost, possibility of geographical separation of processes, required intensity of communication, etc.

2 Multiple Viewpoints and "Industry-Centered" Approach

The studies on industrial competitiveness and the history of industries are marked by a striking diversity of approaches. On the one hand, many studies limit their focus to a specific country/region and analyze industrial dynamics, including the competition among enterprises (Nelson 1993; Owen 1999; Whitley 1999; Fellman et al. 2008). On the other hand, for a countless number of studies, the unit of analysis is individual firms, rather than industry. These studies analyze how those firms interacted with other economic entities in- and outside the industry (Chandler 1962, 1977; Fear 2005; Owen 2010). Furthermore, a considerable number of studies start with industry, rather than individual firms or locations (e.g., Itami 1992; Mowery and Nelson 1999; Chandler 2001; Lamberg et al. 2012). Although all of these approaches are indispensable and are complementary to one another, it is essential to provide an easy-to-understand framework to position each approach within a larger picture.

2.1 Industry as Arena of Competition

In this book, we deem that competition and competitiveness are the most essential elements for understanding industrial dynamics. They play a pivotal role in the transformation of organizations and institutions. The competition among diverse economic entities and locations can be positioned as the most important driver of globalization.

If so, what kind of competition among what type of actors shall be analyzed? First of all, it is obvious that the actual players who compete in the market are enterprises, not industries. Thus we are supposed to focus on competition among firms, and firms shall be taken as a unit of analysis. By focusing on the perception, behavior and resources of firms, and on their strategy and organization including inter-firm networks, the entire picture of industry shall emerge. This is a standard method both in management studies and business history.

However, there is a perplexing issue, namely the diversification of firms. Diversified firms compete with a different set of competitors sector by sector. If a player participates in multiple events, how can one make a coherent analysis across different markets? This is not a marginal problem, because diversification is the central element for the modern corporation, as the classical studies by Alfred Chandler demonstrated. Even after the paradigm shift from integrated large firms to the networking among specialized firms, most multinationals and many internationally competitive medium-sized firms have multiple businesses in diverse sectors and segments. The diversification is even more prominent when we look at new challenges from the emerging markets. As a series of works in business history demonstrated, diversified business groups often have a dominant position both in mature and emerging economies (Colpan, Hikino and Lincoln 2010; Colpan and

Hikino 2017). Many of those studies discovered that resources and capabilities go beyond the boundary of single firms. Hence, even when we regard enterprise as the subject of competition, the setting of boundaries of actors and the unit of competitiveness are not easy issues.

One possible solution to this difficulty is a focus on earning power. By this view, an entire group is regarded as a unit to produce profit and it is treated as the unit of competitiveness, regardless of whether it is a diversified modern corporation or a family owned business group. As long as we position a company organization merely as a vehicle to produce profit, this approach has some validity.

Nevertheless, this approach is not the ultimate solution. Even in this case, one has to investigate competition in each individual sector to understand where the competitiveness resides, and from where the profit comes. Neither the competitiveness of diversified firms/business groups nor their earning power can be separated from the competitiveness of the firm (or a unit of it) in each sector (and their sum). Even if the economies of scope arise from the entire structure of the diversified businesses, the competitiveness of each section has to be investigated in each segment (Kurosawa and Nishimura 2016).

2.2 Triangle of Viewpoints: Industry-Firm-Location

The above-mentioned problem, namely the question of the unit of competition and the adequate framework of analysis, is a very basic issue. However, a clear and simple explanation is often missing and such omission makes debates in this field needlessly complicated. For this reason, I present a conceptual diagram to clarify the position of a variety of approaches (Fig. 0.1).

The diagram shows three viewpoints (enterprise, location [nation/region], industry) of studies on business and economies, together with multiple angles and related research questions. The levels of individual entrepreneurs, managers or workers are omitted for simplification. All of these angles can be applied both to static and dynamic analyses, or historical studies.

When one starts with an enterprise and asks where (i.e. location) it was founded and where it does its business, or how the enterprise connects multiple locations and markets, the viewpoints and angle of the question are shown by the arrow "1) Market/Location Strategy." The term "strategy" is used because enterprise is basically an actor with its own will and action. In addition, research on the geographical features of firms can be represented by the same arrow, even if it does not directly question the behavior of the company.

Conversely, when one focuses on a specific location (or any geographical unit of location such as nation or region), and asks what kind of enterprises (whether domestic or foreign) exist in the location, what type of business they do, or what features they have, the angle of the question is shown by the arrow "2) Enterprise Landscape." For example, here we can categorize

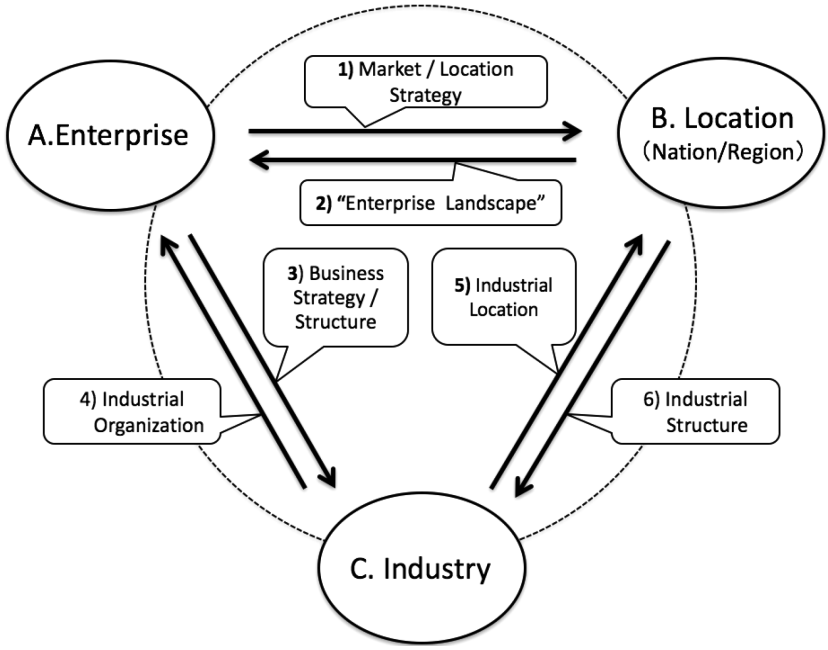

Figure 0.1 Triangle of Viewpoints: Industry-Firm-Location
Source: Designed by the author.

questions such as "Is German business characterized by small and medium-sized enterprises?"; "What was the function of the former bank-centered business groups in Japan?"; and "What are the advantages of start-ups in Silicon Valley?" Due to the lack of established terminology, we provisionally label it as "enterprise landscape."

Likewise, when one takes the viewpoint of enterprise and considers in which industry it does its business, or when one analyzes such a question as a third party observer, the angle can be classified as "3) Business Strategy/ Structure." The afore-mentioned issue of corporate diversification belongs to this category. Both business strategy theory and business history have long traditions to address this type of questions.

The opposite direction, namely the arrow "4) Industrial Organization" is the viewpoint to take an industry as the starting point and observe the players in it. Industrial organization as a research field treats both industry and enterprises as abstract and quantitative entities. Even so, besides this established discipline, other types of studies, which pay more attention to the actual and individual feature of the industry and the enterprises, can be also classified into this section.

There are two directions of questions also between "B. Location (Nation/Region)" and "C. Industry." Once one specifies a certain industry, it is possible to ask the following questions: "Where are production and consumption located?" and "Which nation or region is competitive in production or the coordination of production?" We can also inquire as to what type of geographical structure the entire industry shows (e.g. is it a competition among nations or that among globally integrated networks? How are different locations connected to one another and who controls them? What kind of national or regional feature does the industry have?) We categorize this angle as "5) Industrial Location," although the term is usually used in a narrower sense and not sufficient to encompass all these issues.

Lastly, "6) Industry Structure" exhibits an approach by which one specifies a certain geographical category and analyzes the composition or characteristics of the industry inside the territorial boundary.

In this book, we analyze the global competition by positioning industry (C) in the center. Enterprise (A) and location (B) are channeled through industry (C). Thus a chain of "A-C-B" emerges as the main target of our analysis. The reason is simple; though actors in a competition are enterprises and the global reorganization of industries is an issue of location, the actual venue of competition is industry. The logic of the research and analytical steps are as follows; each chapter takes one industry and examines its geographical features and historical development by applying the viewpoints of "5) Industrial Location." Each chapter also analyzes the composition and characteristics of major players in the industry ("4) Industrial Organization"). By so doing, we reveal the firm-level actions that led to the outcomes (angles of "1) Market /Location Strategy" and "3) Business Strategy/Structure"); The remaining angles of "2) Enterprise Landscape" and "6) Industrial Structure" shall also be discussed, as long as it has a significant importance for understanding the central questions.

3 Industry and Geography: A Compact Birds-Eye-View

3.1 Spatial Categories

The spatial framework and geographical unit also contain both conceptual and technical challenges. The conceptual challenge is obvious: the international division of labor and global value chains of many industries have witnessed a fundamental change since the publication of Porter's influential work on the competitiveness of nations (Porter 1990). However, it is not clear to what extent the classical framework should be modified. Both the introduction of historical viewpoints and the conscious review of the unit of analysis may remind us of old but often marginalized questions: How have industries been geographically organized in the first place, and what kind of spatial/geographical categories were appropriate? If the national framework is not sufficient for the analyses, what type of geographical unit are we

supposed to apply? The technical challenges in the geographical framework may seem less daunting, but they also require a series of systematic studies. Despite the massive amount of research on some industries, an overview of the global competitive landscape covering multiple industries is often missing.

For the first challenges, I make only a brief remark. Regarding the spatial unit of analysis, we are supposed to consider two types of special concepts. One is *territorial* categories, which have not only points and lines, but also spatial expansion. It has a boundary, though it can be unambiguous in some cases (e.g. the national economy), or blur more or less. Some territorial categories have the center-periphery structure, while others have only obscure ones. Many categories, such as small size industrial districts, sub-national regional clustering, national or supra-national economic areas can be classified into this. While the classical framework on the competitiveness of nations by Michel Porter was often mistakenly interpreted as the framework to emphasize only national units, his concept of cluster actually could be applied to the smaller or larger territorial unit. Hence, it is possible to discuss the industrial competitiveness of regional clusters, cross-border economic regions or supra-national regions, such as Europe or East Asia. Some chapters of this book will apply such an understanding to their analysis.

Another type of spatial category is *network*. It is constituted by specific locations/actors and relationships among them. In some cases, actors in such networks are only weakly bound to specific locations and thus have more mobility. However, even in such cases, economic activities tend to create some nodes in the network, which have more pivotal roles than others. If such nodes maintain their central role for a certain period, we can discuss the competitiveness of the location.

As for the second challenge, namely the task to provide an easy-to-comprehend overview of the global competitive landscape, the next section provides a tentative picture.

3.2 Geographic and Sectoral Distribution of the "Global 500"

Tables 0.1 and 0.2 show the geographical distribution of "Fortune 500" companies in each industry in 1990 and 2015. The regional classification is based on the headquarters of the companies.[1] These tables have serious constraints and they are subject to many biases. They show merely the position of large global firms and say little about the situation of entire industries. The inclusion into the "500" is based on revenues and it may have a large gap with market capitalization, profitability or competitiveness of those firms. Even diversified companies are classified into one industrial category and it may make any industry focused implication less reliable. The classification of firms and their revenues into each region/nation is merely based on the location of headquarters, thus neither the importance of each regional market nor FDI activities are reflected. From the perspective of our

book, this table has a strong bias toward the "firm centered view," and it emphasizes too much the importance of headquarter locations.

For example, "Aerospace and Defense" in Table 0.2 (2015) shows 11 firms (5 from North America, 3 from Europe and 3 from China). Although Russia, Brazil and Canada have internationally active airplane makers, their numbers and revenues are not counted in the table, because they are out of the 500 ranking. In addition, while Boeing procures many components from their suppliers in Japan and other countries, and Airbus (EADS) manufactures also in China, all of their revenues are counted in the US and Europe (Netherlands) respectively.

Nonetheless, despite such biases and constraints, these tables are still useful to know "Which part of the world has large firms in each industry?" or "In which industry European, North American or East Asian firms have a larger presence?" These tables show a remarkable stability over a quarter century. The world's 500 largest firms have been concentrated in three regions, North America, Europe and East Asia (469 in 1990 and 464 in 2015). It is surprising that the position of "the rest" has not improved at all, even after a spectacular development of "emerging economies" since the early 21st century. The position of the three major regions witnessed some shifting though. In 1990, North America had the top position (181), followed by Europe (164) and East Asia (124). In 2015, the ranking reversed: East Asia (183), Europe (143) and North America (138). The most dramatic shift occurred inside East Asia. In 1990, "East Asia" was almost synonymous to Japan (111), and only Korea (11) had some position, while China had no company in the ranking. In 2015, however, China (98) had almost double the number of firms than Japan (54), and South Korea (17) and Taiwan (8) also improved their positions. It is true that the majority of those Chinese firms are state-owned enterprises and most of them are largely dependent on the domestic market. Their large presence does not necessarily mean international competitiveness of those companies. However, it shows a fundamental transformation in the region: from the dominance of Japan to a more balanced structure including China, Japan, South Korea and Taiwan. In contrast, the intra-regional composition changed little, both in the NAFTA countries and Europe. In 2015, only three firms are listed from Mexico, and none from Eastern Europe.

How is the situation of each industry? The regional distribution of competitive sectors is stable. North America and Europe have a strong presence in the sectors of energy, consumer goods/household goods, chemicals, pharmaceuticals and aerospace. East Asia has kept its strong position in metals and in electronics related industries. Europe and East Asia improved their positions in automobiles. In IT and electronic devices, Europe's position is constantly inferior to North America and East Asia. The table for 2015 shows a strong position of North American firms in retail, and a larger presence of East Asia in wholesales (e.g. trading company). In East Asia, except for China's presence in "Mining and Crude-Oil Production," where

Table 0.1 Geographical and Sectoral Distribution of the World's Top 500 Companies (*Fortune Global 500*) in 1990

	Industries/ Sectors	*Revenue (Billion USD)*	*Number of firms ranked in*	*Regional Distribution of Headquarters of Fortune 500 Companies (Number of Companies)*					*Share of Revenue by the Regional Distribution of Headquarters (Share of each region by % and world as 100%)*				
				North America	*Europe*	*East Asia*		*Others*	*North America*	*Europe*	*East Asia*		*Others*
						Sub-total	*Japan*				*Sub-Total*	*Japan*	
1	Mining, Crude Oil Production	74	12	1	5	0	0	6	5	65	0	0	30
2	Food	378	46	21	12	10	10	3	47	35	12	12	6
3	Beverages	91	17	5	8	3	2	1	46	36	12	9	6
4	Tobacco	44	5	2	2	1	1	0	23	59	18	18	0
5	Soaps, Cosmetics	52	9	4	3	2	2	0	64	21	15	15	0
6	Textiles	53	12	3	1	7	6	1	19	6	66	57	9
7	Forest Products	139	26	15	5	5	5	1	68	14	13	13	5
8	Petroleum Refining	759	52	16	14	12	7	10	45	34	12	8	9
9	Chemicals	381	50	17	23	9	9	1	31	55	13	13	1
10	Pharmaceuticals	94	17	10	5	2	2	0	62	28	9	9	0
11	Rubber and Plastics Products	53	8	2	3	3	3	0	26	39	35	35	0
12	Building Materials	81	16	3	8	3	3	2	13	67	13	13	7
13	Metals	307	38	10	18	7	6	3	16	57	21	19	6
14	Metal Products	84	18	3	8	7	7	0	19	35	47	47	0
15	Industrial and Farm Equipment	180	27	10	9	8	7	0	31	39	30	28	0

16	Scientific & Photographic Equip.	71	7	4	1	2	2	0	78	7	16	16	0
17	Electronics, Electrical Equipment	589	46	17	11	18	15	0	26	25	49	39	0
18	Computers	177	18	10	5	3	3	0	68	13	20	20	0
19	Motor Vehicles and Parts	745	42	7	14	19	18	2	38	31	30	30	1
20	Aerospace	157	17	11	6	0	0	0	77	23	0	0	0
21	Publishing, Printing	61	12	6	3	2	2	1	42	23	25	25	11
22	Others (Furniture, Apparel, Toys, Sporting Goods)	17	5	4	0	1	1	0	78	0	22	22	0
	Total	4,587	500	181	164	124	111	31					

Source: *Fortune Global 500*, in Fortune, July 1990. Compiled and classified by the author of the chapter.

Note 1) "North America" includes United States (168 companies) and Canada (13 firms). Europe includes United Kingdom (44), Germany (32), France (28), Sweden (15), Switzerland (10), Netherlands (8), Italy (8), Finland (7), Spain (5), Belgium (3), Norway (2) and Luxemburg (1). No firm from Russia is ranked in the list. Three firms from Turkey are classified in "others." East Asia includes Japan, China (including Hong Kong), South Korea, Taiwan, and South East Asian countries. However, in 1990, only Japan (111), South Korea (11), Taiwan (1), and Malaysia (1) had companies in the list and there were no Chinese firms. "Others" in 1990 include Australia (10), India (6), Brazil (3), Turkey (3), South Africa (2), Chile (1), Mexico (1), Venezuela (1), Kuwait (1), Saudi Arabia (1), New Zealand (1) and Zambia (1).

Note 1) "Industries/Sectors" are based on the original data of the "Fortune Global 500," except for "Others," in which three sectors are combined.

Table 0.2 Geographical and Sectoral Distribution of the World's Top 500 Companies (*Fortune Global 500*) in 2015

	Sectors and Industries	*Revenue Billion USD*	*Number of "500" Companies*	*Regional Distribution of Headquarters (Number of Companies)*						*Share of Revenue by the Regional Distribution of Headquarters (Share of each region by % and world as 100%)*					
				North America	*Europe*	*East Asia*			*Other*	*North America*	*Europe*	*East Asia*			*Others*
						Sub-total	*Japan*	*China*				*Sub-total*	*Japan*	*China*	
1	Mining, Crude Oil Production	1,242	25	2	3	15	0	15	5	16	24	47	0	47	13
2	Petroleum Refining	4,738	38	7	8	14	4	2	9	22	29	33	4	20	16
3	Energy (others)	1,063	22	7	5	6	0	5	4	27	31	20	0	17	22
4	Utility	1,273	22	2	10	9	3	4	1	7	40	53	38	10	0
5	Engineering, Construction	759	13	0	3	10	1	9	0	0	19	81	3	77	0
6	Household Products	934	18	9	7	1	0	0	1	51	39	5	0	0	6
7	Apparel	116	3	1	1	1	0	1	0	24	36	40	0	40	0
8	Building Materials	121	3	1	1	1	0	1	0	22	45	34	0	34	0
9	Chemicals	420	8	2	3	2	1	1	1	22	48	18	8	10	12
10	Pharmaceuticals	455	10	4	5	1	0	1	0	42	49	9	0	9	0
11	Metals	716	17	1	3	13	2	10	0	3	22	74	12	54	0
12	Industrials	837	19	5	5	9	5	3	0	22	28	50	30	14	0
13	Technology	1,879	32	12	2	18	6	3	0	45	4	51	15	9	0
14	Motor Vehicles & Parts	2,700	34	4	11	18	9	6	1	14	38	46	26	14	1
15	Aerospace & Defense	541	11	5	3	3	0	3	0	48	24	29	0	29	0
16	Telecommunication	1,220	18	4	6	6	3	3	2	35	27	36	18	18	2
17	Media	138	4	2	2	0	0	0	0	58	42	0	0	0	0
18	Shipping, Railroad	216	6	1	3	2	1	1	0	11	65	24	12	13	0

19	Other Transportations	630	14	6	6	2	0	2	0	47	39	15	0	15	0
20	Wholesaler	1,014	19	5	2	12	5	6	0	19	16	65	27	35	0
21	Retailing	2,435	35	16	11	6	2	3	2	58	26	12	5	6	5
22	Finance	3,868	62	15	20	17	3	14	10	25	33	30	3	26	13
23	Insurance: Life	1,791	31	8	11	12	5	4	0	20	44	37	19	13	0
24	Insurance: Property	1,059	18	8	6	4	3	1	0	47	38	16	11	5	0
25	Services	132	5	1	4	0	0	0	0	79	21	0	0	0	0
26	Healthcare	965	13	10	2	1	1	0	0	91	6	3	3	0	0
	Total	31,262	500	138	143	183	54	98	36						

Source: *Fortune Global 500*, http://fortune.com/global500/Compiled and classified by the author of the chapter.

Note 1) * "North America" includes United States (127 companies), Canada (11). "Europe" includes EU member countries, Switzerland and Norway, but does not include Turkey and Russia. "East Asia" includes China (98), Japan (54), South Korea (17), Taiwan (8) and South East Asian nations. Among South East Asian countries, Indonesia (2), Singapore (2), Thailand (1), Malaysia (1) have ranked companies. China includes Hong Kong. Among "others," Australia (8), Brazil (7), India (7), Russia (5), Mexico(3), Chile (1), Columbia (1), Saudi Arabia (1), Turkey (1), UAE (1) and Venezuela (1) have ranked companies.

Note 2) The original data of the *Fortune Global 500* has two levels of classification: "Sector" and "Industry." "Sector" includes one or multiple industries. In this table, both levels are used and some categories are merged, according to the aim of this book (see below for details).

Note 3) Details of classification adjustments; Categories from Nr. 1 to Nr. 4 correspond to the "energy" sector in the original dataset; "Energy (others)" in the table includes three industries in the original classification ("Energy," "Pipelines," and "Oil and Gas Equipment, Services"; "Household Products" (Nr. 6) includes the "Food, Beverage & Tobacco" sector and "Household Products" in the "Household and Personal Products" sector in the original dataset; "Industrials" (Nr.12) includes Industrial Machinery, Electronics, Electrical Equipment and Miscellaneous; "Technology" (Nr.13) includes the following industries: "Network and Other Communications Equipment," "Computers, Office Equipment," "Information Technology Services," "Computer Software," "Semiconductors and Other Electronic Components," "Electronics, Electrical Equipment," "Computer Peripherals" and "Internet Service and Retailing"; "Other transportations" (Nr. 19) includes "Airlines," "Mail, Package, and Freight Delivery"; "Retailing" (Nr.21) includes "Food and Drug Stores"; "Finance" (Nr. 22) includes "Banks," "Diversified Financials" and "Real Estate"; "Services" (Nr.25) is the sum of "Food Service," "Travel Services," and "Temporary Help" in the "Hotel, Restaurant and Leisure" sector. "Healthcare" (Nr. 26) includes "Health Care: Insurance and Managed Care," "Healthcare: Wholesalers," "Health Care: Medical Facilities" and "Health Care: Pharmacy and Other Services" in the "Healthcare" sector; however, it excludes "Pharmaceuticals" in the original category.

many Chinese coal producers are ranked, East Asian firms' strong presence is mostly limited to the industries in which Japan had a dominant position in 1990.

A comparison between the two tables reveals both dramatic changes and stability. A conspicuous difference is the range of industries in the two tables. The table for 1990 does not include firms in the sectors of utilities, telecommunications, airlines, railways and finance (banking and insurance and variety of services). This is partially due to the coverage of the original data, but it reflects more the outcome of privatization and the opening up of national markets. On the other hand, there is significant stability in regional advantages. Each region has a set of industries with stronger positions, and each has kept its positions for a quarter century. Similarly, though to a lesser extent, the position of each region in a given industry also shows some stability. Therefore, one may argue that we can discuss not only the competitiveness of individual nations, but also regions. Furthermore, this very tentative overview suggests the need for more historical and systematic studies with a longer term perspective. While the scope of this book is limited, quite a few chapters address this challenge.

4 Structure of the Book

This book is structured by industries, and each chapter analyzes a specific industry by reflecting the above-mentioned "industry-centered view." Some chapters observe the competitive landscape of the worldwide market (e.g. the chapter on watches and the chapter on the paper industry), while others focus on specific regions or nations, to exemplify the most essential phenomenon at stake in the industry. The analytical framework varies according to the nature of the industry. The scope of industry is also diverse and some chapters deal with a wide sector, while others analyze a small segment. The editors do not intend to compare this wide range of industries through a unified criterion. However, readers will discover both diversity and commonality among industries by reading through multiple chapters.

The book has three sections. The first section "*FDI and Global Competition*" focuses on multinational enterprises. The authors of this section concentrate more on the behavior of individual enterprises compared to authors in other sections. **Takashi Hirao** analyzes the "big three" firms of the global cigarette industry. The tobacco industry was mostly a business under monopolistic, state-control in many nations until the early 1980s. Since the 1980s, however, privatization, opening up of national markets, and waves of mergers and acquisitions redrew the competitive landscape. Hence, this is an industry to embody the globalization in the last three decades. **Dimitry Anastakis** sheds light on the Canadian automobile industry. Though often underappreciated, Canada's automobile sector was the world's fifth largest at the end of 20th century. With the absence of local car assemblers, the main driver for its development was the inward FDI by American firms, followed

by Japanese multinationals. The Canadian case exemplifies the impact of national policy, the importance of the cross-border economic region and the emergence of the supra-national geographical unit as the spatial framework of competition. **Shigehiro Nishimura** studies turbine production for power plants, a section of the electric equipment industry. The competitive landscape of this industry is marked by a century-long stability, and old players from US, Europe and Japan still enjoy their dominant position in the global market. This chapter focuses on the strategy of Japanese firms, by examining the process of technology transfer and firms' FDI activities. **Julia Yongue** deals with a small but important sector in pharmaceuticals, namely vaccines. Vaccines are a special medicine with a public-goods like function, and French companies have kept their advantages in this market. This chapter analyzes not only the competitiveness of French multinationals, but also the features of competition in the Japanese market.

The second section, "*Localized Knowledge as a Lasting Competitive Advantage*" elucidates three cases in which a certain region or nation has held the dominant position in the world market for a very long period. Three relatively unknown industries, namely water construction, publishing and functional chemicals for electronics are examined. The geographic scope at stake varies: the clustering in a sub-national region (water construction), a nation (electro-chemical) and supra-national region (publishing) are considered as the geographic basis for competitiveness. **Bram Bouwens** analyzes water construction industry, a special segment in the construction business, where the technology of dredging, landfilling and maritime engineering forms the entry barrier. A small region in the Netherlands became a world-class leader in this sector and has maintained its dominant position over centuries. In this case, the transition from the classic sense of industrial district to an industrial cluster equipped with close ties with multinationals was observed. **Nuria Puig** and **María Fernández-Moya** examine the book industry, one of the most important segments of the publishing industry. Interestingly, rather than US firms from world's largest book publishing market, European firms from nationally or linguistically fragmented markets became the dominant global players. This chapter addresses this paradox by examining the role of historical and geographic conditions, together with entrepreneurship and innovations. **So Hirano** deals with specialty chemicals for electronic devices. They are not visible due to their nature as intermediate goods, but are universally used in many products including smartphones. In this market, Japanese medium-sized enterprises have had dominant positions for many decades. Such stability shows a sharp contrast with the situation of end-products, where the catch up by Korean, Taiwanese and Chinese firms entailed the industrial decline of Japanese firms. This chapter elucidates the reason for this contrast.

The third section, "*Shift in Global Value Chains*" investigates the most powerful driver of globalization in recent decades, namely the transformation of value chains. What kind of geographic unit should be adopted to

comprehend the transformation of value chains and its impacts on competition? Did the unit of competition shift from the national economy to the transnational network? If a region keeps its dominant position even during such a transition, what was the mechanism that enabled the sustainable competitiveness? **Pierre-Yves Donzé** addresses these questions by focusing on the watch industry. In this case, the regional cluster in Switzerland maintained its dominant position for centuries, only with a short period of crisis, similar to cases analyzed in the second section. However, what is conspicuous in this case is the transformation of the character of the product (from precision instrument to fashion product) and the fundamental reorganization of the global production network. This chapter explains why Switzerland could maintain its advantage throughout the change. **Rika Fujioka** discusses a similar question by focusing on the retail industry dealing with apparel. Both department stores and fast fashion store chains are analyzed as actors in the competition, together with the role of apparel products suppliers in the emerging economies. A transformation of the value chain may have impacted not only the competition in the industry in question, but also in related industries, by reshaping the boundary of the industry. This chapter provides an eye-catching and insightful case for such a dramatic change. **Stig Tenold** and **Jari Ojala** elucidate how the European shipping industry surmounted challenges from new competitors by proactively reorganizing its value chain. Shipping is by definition a business to overcome distance, and it developed hand-in-hand with globalization. If a new form of global value chain contributes not only to the "latecomers" of the world economy, but also to the competitiveness of the old players, the mechanism in the background deserves special attention. **Takafumi Kurosawa** and **Tomoko Hashino** examine paper and pulp production, a typical "old" industry. While in this industry the national/supra-national markets still maintain a relatively high-level of self-sufficiency, an analysis focusing on global material flows can elucidate why some regions maintained their competitiveness and why others lost it. This chapter also demonstrates how customized analytical concepts can contribute to the explanation of the competitive landscape.

In the final section of the book, two co-editors, **Bram Bouwens** and **Pierre-Yves Donzé** provide conclusions by synthesizing the findings and implications of the analyses in the individual chapters.

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Note

1 By taking 500 firms in the "Fortune Global 500" as the total population, companies are classified into 22 (1990) and 26 (2015) industries and sectors. The third column "Revenue" shows the sum of revenues of the ranked in firms in

the industries. The fifth column "Regional Distribution of Headquarters" shows the number of firms in *Fortune Global 500* which has headquarters in each region and countries. The numbers for Japan (1990, 2015) and China (2015) are included number of "East Asia." The number of column "Share of Revenue by the Regional Distribution of Headquarters" does not show the share of regional revenue of the listed firms, but shows merely the percentage of aggregated sum of revenues of listed firms in each region to the one of total revenues of all listed firms in the 500 ranking.

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