

The Distribution of Economic Rent within Global Value Chains in Resource Management

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Abstract- This research paper covers the distribution of economic rent among different participants of a chains, as exemplified by global value chains in the resource management industries. Five hypotheses on the value-added distribution in a chain were verified: (1) The larger the company, the more market power and advantages in value-added distribution it has; (2) The integrator of a chain (focal company) has more advantages in value-added distribution than other participants of a chain; (3) Suppliers of intellectual solutions have more advantages in value-added distribution than producers of goods; (4) The closer the company to the end consumer, the more advantages in value-added distribution it has; (5) Companies controlling market of final goods (brand or entry to the local market) have more advantages in value-added distribution than their suppliers. None of the mentioned above hypotheses are verified in accordance with empirical data in the selected sectors of economies. At the same time, it has been verified that investments in Research and Development, per se, do not guarantee any privileges in the international division of labor; suppliers of key parts are those who have clear advantages in value chains; localization of production of end goods is not always the right thing to do.

Keywords: *global value chains, economic rent, aircraft production, pharmacy, value chain, resource management, value added, focal company, return on total assets, average salary.*

1. Introduction

Since the last quarter of the twentieth century, there has been a fundamental change in the system of international division of labor. As a result, the value creation concept was modified, which led to the international (geographical) division of production process. Whereas previously, raw materials, capital and final goods were predominantly objects of the international trade, now the delivery of intermediate goods and services is brought to the forefront in the international cooperation [1; 2; 3]. Therefore, there is a phenomenon of global value chains, which includes the full production cycle of goods or services allocated among companies in different countries. This covers research and development, design of a product, production of different components and final

products, distribution, marketing and after-sales servicing. Whereas in the 1980's and 1990's most economists used the term "value chain" [4], nowadays it is more common to refer to "value chains" [5]. In our view, the term "value chain" is more suitable. Within the last two decades, the main target for most companies in global chains was the so-called "promotion", i.e. performing more important tasks in the production process of goods, indicating a share of the collective efficiency – an economic rent for different participants of a chain [6; 7; 8; 9; 10]. The founder of Acer Company Stan Shih identified such level of importance at the different stages of production by means of the curve, showing the correlation between the production stage and value added. This curve was entitled "The smiling curve" and used by [11] while studying value added distribution in global value chains (GVC). According to their observations, the most profitable stages are allocated at the ends of a chain – i.e. R&D and after-sales service, and the least profitable ones (manufacturing) are placed in the middle of the curve (Figure 1).

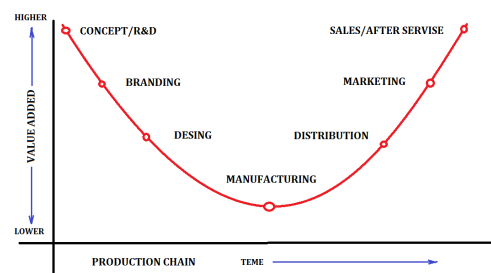


Figure1. The "smiling curve" of value-added distribution

In accordance with such an idea of the chain structure, [12], [11] defined the main types of upgrading within GVN with an objective to increase value added (Table 1).

Table1. Upgrading Trajectories

| Type of Upgrading | Description |
|-------------------------|--|
| Process | The increase in efficiency by means of synergy of production processes, management and technological upgrading |
| Product | The production of goods with advanced technological features |
| Stages of production | Movement to new higher segments in the supply chain |
| Chain | Changes in the whole chain for a shift to the new sector of economy |
| End market | Entry of firms into new end market segments, both industrial and geographical |
| Production technologies | Use of new technologies for lower costs |

Source: Korea in Global Value Chains: Pathways for Industrial Transformation, 2017

Recently, additional global processes have resulted in considerable changes in the system of world economy and international division of labor. Following the global crisis of 2008-2009, there are four main trends that influenced the dynamics of global chains development:

- Active consolidation of suppliers by the leading global firms for the optimization of general technological capability and the decrease in transaction costs of interaction;
- Reorientation of chains towards Asia both in terms of production and sales;
- The use of latest IT-technologies for interaction;
- The increasing role of service links in global value chains.

2. Literature Review

Since the end of the last century the liberalization of trade conditions, the development of transport infrastructure and telecommunication technologies caused structure changes in different sectors of economy, geographical fragmentation of production, and vertical specialization increase [13,14]. As a result, the majority of production processes took the form of global value chains. Decrease in costs by transferring some operations into the countries with relatively cheap labor force was one of the main factors for transnationalization of production [15]. Consequently, global value chains have been organized predominantly in labor-consuming sectors of economy, such as textile or electronics [16; 17, 18], and automotive industry [19]. Nowadays global value chains are the basement in the majority of sectors [20]. These changes were described in many research papers [21; 22; 23; 12; 24]. In fact, a new paradigm for the research of economic development was formed. It was considered as a transfer of global value chains to the segments with higher level of value added [14; 25; 26]. The specialization support in such segments is the target of economic policy both for developed and

developing countries. At the same time, the linear approach of value added creation is changing. Initially, global value chain concept was the consequence of actions, where participants interacted only with neighboring parts of a chain. The limitation of such description is especially noticeable for chain markets, where competitors contribute to the formation of the critical mass of consumers and value dynamics of online goods. The initial logic of value chain is correlated with the production of traditional products but without full reflection of value chain mechanism typical for the information goods [27]. The concept of chain organizations can be considered as the answer to the discrepancy of linear process of value creation to many economic realities [28; 29], competition [30], modular organizations [31], open innovations [32]. These concepts enlarge possibilities of analysis for value creation process, and the links between value chains and its environment. The development of value chains theory summarizes this concept, helping analyze some business models, which are not included in the chain. Many studies of value chain process cover the value-added distribution concept among the participants and the "Smiling curve" approach. The Smiling curve approach indicates the gap among salaries for labor force at the different stages of production process (the most qualified workers are located at the end of segments within value chain: research and development, sales and service [33]. There is a viewpoint that value added depends on the position of power for an economic subject. In accordance with [34], the rent of power, firstly, can be a result of costs transferring from the subject to the object of power. Secondly, the rent of power can be created by general decrease of costs, essential for the production and appropriation of goods. The value-added distribution in global value chains was first mentioned in the concept [11]. This concept is based on several approaches to fragmentation and coordination of production, including transaction costs [35], opportunities of chain coordination [28],

technological competencies [36; 21]. The following factors are considered as influencing the balance of power between partners in a chain and the value-added distribution: (1) complexity of a deal; (2) complexity of transferring requirements to suppliers; (3) abilities of a supplier to meet these requirements. Gereffi, Humphrey and Sturgeon [11] came to conclusion that the access of emerging countries to global markets is dependent on their participation in global production chains, supervised by companies with headquarters in developed countries. The participation of emerging countries in global chains provides both the access to global markets and the improvement of their positions in existing chains. In particular, [in 20] outline that the participation in global value chains provides an opportunity for producers to acquire new competencies, to improve their own production processes, to achieve stable and high quality of goods, and also to increase speed of response to the market changes. This modernization effect is especially important for producers launched into the market for the first time [37; 38]. Gereffi explains such transformation with “organizational succession” or the process, by which producers start producing for consumers of low market segment, and then for consumers with more complicated segments of a market [15].

2.1. Hypotheses

The participation in value chains has led to the effect of collective economic rent, which is distributed among participants of a chain. Accordingly, there are questions arising – how this economic rent is distributed among these chain participants? Who of them gets more and who gets less? Nowadays there are four viewpoints concerning who has an advantage in value-added distribution in a chain:

- 1) an integrator of a chain (focal company);
- 2) a supplier of intellectual solutions;
- 3) a producer of goods with higher stage of value added;
- 4) a supervisor for the market entry.

This research paper includes the following hypotheses for the value-added distribution among participants of a chain:

Hypothesis 1: The larger the company, the more market power and advantages in value-added distribution it has.

Hypothesis 2: The integrator of a chain (focal company) has more advantages in value-added distribution than other participants of a chain.

Hypothesis 3: Suppliers of intellectual solutions have more advantages in value-added distribution than producers of goods [39].

Hypothesis 4: The closer the company to the end consumer, the more advantages in value-added distribution it has.

Hypothesis 5: Companies controlling market of final goods (brand or entry to the local market) have more advantages in value-added distribution than their suppliers.

3. Methodology

Nowadays there are two main approaches to the evaluation of the total value-added distribution: the comparison of costs and retail prices of suppliers of final products and the evaluation of value added based on the “input-output” method. The first approach is based on the comparison of direct material costs of a supplier of final goods and the price of final goods. This can be shown using the example of iPhone X produced by Apple Inc. There are 43 companies from eight countries such as Taiwan, Japan, South Korea, etc., which are participating in the value chain for the production of this product. Two Taiwan companies organize the assembly: Foxconn and Pegatron, with Apple Inc. being the brand owner. There is a conclusion that the brand owner Apple company gets the largest share of value added, which is based on the comparison of retail prices for final goods (from USD 999 up to 1149 depending on the storage capacity) with the costs of parts and assembly (USD 370). However, this approach is not correct because of several reasons. Firstly, direct costs include not only the price of parts but also other components, among other things, salary. Secondly, nowadays, big companies have huge indirect costs, which sometimes are a lot higher than the direct ones. Thirdly, any company should recoup capital investments – i.e. investments in research and development, brand promotion, market research, interaction of all participants in the chain, scaling, etc. The second approach implies the evaluation of value added distribution by means of the “input-output” matrix. There is bottom-up and bottom-down participation in global value chains. In the first case, the analysis is carried out from the production of raw materials up to the production of final goods. The value added by sectors of economy is divided into the value added for the production of final goods distributed inside the country, and the value added of goods and services exported for the production of intermediate and final goods in other countries. In the second case,

GDP consists of the value added imported from other countries and the value added produced inside the country. Then the index of a country's total participation in global value chains and coefficients indicating the country's commitment in bottom-up and bottom-down participation in chains are calculated based on WIOD and TiVA data. The second approach is suitable for the evaluation of value-added distribution among countries. However, when it comes to value-added distribution among the chain members, this approach has some drawbacks. Firstly, not all international transactions take place in global value chains. If oil, gas and other natural resources are supplied to wholesale distributors, then this has nothing to do with global value chains. Secondly, different chains often intermix – hence it is impossible to indicate participants who belong to one particular chain; define their roles and the level of dependence. Thirdly, it is impossible to trace cooperation links inside one country. The authors of this paper have developed their own approach to the evaluation of value added distribution, based on indicators from financial reports and official salaries in companies, which are chain participants. The value added of a company can be measured as a sum of two values: operational profit and salary. However, the comparison of companies from different sectors of economy using absolute figures is not correct, because there are additional factors, such as the company size, capital and labor intensity, that influence these indicators. Therefore,

two relative figures are considered the basis for comparison of members of global value chains: return on total assets (ROTA) of a company and its average salary (W). Additionally two special indicators are computed:

1) relative return on assets:

$$R_i = \frac{ROTA_i}{ROTA_f}$$

Where $ROTA_i$ (%) is return on total assets in the company-partner i ; $ROTA_f$ (%) is return on total assets in the focal company.

$$ROTA = \frac{EBIT}{TA}$$

Where $EBIT$ (USD bn.) is earning before interests and taxes; TA (USD bn.) are total assets.

2) Relative level of a salary:

$$S_i = \frac{W_i}{W_f}$$

Where W_i (USD bn.) is average annual salary in the company-partner i ; W_f (USD bn.) is average annual salary in the focal company.

4. Findings

The first two hypotheses have been tested on the aircraft and automotive industries. These two industries have been chosen due to their diverse market forms. At the same time each of the industries is comprised of global value chains (see Table 2).

Table2. Aircraft and automotive industries

| | Market type | Market form | Degree of government regulation |
|---------------------|-------------|--------------------------|---------------------------------|
| Aircraft industry | B2B | Oligopoly | High |
| Automotive industry | B2C | Monopolistic competition | Low |

The civil aviation market is an oligopoly with four main players: Boeing, Airbus, Embraer and

Bombardier. Other companies account for only 7 per cent of the market (see Figure 2).

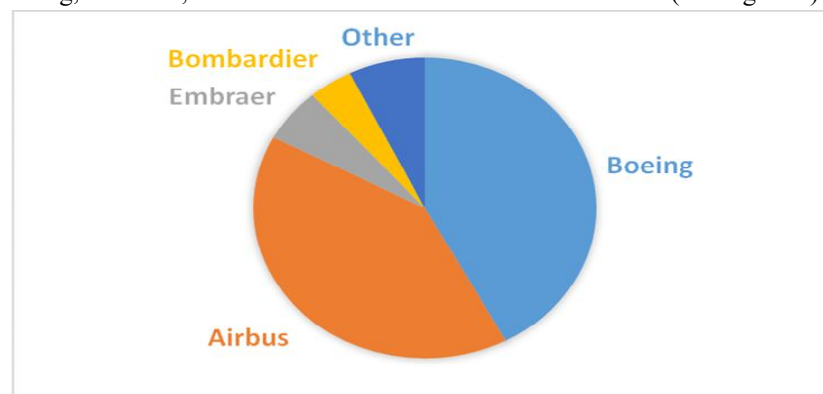


Figure2. Civil aviation market

The turbojet market has three major players that complete the full production cycle – GE Aviation (USA), Rolls-Royce (UK) and Pratt & Whitney (USA). The French company Safran Aircraft Engines

also has a significant market share, but it produces jet engines together with other manufacturers, most notably GE (see Figure 3).

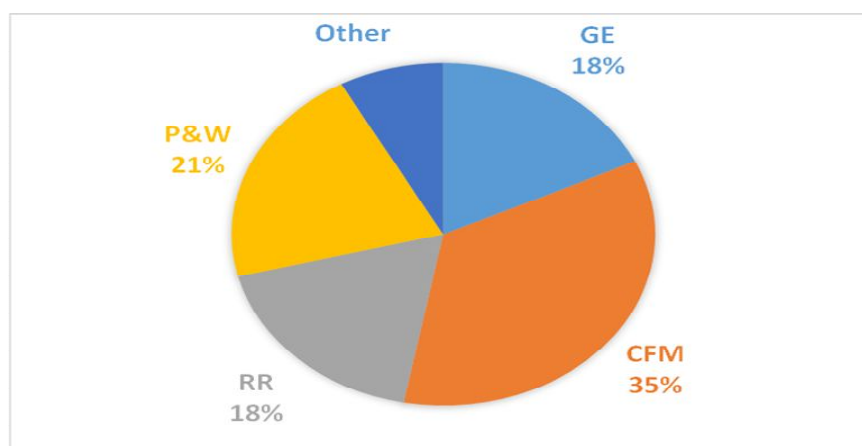


Figure3. Turbojet market

Four suppliers of other aircraft parts – Spirit AeroSystems (fuselage for Boeing), 3M Aerospace Sealants (insulation), Zodiac Aerospace (interior and electrics) and GKN (anti-icing systems) – have also been included in the study. The aircraft industry data

is given in Table 3. Information on EBIT and TA was found on the official websites of respective enterprises (average for 2015-2017). Information on salaries was found on the websites specializing in recruitment in respective countries.

Table3. Indicators of value added in the aircraft industry (average for 2015-2017)

| Company | EBIT (USD bn.) | TA (USD bn.) | ROTA (%) | Average annual salary (USD) |
|----------------------------|----------------|--------------|----------|-----------------------------|
| Boeing (CA), USA | 3.90 | 47.20 | 8.3% | 85,000.0 |
| Airbus, EU | 2.89 | 53.00 | 5.5% | 81,937.0 |
| Bombardier, Canada | 0.27 | 10.63 | 2.6% | 73,000.0 |
| Embraer, Brazil | 0.50 | 9.15 | 5.4% | 72,841.0 |
| GE Aviation, USA | 6.15 | 41.75 | 14.7% | 92,000.0 |
| Rolls-Royce, UK | 1.21 | 16.99 | 7.1% | 53,000.0 |
| Pratt and Whitney, USA | 1.37 | 23.36 | 5.9% | 88,000.0 |
| Spirit AeroSystems, USA | 0.72 | 5.34 | 13.5% | 73,860.0 |
| 3M Aerospace Sealants, USA | 7.33 | 33.69 | 21.8% | 81,867.0 |
| Zodiac Aerospace, France | 0.27 | 2.97 | 9.0% | 79,102.0 |
| GKN, UK | 0.23 | 1.54 | 14.6% | 76,000.0 |

Table 3 reveals that the first hypothesis is wrong. For example, the Boeing Company has a slightly larger market share and a much higher ROTA indicator than Airbus (8.3% vs. 5.5%). The ROTA indicator of GE Aviation (14.7%) is almost 2.5 times as high as that of Pratt and Whitney (5.9%), the company that has a

similar market share. Table 4 shows the same results for the automotive industry. Daimler has the highest ROTA indicator, although its market share (2.76%) is significantly lower than that of other car producers. Ford has the lowest ROTA indicator, although it has the third largest market share (5.83%).

Table4. Indicators of value added in the automotive industry (average for 2015-2017)

| Company | EBIT (USD bn.) | TA (USD bn.) | ROTA (%) | Average annual salary (USD) |
|----------------|----------------|--------------|----------|-----------------------------|
| Toyota Motor | 18.5 | 473 | 3.9 | 65,000 |
| Volkswagen | 15.5 | 531.4 | 2.9 | 66,000 |
| Daimler | 16.5 | 323.2 | 5.1 | 61,000 |
| General Motors | 8.7 | 218.7 | 4.0 | 82,000 |
| Ford Motor | 4.9 | 267.2 | 1.8 | 88,000 |
| Honda Motor | 7.8 | 181.9 | 4.3 | 64,000 |

Source: official websites of respective companies and <https://www.payscale.com/>

In order to test the second hypothesis we computed the relative return on total assets and relative salaries in the aircraft and automotive industries (see Tables 5 and 6).

Table5. Relative return on total assets and relative salaries in the aircraft industry (average for 2015-2017)

| Integrators | Boeing CA | Airbus | Embraer | Bombardier |
|----------------------------|-------------|-------------|-------------|-------------|
| Market share, % | 42 | 41 | 5.8 | 4.2 |
| ROTA, % | 8.3 | 5.5 | 2.6 | 5.4 |
| Average annual salary, USD | 85,000 | 81,937 | 73,000 | 72,841 |
| Partners | Ri / Si | | | |
| GE Aviation, USA | 1.78 / 1.08 | 2.70 / 1.12 | 2.71 / 1.26 | 5.75 / 1.66 |
| Rolls-Royce, UK | 0.86 / 0.87 | 1.31 / 0.90 | 1.32 / 1.01 | |
| Pratt and Whitney, USA | 0.87 / 1.04 | 1.07 / 1.07 | | |
| Spirit AeroSystems, USA | 1.63 / 0.87 | 2.47 / 0.90 | | |
| 3M Aerospace Sealants, USA | 2.63 / 0.96 | | 4.01 / 1.01 | |
| Zodiac Aerospace, France | 1.09 / 0.93 | 1.65 / 0.97 | | |
| GKN, UK | 1.77 / 0.89 | 2.68 / 0.93 | | |

Note: calculated using information from the official websites of the respective companies

Table6. Relative return on total assets and relative salaries in the automotive industry (average for 2015-2017)

| Integrators | Toyota Motor | Volkswagen | Daimler | General Motors | Ford Motor | Honda Motor |
|----------------------------------|--------------|------------|-----------|----------------|------------|-------------|
| Market share, % | 9.46 | 7.38 | 2.76 | 4.39 | 5.83 | 5.39 |
| ROTA, % | 4.8 | 7.3 | 3.9 | 1.9 | 1.2 | 5.6 |
| Average annual salary, USD | 65,000 | 77,970 | 64,410 | 82,000 | 82,000 | 64,000 |
| Partners | Ri / Si | | | | | |
| Robert Bosch GmbH, Germany | 1.3 / 1.3 | 0.9 / 1.1 | 1.6 / 1.3 | 3.3 / 1.0 | 5.3 / 1.0 | 1.1 / 1.3 |
| Denso Corp., Japan | 1.4 / 1.3 | 0.9 / 1.1 | 1.7 / 1.3 | 3.5 / 1.0 | 5.6 / 1.0 | 1.2 / 1.3 |
| Continental AG, Germany | 5.0 / 1.1 | 3.3 / 0.9 | 6.1 / 1.1 | 12.5 / 0.9 | 19.8 / 0.9 | 4.3 / 1.1 |
| Magna International Inc., Canada | 4.9 / 0.8 | 3.2 / 0.7 | 6.0 / 0.8 | 12.3 / 0.6 | 19.4 / 0.6 | 4.2 / 0.8 |
| Aisin Seiki Co., Japan | 3.9 / 1.1 | 2.5 / 0.9 | 4.7 / 1.1 | 9.7 / 0.9 | 15.4 / 0.9 | 3.3 / 1.1 |
| Siemens, Germany | | 3.5 / 1.0 | | | 21.3 / 1.0 | 4.6 / 1.3 |
| Toyota Boshoku Corp., Japan | 0.9 / 0.9 | 0.6 / 0.8 | 1.1 / 0.9 | 2.2 / 0.7 | | |
| JTEKT Corp., Japan | 1.5 / 1.0 | 1.0 / 0.8 | 1.8 / 1.0 | 3.7 / 0.8 | 5.8 / 0.8 | 1.2 / 1.0 |
| Lear Corp, USA | 2.8 / 1.1 | 1.8 / 0.9 | 3.4 / 1.1 | 7.0 / 0.9 | 11.2 / 0.9 | 2.4 / 1.1 |
| Valeo, France | 1.7 / 1.1 | 1.1 / 0.9 | 2.1 / 1.1 | 4.3 / 0.8 | 6.8 / 0.8 | 1.5 / 1.1 |

Tables 5 and 6 reveal that while paying similar salaries (S_i ranges on average from 0.8 to 1.3) integrators usually have a lower return on total assets than their partners (suppliers and contractors). In some cases, this happens due to a low ROTA indicator of an integrator (e.g. Ford). In other cases, this occurs due to a very high ROTA indicator of a supplier (e.g. GE Aviation). We can see that R_i – the ratio of a partner's ROTA to an integrator's ROTA is

usually greater than 1. Therefore, the second hypothesis is also wrong. The fourth hypothesis has been confuted as well – suppliers of key parts have a higher ROTA indicator than manufacturers of end products. The third hypothesis has been tested on the pharmaceutical industry. Table 7 shows ROTA indicators and average salaries of the largest pharmaceutical firms – i.e. developers and producers of drugs.

Table7. Return on total assets and average salaries in the pharmaceutical industry (average for 2015-2017)

| | Pharmaceutical Company | Market share, % | ROTA, % | Average annual salary, USD |
|----------------------|--|-----------------|---------|----------------------------|
| Pharmaceutical firms | Roche, Switzerland | 4.5 | 21.6 | 97,579 |
| | Pfizer, USA | 4.4 | 8.4 | 95,885 |
| | Sinopharm, China | 4.0 | 6.7 | 11,954 |
| | Novartis, Switzerland | 4.1 | 6.9 | 105,311 |
| | GlaxoSmithKline, UK | 3.4 | 8.7 | 94,194 |
| | Johnson and Johnson, USA | 3.4 | 13.7 | 92,226 |
| | Merck and Co, USA | 3.3 | 9.4 | 116,722 |
| Developers of drugs | Eurofins, Belgium | | 6.5 | 73,029 |
| | Laboratories Ranbaxy (Sun Pharma), India | | 13.9 | 21,958 |
| | Strides Shasun Limited, India | | 11.2 | 14,914 |
| | Shanghai Pharmaceuticals, China | | 4.9 | 2,366 |
| | WuXi Biologics, China | | 8.6 | 4,120 |
| Producers of drugs | Catalent Pharma Solutions, USA | | 7.4 | 93,596 |
| | GlaxoSmithKline Manufacturing, Italy | | 8.7 | 118,314 |
| | Sumitomo Pharmaceuticals, Japan | | 7.5 | 116,774 |
| | Petrovaks, Russia | | 31.9 | 10,363 |
| | BRISTOL-MYERS SQUIBB, Puerto Rico | | 13.3 | 88,601 |
| | Boehringer Incelheim Pharma, Germany | | 11.1 | 94,875 |
| | Polisan, Russia | | 18.8 | 5,811 |

Table 6 shows that the share of value added depends more on the company's country of origin than on its position in a value chain. For example, pharmaceutical companies from Russia have very high ROTA indicators and very low salaries. The

impact of differences in salaries on the value-added distribution can be seen in the diagram showing average salaries paid by Ford compared to average salaries in the industry in different countries of the world (see Figure 4).

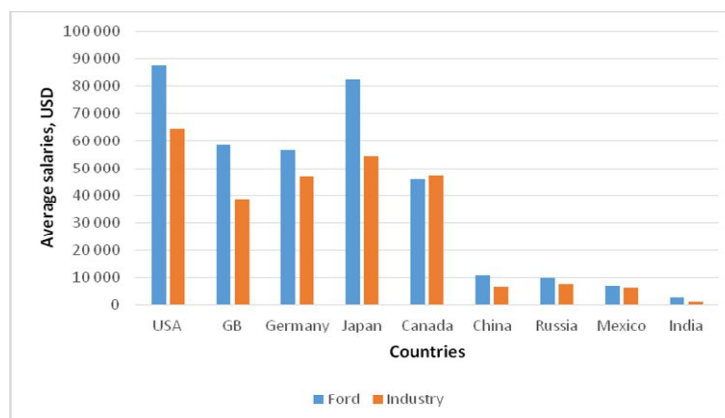


Figure4. Average salaries paid by Ford and average salaries in the industry in different countries of the world

This data also proves that control over market entry (see the fifth hypothesis) is not a definite advantage that affects the share of value added. Firms localize production in countries where their final goods are bought in order to overcome entry barriers (inter alia eliminate tariffs), reduce transaction costs and hire cheap labor force. At the same time, local firms do not get any advantages in the value-added distribution.

5. Conclusion

The paper examines the most popular hypotheses concerning the value-added distribution in global value chains. Every hypothesis has been tested on the aircraft, automotive and pharmaceutical industries. So far, neither hypothesis has been proved. Hypotheses concerning the value-added distribution in global value chains:

1. The larger the company, the more advantages in value-added distribution it has – wrong.
2. The integrator of a chain (focal company) has more advantages in value-added distribution than other participants of a chain – wrong.
3. Suppliers of intellectual solutions have more advantages in value-added distribution than producers of goods – wrong.
4. The closer the company to the end consumer, the more advantages in value-added distribution it has – wrong.
5. Companies controlling market of final goods (brand or entry to the local market) have more advantages in value-added distribution than their suppliers – wrong.

At the same time, it has been revealed that

- 1) average salary in a company's country of origin is the factor that influences value-added distribution the most;

- 2) Suppliers of key parts have an advantage in the value-added distribution (especially in the aircraft industry).

These results prove that:

- Investments in Research and Development, per se, do not guarantee any privileges in the international division of labor;
- Suppliers of key parts have clear advantages in value chains;
- Localization of production of the end goods is not always the right thing to do.

However, the collected data from three industries is obviously not sufficient for important conclusions regarding value chains. Therefore, it is necessary to test the hypotheses in other markets.

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