Production Outsourcing in the International Market

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The article is organized in four parts. First part is introduction. In this part the aim of this work, the research problem and objectives are formulated. The aim of this work is as follows: to use the methods of simulation, to examine the outsourcing, to show theoretical and practical aspects of the selected thesis, which have not only methodological, but the applicable value as well. The objectives of this work are: 1) to examine and to introduce the impact of the costs of transportation to outsourcing in the international trade, as well as to study the question of applicability and practice nationally and internationally; 2) to review and to introduce to the calculation of the impact of transportation costs of intermediate goods and the practical use as well;

In the second part of this article relationship of outsourcing and international trade in contemporary economy is analyzed and research hypotheses are formulated.

In the third part of this article production outsourcing in the autarky is analyzed.

In the fourth part of this article outsourcing in the international market like the results of study are analyzed. The problem solved in this paper is as follows: the existence of international outsourcing depends on 3 factors: (a) fragmentation and benefits of outsourcing; (b) transportation costs; (c) distance between the input producer and final product producer. As bigger is the advantage of costs and lower are the costs of transportation the outsourcing becomes more attractive in the case of free trade equilibrium.

After the execution of the analysis of costs of delivery of input from input producer to the final product producer, it is essential to consider, where the production of final product is developed. This information becomes very important making the decisions of investments.

Keywords: outsourcing, production outsourcing, input producers, international market.

Introduction

We live in the age of outsourcing. Firms seem to be subcontracting an ever expanding set of activities, ranging from product design to assembly, from research and development to marketing, distribution, and after-sales service. Some firms have gone so far as to become “virtual” manufacturers, owning designs for many products but making almost nothing themselves.

During integration and globalisation process, businessmen are more actively expanding the activities in other countries, starting with international trading and ending with international companies. Vertical disintegration is especially evident in international trade. Companies are looking for partners in some more technologically and politically developed countries or they are looking for low wages in poor economy countries. High vertical fragmentation is typical for modern industrial production. It is evident that there exists not only vertical fragmentation, because internationally the fragmentation of production is increasing, and it is reflected in trade growth of intermediate goods.

The research problem. At the moment scientists are actively analysing the trade of intermediate goods and authorized components termed as “vertical specialization” or “global production sharing”. This economic process has been formed because of rapid expansion in international specialization for a varied group of industries. It seems safe to tentatively conclude that the outsourcing of intermediate goods and business services is one of the most rapidly growing components of international trade.

The aim of this work. The purpose is to examine and introduce the impact of the costs of transportation to outsourcing in the international trade, the question of applicability and the practice nationally and internationally.

The objectives of this work are: 1) We can show theoretical and practical aspects of the selected thesis, which have not only methodological, but the applicable value as well. 2) To review and to introduce to the calculation of the impact of transportation costs of intermediate goods and the practical use as well. 3) Using the methods of simulation we can examine the outsourcing.

The research object is the impact of outsourcing in the international market.

Research methods used: The comparison analysis of literature, methods of simulation, statistical analysis.

The relation of outsourcing and international trade in a lateral-day economy.

A very high vertical fragmentation is typical for the modern production. Grossman and Helpman (2002) emphasize that each decreasing activity extent is guaranteed in different boundaries.

It is evident, that not only the vertical fragmentation exists, but the fragmentation of production is also increasing internationally, and is reflected in growth of intermediate product trade. International economics literature identifies a key role for both national (Burda and Dluhosch, 2002) and international outsourcing in the recent wave of globalization, therefore a very large role is played not only by the national (Burda 2002), but also by
the international outsourcing as well. In order to understand the company’s decision to use international outsourcing, that is to say the factors which determine the trade of intermediate goods, it is very important to examine the relations between the costs of transportation and the costs of services. However, the trading models usually ignore the barriers of trade contracting nationally (local transportation costs). Behrens (2003) considers that it is a very important difficulty and one of the most distinctive features, when international trading theory is compared to local trading theory. Ohlin (1968) emphasizes that the transportation of products locally and internationally is conditioned by economic activity localization, the geography of demand and the manner of trading. (Hendry, 1995). Consequently, geographical distance is concerned with inescapable cost of local transportation. Therefore, the searching analysis of national and international transportation costs in the world, where technologically the outsourcing is possible, is very important. For such analysis we will represent the model, which explains the dimensions of space between countries.

In this part we will introduce fragmentation and outsourcing into a linear model à la Hotelling. This allows us to identify compatibility and to explore its impact on the final goods trade pattern and the welfare effects of trade liberalization in a world with two asymmetrically sized economies. Such compatibility is conditioned by these two effects.

On the one hand, a larger population size leads to a higher degree of vertical specialization and, under autarky, to more intensive national outsourcing. This is a labour division effect, which was first mentioned in Adam Smith’s “Wealth of Nations”. It implies lower variable production costs in the case of outsourcing and, thus, an advantage of a (population-wise) large economy. On the other hand, empirical evidence shows that “on average firms facing larger markets are larger” (Kumar et al., 1999). Hence, if a population-rich economy is also geographically large, we can on average expect large geographical distances between producers and consumers of final output under autarky. This gives rise to a transport-cost related disadvantage of a (geographically) large economy.

The analysis starts with discussion about the layer effects of international openness market. As McLaren (2000), we can show, that disappearing trading barriers influences the structure of production that it is to say, companies are using integrated production method or the production based on outsourcing.

Any way, the achieved results clearly show, that outsourcing can determine the devastating business liberalization effects, which are concerned with high level vertical fragmentation of production of a final product. It is a new notice, which is opposite to the McLaren “law” to increase the outsourcing and should be particularly actual for the analysis of empirical trade liberalization effect.

To analyze this trade-off, we proceed in the following way. First, we set up a partial equilibrium model à la Hotelling with one final goods producer located at the centre of a linear economy.

The contribution of this study is to allow two different production technologies in a spatial model of trade. First, according Schachmurove and Spiegel (1995) and Tharakan and Thisse (2002), there is an integrated production mode, where the whole production process takes place in-house. Second, the final goods producer may fragment the production process and engage in outsourcing by purchasing intermediate inputs from an external supplier at arm’s length.

There is a sequence of five decisions that determines the autarky equilibrium.

See Figure 1 for a summary of these decisions.

As it was represented in the model, trade liberalization may lead to international outsourcing and, thus, to a change in the small economy’s mode of final goods production. In the long-run, when entry/exit and location decisions of input producers are endogenous, there may be entry of a further input producer and national outsourcing in both economies. This result coincides with findings by McLaren who emphasizes that market thickness effects lead to leaner and less integrated firms, when countries lower their trade barriers.

However, as it was made clear, competition effects may also make the single input producer attractive, and the integrated production in both economies is the outcome under free trade. This is associated with a negative efficiency effect, because the superior outsourcing technology is replaced. The possibility of such a devastating outcome is a new insight and of particular relevance, when measuring the gains of trade empirically.

In view of the analysis above, there is no clear-cut prediction regarding the long-run welfare effects of trade liber-
alization. If competition leads to an exit of the single input producer and, therefore, implies integrated production in both economies or if a second input producer enters the integrated market in the long-run, the outsourcing-related production cost advantage of the large economy vanishes.

The long-run effects of trade liberalization point to the relevance of outsourcing opportunities for welfare gains. Only if there is an outsourcing-related production cost advantage in the large economy, both small and large countries can simultaneously gain from trade liberalization without measures of cross-country redistribution. As a consequence, one may hypothesize that improved outsourcing opportunities from the 70s onwards play a key role in explaining the wave of trade liberalization observed in that period. And with regard to the economic success of the EU, the theoretical insights in this subsection suggest that better outsourcing opportunities for European firms can explain the pace of the European integration process.

In outsourcing of professional services, the set of relevant stakeholders involves include parties from both developed and developing nations. Now, companies in developing nations themselves are beginning to outsource to other markets to spread their labour costs.

The table below summarizes the key stakeholders.

<table>
<thead>
<tr>
<th>Outsourcing Nations</th>
<th>Host Nations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional service workers losing jobs</td>
<td>Professional service workers being hired</td>
</tr>
<tr>
<td>Firms hiring foreign labour</td>
<td>Firms providing outsourcing service</td>
</tr>
<tr>
<td>Legislators responsible for economy regulators</td>
<td>Policy makers responsible for economy</td>
</tr>
<tr>
<td>Government procurement</td>
<td>Citizens not being hired for professional services</td>
</tr>
<tr>
<td>Customers of professional services</td>
<td></td>
</tr>
</tbody>
</table>

The relationships between these stakeholders are complex. Professional service workers who lose their jobs to outsourcing and legislators who are faced with the impacts on labour and economy must create a new economy reform program with the short-term impact.

No one is trying to challenge the economic benefit and no one is amazed, that in more and more activities the outsourcing is used. Paret law declares, 20% of pains determine 80% of result. R. Koch who expanded this theory, predicates that mostly 20% of activity brings the mainly profit to the company. Such new company, which acts only in well known sphere and transfers other works transfer other company, may be called a virtual company. Externally it looks as a full company, but internally it is empty, except the brain. Outsourcing educates the dilemma of a producer to produce or buy the inputs used in production. This is concerned with the questions of price reduction and quality.

Very often people are seeking, that more work could be done by suppliers; that can be called reverse disintegration. But it can be done by transferring a part of activity to customers as IKEA Company did. A typical internet bank let us pay our bills by ourselves that is direct disintegration. If we will look to the company as to the set “Lego” cubes, essentially for each part of organisation, it will be possible to consider itself the position in the process of creation of all organisation. Earlier it was a sum question – integration. Now the attention turns to subtraction actions – disintegration. (Bagdonas and others 2000).

Production outsourcing in the autarky

In the case of production outsourcing, company transfers a part or the whole cycle of production chain processes to some other company.

For example, it is possible to examine the general production and trade equilibrium model, in which one industry branch companies are outsourcing specific activities from other industry branch companies. Such companies are looking for partners, who technologically are ready to satisfy its needs. In this situation the possible solutions of companies unite three modern outsourcing strategy features, which are substantial according our assumption:

- Companies must find a partner, who lets perform some needed specific kind of activities.
- Those companies must convince the potential suppliers to produce products according to specific orders or their needs.
- Outsourcer must arouse the investment of some needed specific partnership at the environment of not finished contract.

The first subject of outsourcing distribution – the size of market. Companies outsourcers must be sure, that there is a real possibility to find a suitable partner with experience, who could enable the need of specific preparation of inputs or services to the needs of a final good producer. Second, the methodology of search impacts the costs and chance of finding a suitable partner. The search will cost lower and will be more successful in a market, where infrastructure of communication and services is well developed. Third, the technology for specific components impacts the wishes of partner to undertake the investment which is needed for the prototype.

In order to prove the substantial factors, which determine the decision to outsource or to continue the integrated production, we will analyse the example of Lithuanian company cooperation with a Swedish company. For 15 years the company was pursuing 100% integrated production of typical final product stone crushing machine. For the first 5 years the company was producing 10 products per year. Because the product is technologically complicated, a lot of operations are needed for the production, which is made by high qualification workforce.

For the last years the demand of the market increased very much and the average need of final products “stone crushers” increased to 50 units per year. Because of this situation company had to increase the capacities and to expand the production. During the last year meeting of shareholders it the management of the company and shareholders decided to change the strategy of production. It was decided to increase the capacities of production, by developing the technological sectors, creating the largest surplus value of final product and the production
of metal structure of mechanism to outsource to some specialized metal processing company. Therefore the main three tasks were pointed:

- to find some proper qualified partner;
- to coordinate the technology of production;
- to analyse all the economic factors, which are concerned with decreasing of costs of integrated production and maximization of profit of final product – “stone crasher”.

In order to analyse the possibilities of production outsourcing of the input – metal structure, we will evaluate all the economic qualitative and quantitative factors, which can determine the decision of final producer.

The decision of final producer is determined by economic, technological and qualitative criteria. Economic criteria are the most important for final product producer. In this case final product producer must evaluate if it is worth to continue integrated production, or it is better to outsource some resources from an input producer. Therefore the final producer must intend the marginal price, which can be paid to an input producer. This situation can be determined as follows:

\[ c_i \sim A_{\text{max}} \]

The maximum price of input will be marked \( A_{\text{max}} \), for which the final producer will buy the input still. \( c_i \) – the constant of marginal costs of integrated production (index \( i \)), where \( A > c_i > 0 \). In the case of outsourcing the final good producer uses one unit of input, which is bought from the input supplier (index \( u \)) to produce one unit of final product.

Input price, for which the input producer (index \( u \)) will be ready to produce for final good producer, will be marked \( c_u \). Transportation costs, which appear during delivery of input to final good producer, is marked \( t \).

The price which shall be paid to input producer, in case of purchasing the input is marked \( \rho \) and determined by equality:

\[ \rho = c_u + t \]

At the moment Swedish company capacities let produce 35-40 units of final products “stone crushers” and metal structures which are needed for them. The production costs for one unit or marginal price, which can be paid by final producer to input producer is \( c_i = 7500 \) €/pcs.

In this case the company must find a suitable qualification supplier, which could meet 4 main criteria:

1. It should be able to produce suitable quality metal structures: 50 units per year with perspective to increase the capacities 10 each year.
2. It should be reliable, financial strong and profitable working company.
3. It should be able to produce metal structures, for a price \( A_{\text{max}} = 7500,00 \) €/pcs. or for some more attractive price.
4. It should produce the metal structure for a price \( A_{\text{min}} = 5250,00 \) €/pcs. or higher price, because the lower price could mean that the production of input will not be implemented according to the suitable technology (such situation can be proved with reference, that in the same competition market the costs of material are \(~5250,00 \) €/pcs. (~65% – ~70% from final producer, which is in the same competition market).

In order to evaluate the situation in the market and to know the real possibilities of outsourcing, Swedish company has sent 25 inquiries, which could have an interest to produce this input. All potential input producers had got their commercial inquiries, in which the technical information was directed (product drawings and production technology) also the conditions of cooperation (production terms, quantities, transportation conditions and the terms of payment).

After the survey of the companies 18 quotations were obtained. The prices are represented in the second figure.

![Figure 2. The possibility of outsourcing of input in autarky](image-url)
For the purpose to better understand the decision of cooperation between final producer and input producer, the analysis of input producer must be performed, in order the final producer could act in the input market successfully or to develop the activity of production according to exclusive requirements.

To operate usefully in the market of inputs or to develop the production according exclusive orders, the input products producer must measure the costs of transportation, which run up during the delivery of inputs to the final producer.

First, in order to operate successfully in the market, input producer must sell his product profitably, getting the desirable profit margin. Only in this case the input producer will be able to perform and develop his activity in the market. The main condition of successful cooperation can be determined as follows:

\[ A_{\text{max}} > c_u > A_{\text{min}} \]

In this equality the price of input will be marked \( - c_u \), the profit of input producer \( - \pi \) and the costs of production \( - \chi^* \), and these rates will be determined as follows:

\[ \pi > 0 \quad \text{and} \quad \pi = c_u - \chi^* \]

In case of cooperation of input producer and final product producer, the costs of transportation must be measured as the constituent part of input production costs, because these costs \( t \) will influence the realization of input products in the market. This can be expressed by the formula:

\[ \rho = \chi^* + t + \pi \]

Because all the input producers are located in the same competition market, the costs of production and the desirable profit margin are in the similar level. Let’s say, that each producer expects to earn ~15% as a profit margin. Also we accept the assumption, that because of the same reason all these producers have very similar production costs.

After evaluating the level of competition the table was created, in which firstly the average market price of input was calculated. \( (c_u \text{ average} = 6900 \text{ €/pcs}) \). If all these producers will earn the profit margin of ~15%, then average costs of input will be \( \chi^* \text{ average} = c_u \text{ average} * 0.85 \). Consequently, the average costs of product will be \( \chi^* = 6900 * 0.85 \).

With reference to a la Hotelling model, we accept the assumption, that the final product producer is located in the centre of the country. All potential suppliers are located in all the country. The largest distance (Sweden) runs til ~1500 km, therefore the final product producer can be far-off, about ~700 km. Because the market price of one kilometre of transport which is needed for transportation of the product runs up to 1,1 €/km, the transportation costs dependence on the location of input producer can be easily evaluated. The picture shows that as the input producer is located far the costs of transportation are larger and the price of input, which should be paid by final product producer is also larger. The illustration of the situation is imaged in Figure 3.

![Figure 3. The analysis of input producers](image)

The figure shows, that the closer is the input producer to final product producer the lower is the price of input. So we come to the conclusion that the most profitable thing for the input producer is to establish itself as close as possible to final product producer. In this way the largest margin of profit can be expected.

**Outsourcing in the international market**

As it was already mentioned, the first factor of outsourcing distribution is the size of the market. In this instance we will analyse the fundamental factors, which influence the decision of Sweden Company to outsource to abroad market. In this situation company outsourcer must be sure, that there is a real probability to find a partner, who will be technologically capable to produce the input and to quote some more attractive price than the potential input producers from the local market.

In order to prove all fundamental factors that determine the decision of final product producer to outsource or to proceed the integrated production, we will analyze...
the same Swedish company’s typical final product – “stone crasher” production.

With the purpose to evaluate the situation in the abroad market Swedish Company send 15 inquiries to metal processing companies, that could be interested to produce the input. All the inquiries were sent to EU companies, which are in the zone of free trade. After inquiring 12 quotations were received, and the which prices can be seen in Figure 4.

After the analysis of quotations, Swedish Company saw, that there is a real possibility to outsource the production for a more attractive price than in the local market.

Potential input suppliers (companies 3, 4, 5, 6, 7, 8) provided economically better quotations comparing with the integrated production model and the quotation of company no. 3 was even better local market prices. In this case it was clear that there is not only a real possibility to outsource, but also to lower the costs of production and to increase the profit margin.

Figure 4. The comparison of the price of input producers in autarky and foreign market

In order to more properly understand the decision of cooperation between final product producer and input producer, the analysis of input producers in Swedish market and foreign market is to be conducted. In this case we will compare the costs of both countries input producers’ costs, product prices and transportation costs, which are needed for the delivery of input to the location of final product producer.

Figure 5. The comparison of part of transportation costs in the price of input
The rates will be indicated as follows. All foreign input producers are located not in Sweden, but in the same competition EU market. Their production costs and the desirable profit margin are in a very similar level. Let’s say, that each producer expects the same ~15% profit margin as in the Swedish market. The assumption is accepted that being in the same market determines very similar production costs.

After evaluating the level of competition, firstly the average market price and average costs of input will be calculated. The latter runs up during the production of input $c_u$ average = 5800 €/pcs. and all of the will earn ~15% profit margin, so the average costs for one piece of input would be $c_u$ average = $c_u$ average * 0.85. Consequently, the average market costs would be $c_u$ average = 5000 * 0.85.

In autarky the final product producer is located in the middle of the country and national input producers are distant equal. In the international market or communicating with other country the input producers will be much more distant than some other local input producer. So it is possible to determine that as further is the input producer located, the lower are his production costs, because in some other way his price will be to high and will exceed the margin price $A_{max}$ of final product producer.

In order to better evaluate the influence of transportation costs to the price of input, the diagrams no. 6 and no. 7 will be represented. In one pair of diagrams input producer is represented as acting in the autarky and another in the international market. There are two diagrams in each pair and it is very easy to see the differences. In both diagrams of figure No. 6 autarky input producers costs are represented at minimum and maximum distance to final product producer location. In diagram which is on the right side transportation costs are 9% larger than the transportation costs of input producer that is in a minimum distant to final product producer, (the diagram on the left side).

![Figure 6. Structure of input price in the autarky](image)

Much larger difference is possible to see evaluating the situation in the international market. There the costs are ranging from 12% to 22%.

![Figure 7. Structure of input price in the international market](image)

The analysis made by simulation calculations showed, that in case of outsourcing it is very important to consider the distance between the input producer and the final product producer. Increasing distance determines the increase of comparative standing of transportation costs in the price of input. This inequality shall be paid by final product producer. Consequently, it will influence the decision to continue the integrated production or to specialize in the production, which crates the largest added value, by using beneficial costs of outsourcing.

**Conclusions**

- The accomplished theoretical analysis lets us understand, that outsourcing as the strategy of business has a possibility to exclude the importance of the branch competition. Company can choose the main critical areas, where the largest added value
of product is created and where there are unsub-
tantial services to outsource from suppliers. Such
process, when most of organization processes are
outsourced from outside is determined by eco-

- Outsourcing is more than buying raw material or in-
puts. It means the finding of suitable partner whom
which it is possible to create bilateral cooperation, and
to understand the importance of investment into pro-
duction of input. It is also important to find a partner
who is capable to produce the inputs corresponding to
the needs of final product producer.

- In many professional services the costs of activity
start are lower and do not require a huge capital
investment. This is usual for a typical production
scenario. These facts let the smaller companies en-
ter the new markets and keep a smaller number of
designers in autarky complemented by profes-
sional labour source from abroad. By using this
hybrid model they can compete more flexible in a
global market.

- The use of outsourcing determines the following
benefits: economic effectiveness, the effectiveness
of working hours, the use of nowadays technolo-
gies, developed competence in special areas, the
upraising of living standard.

- The outsourcing decreases the costs of company
and increases the productivity. In a long term both
individual companies and economy receive the
benefits because of decrease of costs and increase of
profitability.

- The existence of international outsourcing depends
on 3 factors: (a) fragmentation and benefits of out-
sourcing $C_1 - C_u$; (b) transportation costs; (c) dis-
tance between the input producer and final product
producer. The bigger is the advantage of costs
$C_1 - C_u$, the lower are the costs of transportation,
and the outsourcing becomes more attractive in
case of free trade equilibrium.

- Having carried out the analysis of costs of delivery
of input from input producer to the final product
producer, it is essential to consider, where the pro-
duction of final product is developed. This infor-
mation becomes very important making the deci-
sions about investments.

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Šiuo atveju galutinio gamintojos turi atsižvelgti į tarpinio produkto gamybą. Ši informacija tampa labai svarbi, nes galutinis gamintojas gali atlikti šį tyrimą, o tai yra papildyta dar kai kurią reikšmingą informaciją, kurią galutinis gamintojas gali gauti iš tarpinio produktų gamintojo. Taigi galutinis gamintojas turi nustatyti, kokius tarpinio produktų gamintojų šaltinius gali naudoti, kad gautų naudingą informaciją apie tarpinio produktų gamintojų galimybes ir atsakomybę. 

Vestutės

Tyrimo rezultatai. Apie 15 metų įmonė vykdė 100 % integruotą šio gaminio gamybą. Pirmasis išteklių nuomos paskirstymo veiksnys tarpinio produktų gamintojo yra tai, kad galutinis gamintojas turi nustatyti, kokius tarpinio produktų gamintojų šaltinius gali naudoti, kad gautų naudingą informaciją apie tarpinio produktų gamintojų galimybes ir atsakomybę. 

Išteklių nuoma

Apskaičiavimų ir analizės rezultatai parodė, kad galutinio gamintojo apsisprendžiamą sąlygą yra ekonominiai, technologiniai, kokybiniai kriterijai, ir yra tokių kriterijų, kuriuos galutinis gamintojas gali naudoti, kad gautų naudingą informaciją apie tarpinio produktų gamintojų galimybes ir atsakomybę. 

Efektyvus tarpinio produktų gamintojo apsisprendimas

Išteklių nuoma

Remiantis atlikta išteklių nuomos ir tarptautinės priklausomybės tyrimu galima pranešti, kad galutinis gamintojas turi nustatyti, kokius tarpinio produktų gamintojų šaltinius gali naudoti, kad gautų naudingą informaciją apie tarpinio produktų gamintojų galimybes ir atsakomybę. 

Tarptautinė gamybų ir investicijų strategija

Raktožodžiai: išteklių nuoma, gamybos širniai, gamybos paslaugos, tarptautinė rinka.