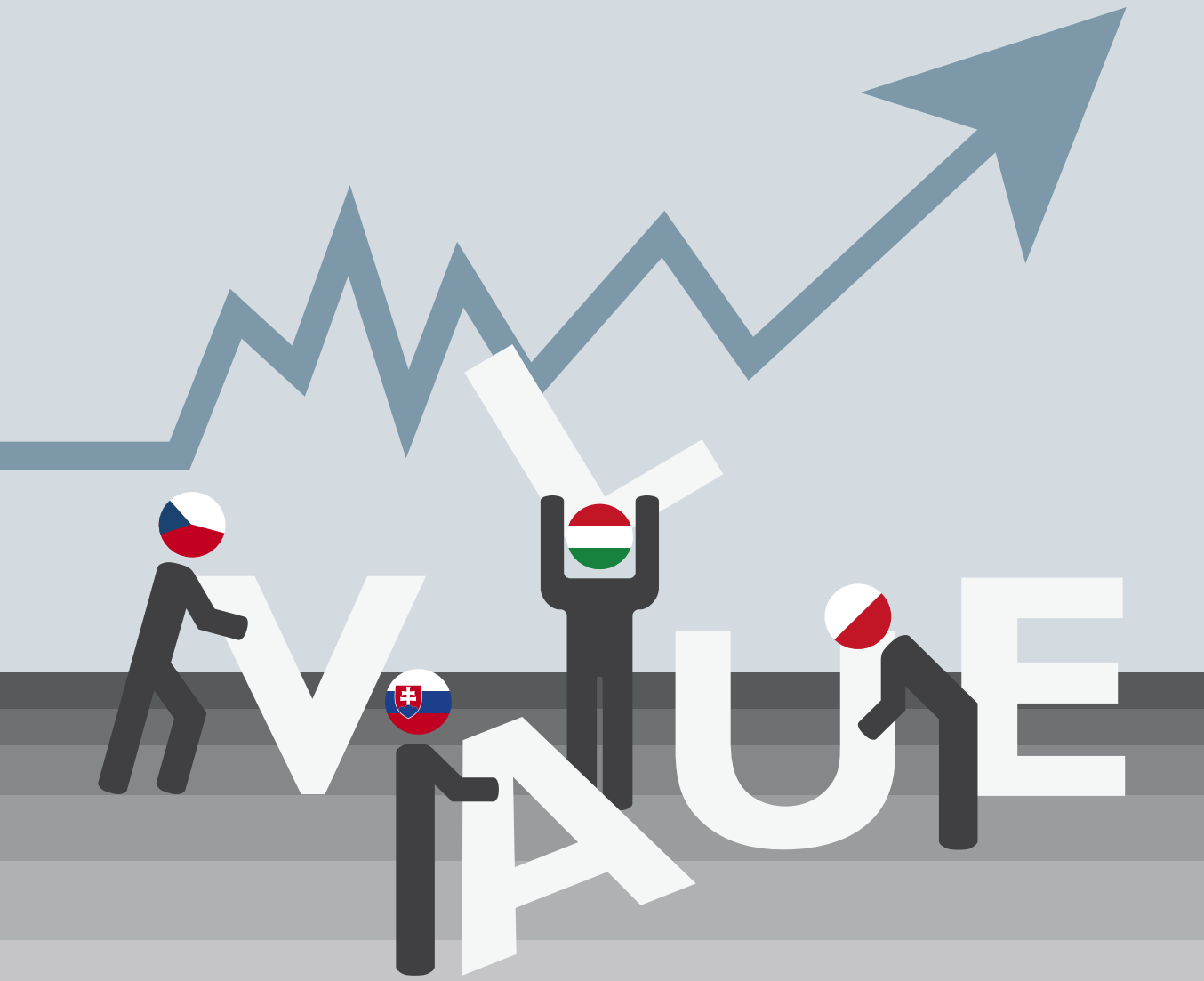
How to Benefit from Global Value Chains:
Implications for the V4 countries



Edited by Jana Vlčková

HOW TO BENEFIT FROM GLOBAL VALUE CHAINS – IMPLICATIONS FOR THE V4 COUNTRIES

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Jana Vlčková

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Foreword

The Central European, or Visegrad countries (Czech Republic, Hungary, Poland, Slovak Republic) have experienced dynamic social and economic changes since their transition. In the 1990s, this region became attractive for foreign direct investment, particularly from Western Europe and the USA. One of the features of the region is its strong export orientation and high participation in global value chains (hereafter: GVC). The position of a country in the GVCs affects its ability to produce and retain value, and thus also the degree to which it benefits from participation in GVCs. So far, little is known about the costs and benefits associated with participation in GVCs in the Visegrad countries. Most of the research has been based on case studies and surveys, and major attention has been given to the automotive industry.

In order to further map, the situation, we prepared a project under the Visegrad fund called "**Global Value Chains: Upgrading in the V4 Countries**". The aims of this project were, firstly, to discuss new data sources and indicators, their possible usage and limitations. The second aim was to analyze the benefits, potential and shifting role of individual V4 countries in the global value chains. Thirdly, the project's objective was to enable discussion among experts, scholars and policy makers from the V4 countries on these issues. This should contribute to knowledge sharing, and the exchange of experience of countries with similar developments relevant to trade, investment, innovation, and structural policies. An important question raised by the project is how to enhance upgrading of V4 countries within the GVCs. The integral part of the project was a conference "**How to benefit from Global Value Chains: Implications for the V4 countries**", which was held at the University of Economics, Prague, on May 9th, 2015. Apart from the project members who presented their research, other researchers, policy makers and stakeholders discussed the situation in the Visegrad countries, especially the possibilities for upgrading and policy implications.

This publication presents the results of the Visegrad project. Different methodologies were combined in order to assess the position of the Visegrad countries in GVCs and especially the possibilities for upgrading. This approach enabled us to get a complex view on this issue. The findings are summarized in five research papers. All papers focus primarily on upgrading, and include policy implications.

Assessing the position of the V4 countries (as well as that of other countries) in global value chains based on traditional trade data has been problematic. New

datasets such as TiVA by the WTO-OECD, or the WIOD, database have been developed only recently and their usage and interpretation raises new research questions. The first paper by Jana Vlčková "**Global Value Chains in the Visegrad Countries: Measuring GVC and Policy Implications**", explores how OECD-WTO TiVA data can be used for measuring GVC in Visegrad countries. Further, policy implications related to the participation of the Visegrad countries in GVC are thoroughly described. One of the conclusions of the paper is that both qualitative and quantitative methods are needed to assess the impact of GVCs on the Visegrad economies. The other four papers map the situation in individual Visegrad countries in various industries. In the paper "**Upgrading in the Global Value Chains: the Case of the Czech Republic**" Jana Vlčková, Tereza De Castro and Jarolím Antal describe the situation in the Czech Republic in several areas, including education, R&D and innovation, labor productivity or competitiveness. In addition, a case study of a company in the machinery industry is included. According to the authors, in most areas the situation in the Czech Republic has improved, although the rising share of foreign value added embodied in Czech exports and profit repatriations limit the value that is captured. The unstable regulatory framework, and mismatch between the needs of employers and the orientation of students have been identified as the major obstacle to upgrading. Andrea Éltető, Anikó Magasházi, Andrea Szalavetz and Gábor Túry describe upgrading in the heavy engineering and automotive industry in Hungary based on interviews in the paper "**Global Value Chains and Upgrading – The Experience of Hungarian Firms in the Heavy Engineering and Automotive Industries**". Their main finding is that there are differences among the firms regarding the extent of the upgrading, which depend both on the owner's global strategy and the type of final product being turned out. Furthermore, they suggest that upgrading is not a mono-directional process, therefore previously gained mandates can also be lost. Grzegorz Micek describes the software industry in Poland. The main conclusions of his paper, entitled "**Global Value Chains: The Case of the Software Industry in Poland**", is that there is mixed and uneven evidence of Polish software companies moving up the value chain. One of the main causal drivers of the inclusion of Poland into the GVCs of the software industry is the cost-capability ratio. In the last paper: "**Global Value Chains: Upgrading of the Slovak Clothing Industry**" the clothing industry in the Slovak Republic is examined by Rudolf Pástor and Eva Belvončíková. Despite the recent negative developments in the Slovak clothing production, according to the authors, the future of Slovak clothing industry upgrading is in further specialization, either with the focus on the production of clothes from technical textiles, or in production of at the higher luxury segment.

This project has contributed to deepening the level of cooperation between researchers in the Visegrad countries, as well as having yielded many new findings related to GVCs in the Visegrad countries. Furthermore, these findings and newly raised questions, have implications relevant for policymakers in the V4 countries. This topic is thus crucial for strengthening the competitiveness of Visegrad countries, and warrants more attention and further research.

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editor

Measuring GVCs and Policy Implications

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Abstract

The Visegrad countries are highly export oriented and integrated into the global economy. New measures are needed in order to assess the extent of their integration into the global value chains, as well as the benefits and costs that are associated with it. This paper examines the approaches to measuring Global Value Chains. The aim of this paper is to explore how OECD-WTO TiVA data can be used for measuring GVCs in the Visegrad countries. Furthermore, policy implications related to the participation of the Visegrad countries in GVCs are thoroughly described. These new datasets are highly valuable for assessing the extent of the integration into the GVCs, and enable international comparisons. Nonetheless, the construction of the input-output tables affects the results, therefore, the data need to be interpreted with caution, especially at the level of industries. Overall, both qualitative and quantitative methods are needed to assess the impact of GVCs on the Visegrad economies.

Keywords: global value chains, Visegrad countries TiVA, measuring GVC, policy implications

Introduction

Fragmentation of production, outsourcing and offshoring, or the impact of trade on wage inequality have been common topics for many years (e.g. Feenstra and Hanson, 2001; Baldwin, 2006, Blinder, 2006; Hummels and Klenow, 2006). Considerable attention has also been given to emerging markets, such as those of East Asia or Eastern Europe, and their increasing share in world production (Humphrey and Memedovic, 2003; Ng and Yeats, 2001 and others). Thanks to their economic transformation, industrial tradition and proximity to Western European markets, the Central and Eastern European countries have, over time, become important export platforms for the European market, especially for Germany. Many studies have been focused on the situation in the Visegrad countries (Pavlínek et al., 2009; Smith et al., 2014). Nonetheless, apart from the automotive industry, which is well mapped in all the V4 countries, the case studies do not allow for generalizations in other industries, or at national level.

Since the introduction of the OECD-WTO Trade in Value Added data (TiVA), and WIOD database, many research papers on global value chains have emerged which use these new data-sources. Attention is now given to where the

value comes from, who benefits from it and, in general, to the comparisons between individual countries (de Backer and Miroudot, 2009; Timmer et al., 2013). Constant changes in the patterns of trade and production require constant monitoring of these changes, as well as the making of adjustments to policies accordingly. This topic was rather neglected at government level until recently. This was mainly due to the unavailability of reliable data. Several summarizing OECD publications emerged such as **Inter-connected Economies** (OECD, 2013) and even governmental bodies started using these new datasets (e.g. Dupress and Dresse, 2013).

The Visegrad countries have attracted significant FDI inflows since the transition of their economies. Manufacturing, especially manufacturing exports, are highly important for these economies. Nonetheless, their production activities are often based on foreign inputs, and belong among the low or medium skilled activities sector (OECD, 2015). The governments of the Visegrad countries should therefore pay more attention to this topic, and follow closely the value added that is created, and remains, in their economies. This has further policy implications. The Visegrad countries should reflect these aspects in their policies which are geared towards maximizing the gains from GVC participation.

The aim of this paper is to explore how OECD-WTO TiVA data can be used for measuring GVCs in the Visegrad countries. Furthermore, policy implications related to the participation of the Visegrad countries in GVCs are thoroughly described. The paper proceeds as follows. In the first, theoretical, section, the GVCs and their role for the Visegrad countries is described. The second section focuses on measuring GVCs and upgrading. Major datasets and their problems are described. In the third section, TiVA data are used to measure GVCs in the Visegrad countries. Major findings, as well as problems with the data, are defined. In the fourth section, policy implications resulting from participation in GVCs are discussed. The last section summarizes major finding from the paper.

1. What are GVCs and why are they Important for the Visegrad Countries

Over time, the global value chains concept is getting more and more attention. With the increasing complexity of the world economy, and changes in the nature of the production, distribution and consumption, the GVC approach is more successful in capturing the fragmented production methods. Furthermore, this approach combines location specific comparative advantages with firm specific competitive advantages (Pavlínek et al., 2009). Global value chains are, in general, a sequence of production activities that are spread across more than one country (Kaplinsky and Morris, 2001). These include all activities

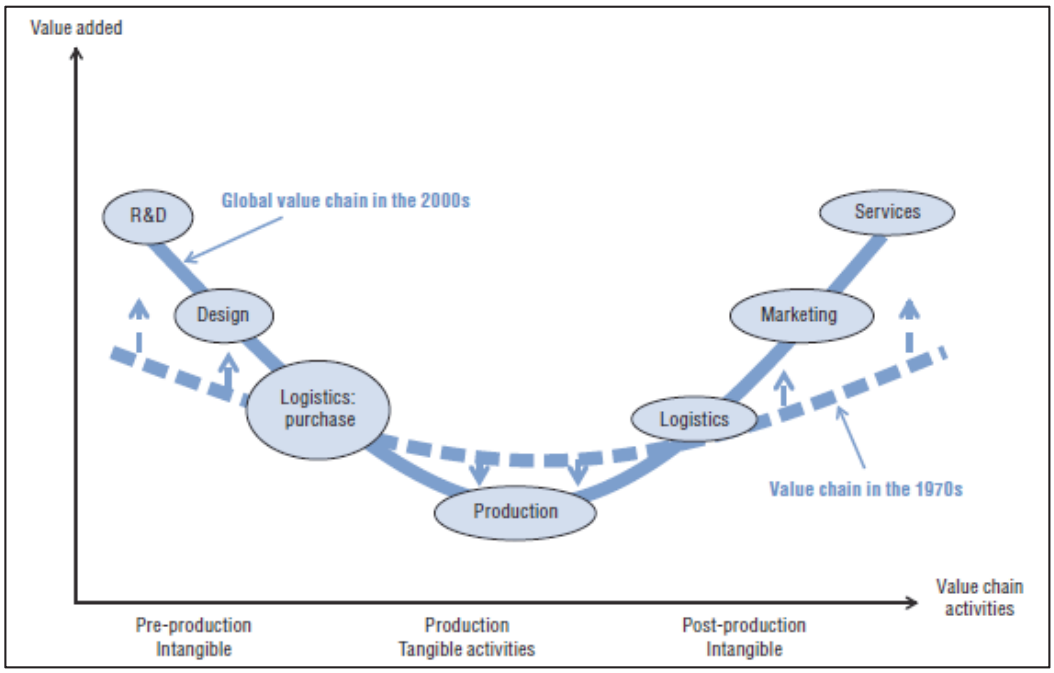
of the production process such as research and development, design, sourcing of primary products, production of intermediate products, final assembly, packaging, branding and marketing of the product. In addition, they are split across various geographic locations, often across different countries or even continents.

The value chains approach has attracted attention thanks to the work of Porter (1985). Since then, the global supply or commodity chains concept has become more widely used. These concepts focus on the steps which have been taken in the transfer of material from one place to its final destination; Gereffi (1994). Especially in economic geography, the global production networks approach dominates. This is because it captures the complex organizational and geographical network of production, distribution and consumption. Furthermore, it is not linear and encompasses all relevant sets of actors and relationships (Coe et al., 2008). In this publication we use the GVC approach, since we give the most attention to actors directly involved in trade, and those are firms linked to GVC. In addition, such organizations as OECD or UNCTAD use the GVC terminology. Nonetheless, the difference between the approaches is often negligible.

Fragmentation of production has been occurring for a long time. However, its extent has significantly increased. According to Miroudot et al. (2009), trade in intermediates accounts now for about 56% of world trade in the case of goods, and 70% in the case of services. GVCs emerged in East Asia as the regional supply chains of Japanese investors, and now they cover almost all countries and industries. GVCs are driven by technological progress and trade policy reforms. The liberalization and integration of East Asia, as well as the transition economies to the global economy have contributed to the rise of GVCs (Hilberry, 2011). Production is now spread across countries and regions in order to gather cost advantages to become globally competitive. Another specific feature is that the manufacture of a particular product in the GVCs often includes inputs from several industries, and trade is getting more intra-industry. Moreover, the configuration of GVCs is constantly changing, which makes it difficult to measure.

Value is created by the application of labor, technologies and organizational expertise to each stage of the production process, and it is a surplus over the costs involved in performing the transformations and transactions at each of these stages (Dicken, 2015). Services play an important role in GVCs. On average, around 40% of the total value added of industrial products intended for export originate in the service sector (Dupre and Dresse, 2013; OECD, 2015), although the situation differs between countries. In general, services incorporated in industrial products have higher value added.

Figure 1: The smiling curve: Value added along the GVC



Source: OECD, 2013

GVCs have both a positive and negative impact on particular economies, regions or social groups. This is mostly dependent on the characteristics of the economy and the nature of the GVC operations. Therefore, it is important to assess who benefits from trade, and in general the contribution of trade to countries' value added, income and employment. Activities located at the beginning and end of the value chain are in general those with the highest value added (see the smiling curve in fig. 1). Firms, regions and even countries strive to improve their position within the GVCs, and in this way they affect the value that is produced, created and retained. This process is called upgrading (Gereffi, 1999).

Four basic types of upgrading have been identified by Humphrey and Schmitz (2002). Process upgrading means improving the efficiency of production by either reorganizing the production process, or by introducing superior technologies. Product upgrading refers to diversification into more sophisticated, higher-value products. Functional upgrading refers to the situation where firms are acquiring new roles in the chain (and often abandoning existing functions), in order to increase the overall skill content and value added of the activities undertaken. Chain, or inter-sectoral, upgrading denotes a move into different sectors by using the knowledge derived from a particular chain. In general, product upgrading is, relatively speaking, the easiest, whereas functional

upgrading increases the value the most and is, therefore, the most difficult one (Gereffi, 1999). In practice, these types of upgrading, to a certain extent, overlap. Industrial upgrading refers only to the first three types of upgrading, with the exception of chain upgrading. Apart from "economic" upgrading, attention is now being given also to the impact of GVCs on individual workers. This is called social upgrading, and refers to the process of improving the working conditions and rights of workers, and getting a "better" job (Barientos et al., 2011). However, the opposite situation, i.e., the so called downgrading can also be discerned in firms, regions and even countries. It is not only important to distinguish between the different forms of upgrading, but also the different forms of governance of the chains (Humphrey and Schmitz, 2002).

1.1. The Situation in the V4 Countries

Over the past two decades, the Central and Eastern European countries have been integrated into the global economy. Due to their favorable position, stable political and economic environment, as well as their relatively cheap and well qualified labor force, the V4 countries have received large FDI inflows. In addition, the transformation was accompanied by neo-liberal market-based reforms. This has contributed to the introduction of policies and tools that make the job market more flexible, with lower engagement on the part of the trade unions (Pavlínek, 2004).

Several papers describe the situation in the Visegrad countries. The transportation equipment industry, as a group, is the biggest exporting branch of industry in all the V4 economies, except for that of Hungary (OECD, 2015). Overall, almost 20% of European passenger cars are produced in the CEE (OICA, 2015). Thus, the automotive industry attracts the most attention, and has been well mapped out in many papers (Pavlínek et al., 2009; Pavlínek and Ženka, 2011; Humphrey and Memedovic, 2003; Jürgens and Krzywdzinski; 2009….). To draw a general conclusion about the Visegrad economies based only on the data from the automotive industry could be misleading. However, other industries attract significantly less attention. For example, the software industry in Poland was covered by Guzik et al. (2008); while the clothing industry in the Slovak Republic is dealt with in the papers of Pickles et al. (2006) and Smith et al. (2014). The electronics industry in Hungary is examined in the papers of Plank and Staritz (2013), as well as of Sass and Szalavetz (2014).

In general, the Visegrad countries (especially their governments), stress the positive impact of FDI inflows on the export orientation of their economies (e.g. Czechinvest, 2015). Nonetheless, there are also many negative effects, including high dependence on foreign inputs, value outflow (mainly in the form of profit

repatriations), and greater vulnerability to global changes in demand, along with other adverse situations affecting local companies. Limited attention is given to upgrading. This is highly problematic, because the position of the firms in the GVCs affects the overall locational stability or instability of production in the Central and Eastern European countries (Pavlínek and Ženka, 2011). Additionally, the big role played by TNC's also means greater dependence on their knowledge, technology and capital. Thus, to increase the value added generated in the V4 countries, the local linkages are highly important. Nonetheless, the incidence of local linkages is dependent on the strategy of the TNC's, the nature of the economy, as well as the time factor (Dicken, 2015). Linkages are also relevant to technology transfers. Technology transfers and knowledge spillovers are dependent on the absorptive capacity of local firms (Cohen and Levinthal, 1990). In the V4 countries, the technology spillovers from foreign to domestic firms have been only partial because the absorptive capacity of domestic companies is limited. This is also due to the fact that most capable domestic firms were acquired by foreign companies (Pavlínek and Žížalová, 2014).

The types of governance of GVCs also affect the upgrading possibilities (Humphrey and Schmitz, 2002). Gereffi et al. (2005), distinguish five basic types: market, modular, relational, captive and hierarchical. For example, upgrading is more difficult in captive than in modular types of GVCs. In the Visegrad countries, GVCs dominate in the automotive industry. These are mostly quasi-hierarchical or captive value chains, which allow for process, or product upgrading. However, functional upgrading is much less probable due to the power of the lead firms over the rest of the chain (Pavlínek and Ženka, 2011). This limits the value that is controlled and retained in the Visegrad countries. The basic preconditions for upgrading are: a stable business environment, political stability and, above all, knowledge, skill base and education. In this respect the Visegrad countries face several problems, and their business environments remain their major stumbling block (for more: see chapter 4).

The V4 countries focus on manufacturing. The share of manufacturing to GDP belongs among the highest in Europe (ranging from 19% in Poland; to 23% in the Czech Republic in 2013 – World Bank, 2015a). Due to the high participation in GVCs, the labor market in the V4 countries is affected by the demand for specific skill groups. Due to the predominantly manufacturing orientation, the lack of synchronisation of industry's needs with the countries' educational policies might lead to problems regarding the availability of a suitably qualified labor force (see chapter 4). On the other hand, the service sector is under represented in the V4 countries, despite the fact that the percentage of services related value added exports, as part of the global value added exports, has increased at a faster rate than that of manufactured products

over the past 15 years. Service activities in general generate more value added than basic manufacturing and assembly. The stagnating share of services value added in the V4 countries exports is thus highly problematic. This topic is further elaborated upon in section 3.3.

2. Measuring GVCs

Growth in world trade over the past three decades was, to a certain extent, caused by the increase in trade in intermediate inputs, which, as a consequence overestimates the role of trade. Furthermore, traditional trade data do not catch trade figures in intermediate inputs. This leads to multiple counting. The gross exports were 32% higher than value added exports in 2011, whereas in 1995 it was only 22% higher (OECD, 2015). Intermediate products are often re-exported to their country of origin for further processing and export. The so called circular trade is particularly important between Mexico and the USA, but is also common in Europe and Eastern Asia. On average, the share of the re-imported domestic value added of gross exports is around 0.1–0.2%, but in some countries the number is much higher. For example, in the United States it reached 0.6%, and in Germany and China over 1% in 2009 (OECD, 2013). Trade in the value added approach applied in this paper allows us to distinguish between foreign and domestic value added exports, including the domestic value added which is embodied in imports from third countries. Traditional trade data do not distinguish between the industries that add the value, since firms also incorporate domestic inputs from other sectors of the economy.

GVCs are closely related to trade policies, more specifically to global imbalances or even market access and trade disputes. Trade imbalances based on value added exports are often much lower. For example, according to the WTO (2010), the US-China trade balance in 2008 would have been about 40 per cent lower if it had been estimated in value added terms. These findings are confirmed in a study by Koopman et al. (2010). According to them, China's trade surplus with the US would have been 41% lower and with the EU15 49% lower than in gross terms. Despite the fact that there were several political attacks against Asian, and especially, Chinese products, according to a study by the Swedish National Board of Trade, shoes manufactured in Asia incorporate between 50% and 80% of the value added in the European Union (The Swedish National Board of Trade, 2012).

There are many other reasons why measuring GVCs is important. It is often misleading to directly relate gross exports with domestic value added and national income, profits, wages or employment. Measuring trade in value added is important in order to identify the "real" sources of competitiveness in the

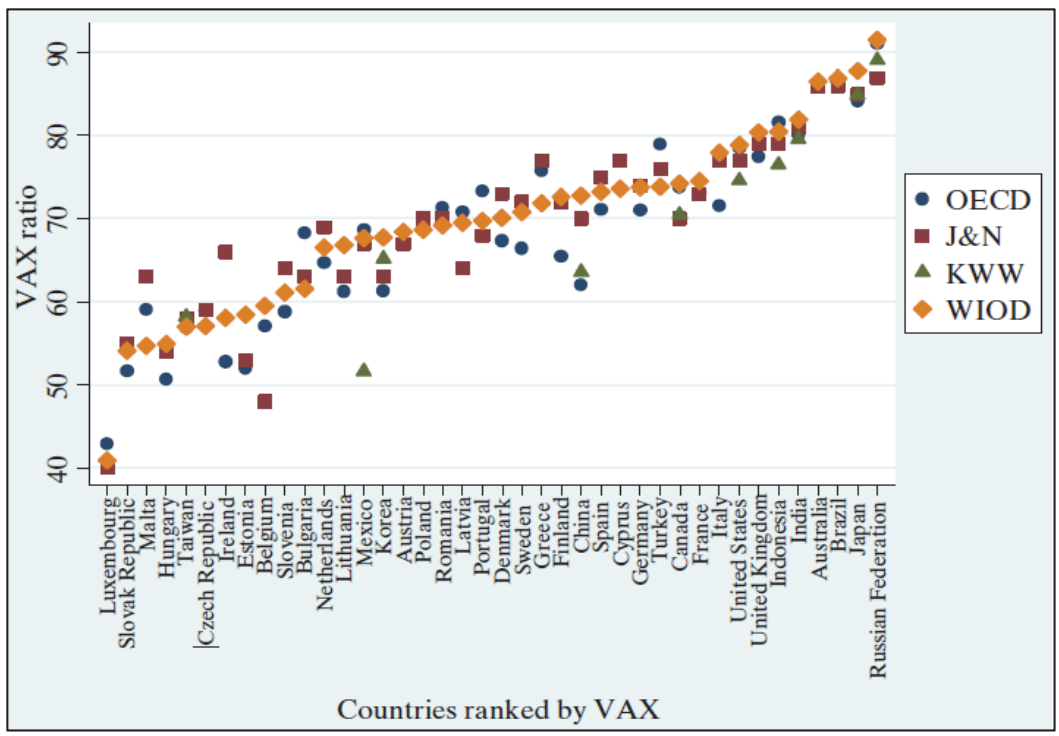
economy. Measuring the origin of the value added is also related to environmental protection. China has been widely criticized for environmental pollution by developed countries under the Kyoto protocol (the so called Annex I countries). Yet when looking at the consumption of products, and the CO2 emissions embodied in these products, the biggest polluters are the developed countries. In these countries, the reduction of emissions in Annex I countries is often offset by the relocation of production or import substitution (Ahmad and Wyckoff, 2003). Thus, better measures are needed to assess the benefits and costs associated with GVCs, especially since they are unevenly distributed across countries and social groups.

As Coe (2011) stated, qualitative methods predominated in GVC research. Either case studies based on firm-level analysis (e.g. Hummels et al., 2011), or highly detailed product trade statistics (e.g. Yeats, 1998; Feenstra et al., 1998) were used for mapping GVCs. Detailed trade data do not show how much value is actually generated or added in the region, though. Elaborate descriptions of measuring GVCs can be found in Amador and Cabral (2013). However, systematic research is needed in order to get an overall picture of how GVCs affect individual economies. This has been, so far, rare, due to the limited availability of data. Nonetheless, new datasets have recently emerged. These are based on input-output models which provide the most appropriate source of sectoral information, and are further merged with other statistics. Currently there are several datasets such as the OECD TiVA, GTAP, WIOD, UNCTAD-Eora, IDE-JETRO, and others.

The IDE-JETRO is a one-off project focused on US-Asian trade, and which covers 10 countries in 76 sectors for the years 1975, 1985, 1995, 2000 and 2005. The GTAP (Global Trade Analytical Project) is a dataset prepared by Purdue University, and is based on the Computable General Equilibrium model. The latest version (GTAP 8 Data Base) covers 129 regions in 57 sectors. The dataset is widely used in environmental research since it also includes energy and CO_2 emissions data. Despite its wide coverage, the underlying input-output tables are heterogeneous in sources, base years, and sectoral detail. The World Input-Output Database (WIOD) is a public database funded by the European Commission as a part of the 7th Framework Program. It includes world input-output tables for forty countries worldwide, and a model for the rest of the world, covering the period from 1995 to 2011. Moreover, the WIOD provides data on labor and capital inputs and pollution indicators at the industry level. The UNCTAD-Eora GVC Database is a "Meta" database which draws together many sources and interpolating missing points to provide broad, consistent coverage, and is especially suitable for data-poor countries (it covers 187 countries).

In earlier studies mostly GTAP was used (e.g. Daudin et al., 2011). With the emergence of WIOD and TiVA, researchers now more regularly employ the new datasets (Timmer, et al, 2013; Timmer et al., 2015, de Backer and Miroudot, 2013). Despite differences in the construction of these datasets, there are only slight differences between them, and in several papers both TiVA and WIOD datasets are being used (e.g. Baldwin and Lopez-Gonzales, 2013; Timmer et al., 2013). Timmer et al. (2015) compared value added exports in several datasets, and rank correlations were between 0.93 and 0.98 (see fig 2).

Figure 2: Value added Exports Ratios in 2004



Note: Value added export ratios refer to **ratio** of **value-added exports** to gross **exports.** The OECD refers to numbers taken from OECD Trade-in-value-added (TiVA) database, July 2013 version. J&N refers to numbers in Johnson and Noguera (2012a) and KWW to Koopman et al. (2014). The WIOD are authors' calculations based on the World Input–Output Database, November 2013 version.

Source: Timmer et al. (2015)

In this paper, a joint initiative of OECD and WTO - TiVA dataset is used. The dataset is based on the OECD Input-Output Tables, while additional information is derived from the Bilateral Trade in goods by Industry and

End-use (BTDIxE), International Trade in Services (TIS) and STAN industry databases. The dataset was first introduced in May 2013, and the data were updated in June 2015. Currently, the statistics are available for 61 countries in 37 industries for 7 years (1995, 2000, 2005, 2008, 2009, 2010, 2011), as well as covering 95% of global output, and over 90% of international trade. Nonetheless, there are several limitations with this dataset. The major limitations are the production and proportionality assumptions. Based on the production assumption for a given industry, all firms allocated to that industry use the same goods and services to produce the same outputs. The production assumption may lead to a downward bias for the share of foreign content, since the same coefficients are used for the production sold on the domestic market as for exports. This is especially problematic for countries largely involved in the processing trade such as China (e.g. Koopman et al., 2008; Vlčková, 2015). This is visible in Figure 2. Therefore, in the latest version, specially constructed input-output tables for China are used which differentiate between processing firms, other exporting firms, and those that produce goods and services intended only for domestic consumption. According to the proportionality assumption, the share of intermediate imports of products consumed directly, and those destined for export, is the same. Further problems are related to the confidential trade, re-exports other than from Hong Kong, identifying second hand capital goods and many others. Thus, the data need to be interpreted with caution.

Currently, the OECD, in cooperation with Eurostat, is working on a project called TEC (Trade by Enterprise Characteristics). This project disaggregates the values of imports and exports according to the characteristics of the trading firms. This should improve the quality of data. Furthermore, the OECD is working on estimates of the "Trade in Jobs"; exploring in more detail the types of jobs created via trade, as well as measuring the "Trade in Income" which should help us understand not only where value is created, but also where the profits flow (repatriation of profits within the TNC's).

New datasets are used to measure GVCs in particular economies. The most attention is usually given to the participation in GVCs, as well as to the share of foreign inputs in the countries´ exports. As regards upgrading, the situation is more specific, since upgrading is widely connected with firm level activities. Nonetheless, upgrading occurs at various levels: firms, regions, countries and even macro-regions. This paper concentrates on country level. The OECD TiVA and GVC indicators are most frequently used.

3. Global Value Chains in the Visegrad Countries based on TiVA Data

The Visegrad countries have integrated into the global economy, which is demonstrated by their high share of exports to GDP. To assess the importance of GVCs for individual economies, the participation index has been proposed. The OECD has also published other GVC indicators, which should help in assessing the position of countries in the GVCs. In other texts these indicators are presented to assess the situation in the V4 countries. Attention is given not only to the numbers, but also to the reliability of these indicators and their usage for measuring GVCs. The GVC participation is calculated based on the latest data, which are available up to 2011. Five year periods, are used, although 2011 is used instead of 2010 since it is the latest year available. Other indicators such as the length of the GVCs and number of production stages are calculated by the OECD, and are only available up to 2009. The role of services in the V4 countries, and other data used for measuring GVCs are also described.

3.1. Participation in GVCs

The Visegrad countries belong among the countries with the highest share of exports to GDP. Nonetheless, this number does not indicate, how much of the production, which is destined for export, is vertically fragmented. This has been measured by vertical specialization but it followed only the value of imported inputs which were contained in the overall exports of a country. Nonetheless, inputs are often produced in a country and further used in the exports of third countries. Therefore, Hummels et al. (2001) proposed the VS1 indicator which measures the value of exports that are embodied in a second country's export goods. Here, an indicator proposed by Koopman et al. (2010) is applied, which incorporates the previous measurements of vertical specialization, and value added trade. The participation index is the sum of the forward and backward participation indexes.

The participation index consists of two parts. The backward participation index is, in fact, the foreign value added share of gross exports (the indicator in the TiVA dataset), and indicates the share of foreign inputs in countries´ exports. The forward participation index measures the share of domestically produced inputs used in third countries' exports. It can be calculated by using the TiVA matrix, with fully decomposing value added in gross exports by the source industry, and the source country. This is achieved by adding up all the values for a specific country and industry of origin (in the exports of all other countries). The backward participation index is sometimes called the VS, while the forward participation index is called the VS1. The remaining part of the gross exports are domestic value added exports used to satisfy other countries'

domestic demand. This index can be further broken down to cover the industries.

Small economies, in general, source more inputs from abroad, and have greater levels of participation in GVCs. Therefore, the participation index is high for all V4 countries. Especially the backward participation index is high, whereas domestic value added exports, which cater to end consumers' demands of other countries are relatively low (1-participation index). The Czech Republic, Hungary and the Slovak Republic belong to the countries with the highest GVC participation among the OECD economies, with over 70% of gross exports. Mostly due to its bigger market, the participation index in Poland reached only 58% in 2011. Only in such countries as Luxemburg, Chinese Taipei and Singapore, the participation index is higher than in the Visegrad countries, and reaches between 75–80%.

Table 1: Participation index in the Visegrad countries

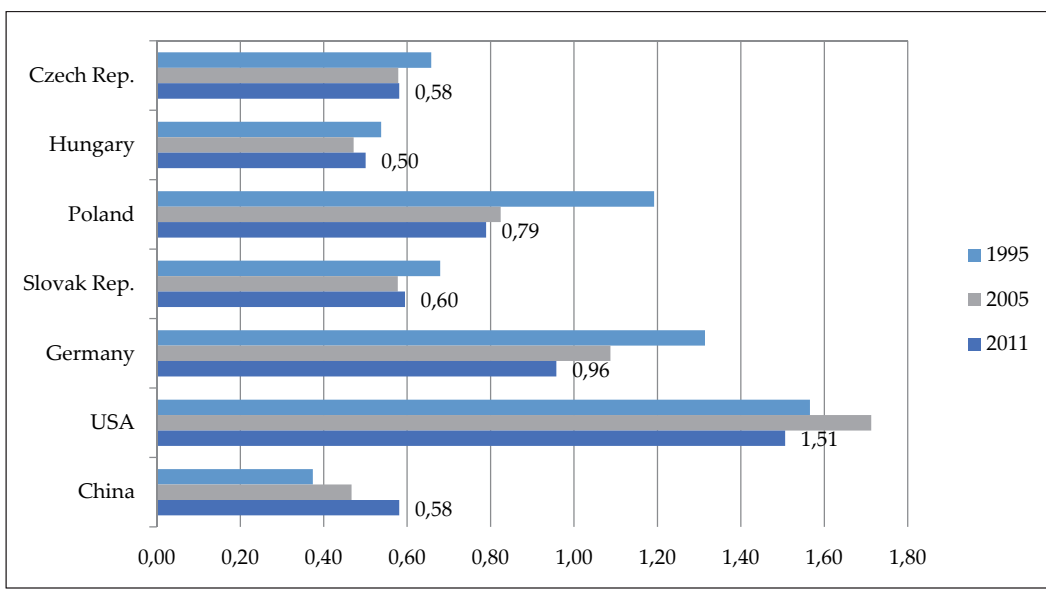
	Participation index			*Participation index - backward*			*Participation index - forward*		
Year	**1995**	**2005**	**2011**	**1995**	**2005**	**2011**	**1995**	**2005**	**2011**
Czech Rep.	50,7	67,2	71,6	30,6	42,6	45,3	20,1	24,6	26,3
Hungary	45,9	70,8	73,0	29,9	48,1	48,7	16,1	22,7	24,4
Poland	35,3	51,6	58,0	16,1	28,3	32,4	19,2	23,3	25,6
Slovak Rep.	53,6	74,4	74,7	31,9	47,2	46,8	21,7	27,2	27,9
Germany	34,4	44,5	50,0	14,9	21,3	25,5	19,5	23,2	24,5
USA	29,4	35,4	37,7	11,5	13,1	15,0	17,9	22,3	22,6
China	45,9	54,9	50,8	33,4	37,4	32,2	12,5	17,5	18,7

Source: OECD, 2015 (own calculations)

In terms of net value added from participation in GVCs, the forward index is higher compared to the backward index; the more a country exports domestic value added, the more it imports foreign value added. Due to its structure, the high forward participation index is common in countries that are located upstream in the chain. Therefore, the forward participation index is high not only in countries like the USA, which retains value thanks to activities such as design, R&D or branding, but it is also very high in countries exporting primary sector commodities such as Russia, Saudi Arabia or Brazil.

In the V4 countries the ratio between forward to backward linkages is rather low, but there are differences between countries (see fig. 3). Poland has the highest ratio (0.79), which is probably related to the size of its economy. In the Czech Republic, and the Slovak Republic, the ratio is around 0.6, while Hungary has a ratio of 0.5. This trend is more surprising. In most countries the ratio has decreased over time (indicating the rising importance of production fragmentation). In the Visegrad countries, the ratio remains relatively stable with a slight increase between 2005 and 2011. Only in Poland does the ratio decrease more significantly. In contrast to other countries, the pace of the changes as well as the ratios are small. China is a specific case as its ratios increase steadily. This has changed in the latest edition of TiVA. In the first version, the FVA in China's (backward linkages) reached 12% in 1995. According to the latest data it was 33%. Therefore, the data are highly dependent on the construction of input-output tables, and the data needs to be interpreted with caution. Furthermore, increasing domestic value added in exports does not necessarily equal upgrading and vice versa. As the UNCTAD report states: "…even countries with decreasing shares of domestic value added in exports may well be on an upgrading path, if they increasingly participate in GVCs that create higher overall value, or engage in GVC tasks and activities at higher levels of technological sophistication that generate more value in absolute terms, but at the same time depend on increasing the foreign content in exports" (UNCTAD, 2013, p. 172).

Figure 3: Ratio of forward to backward linkages in Visegrad countries



Source: OECD, 2015 (own calculations)

Participation in GVCs can positively affect production, employment and economic growth in the given countries. This is specific for industries, where the country does not have a comparative advantage in producing the final products, but has the locational advantages in production of its intermediate products such as low labor costs, possession of particular skills or factors like land etc. This seems to be the case with the Visegrad countries, where most of their intermediate imports (69% in Hungary and 47% in Poland) are further re-exported and this number steadily increases. Nonetheless, the positive (and negative) effects of participation are mostly dependent on the nature of the local economies, especially their knowledge and skill base, composition of the local labor supply and overall institutional framework (Dicken, 2015). This affects the embededdeness of TNC's in local economies which is crucial for increasing competitiveness and upgrading. In the Visegrad countries, the linkages were rather weak in the earlier periods, which contributed to the rising regional disparities (Pavlínek, 2004), but TNC's in the automotive industry are getting more embedded (Domanski and Gwosdz, 2009).

3.2. The Length of GVCs and the Distance to the End Consumers' Demand

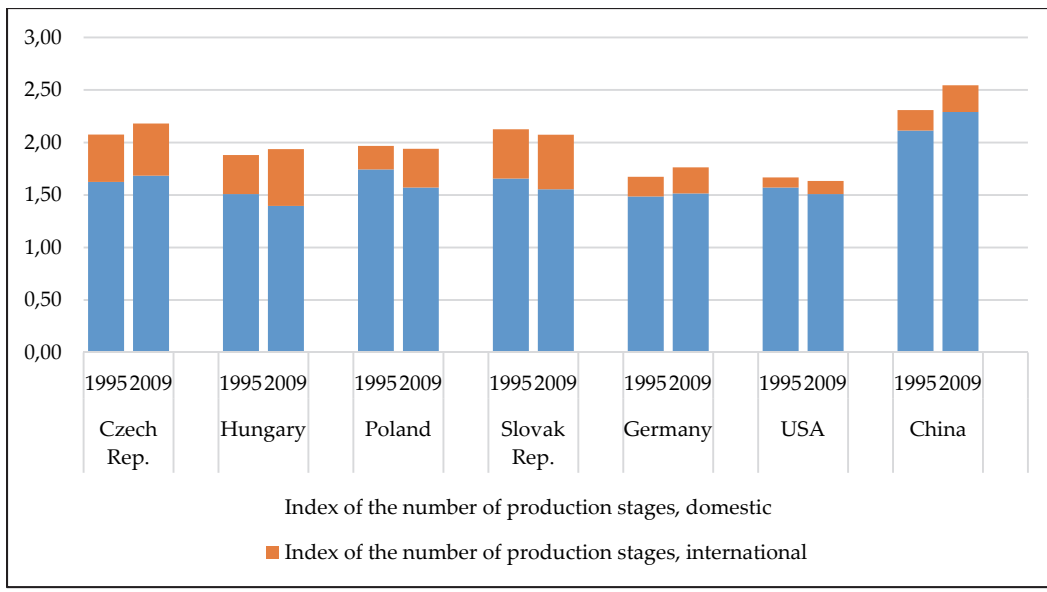
An indicator of the number of production stages in the chain called the "average propagation length" (APL) has been proposed by Dietzenbacher and Romero (2007). The OECD uses a simpler measure, presented by Antras et al. (2012) and Fally (2012). This index of the number of production stages is equal to 1, when there are no intermediate inputs. At the aggregate level, the number does not indicate the number of production stages, it is just an index. Nonetheless, the higher is the number, the more stages are present. This index also takes into account the domestic and international part. The difference between the participation in GVCs and length of the GVCs is that high backward participation can be caused by expensive inputs (e.g., raw materials), which indicate the importance of GVCs, not their length, since it might be a very simple value chain with a small number of production stages.

Globally, over the examined period, there has been an increase in the number of production stages in the international part; the domestic part has remained stable. Nonetheless, there has been a drop in the international part between 2008 and 2009 which is probably attributable to the financial crises, and changes in corporate strategies (lack of finance, re-shoring etc.). Whether this is a current trend or just a cyclical effect can only be verified by analysing the newer data, which are not yet available.

At the industry level, there are much bigger differences. As might be expected, the length of the chains is the shortest in industries like "education" or

"real estate", which are also predominantly domestic. The longest global value chains are in industries like "TV and Communications Equipment", "Motor Vehicles", or "Textiles, Leather and Footwear". Relatively speaking, the international part of the production stages is biggest for "Electrical and Optical Equipment", followed by "Transport Equipment" (de Backer and Miroudot, 2013). In general, low tech industries are less fragmented than high tech industries. However, the TiVA Length of GVC index shows that the "Textiles, Leather and Footwear" industry is more fragmented than some high tech industries such as "Electrical and Optical Equipment". This can be affected by the structure of input-output tables.

Figure 4: Length of GVCs 1995/2009 in selected countries



Source: OECD, 2015

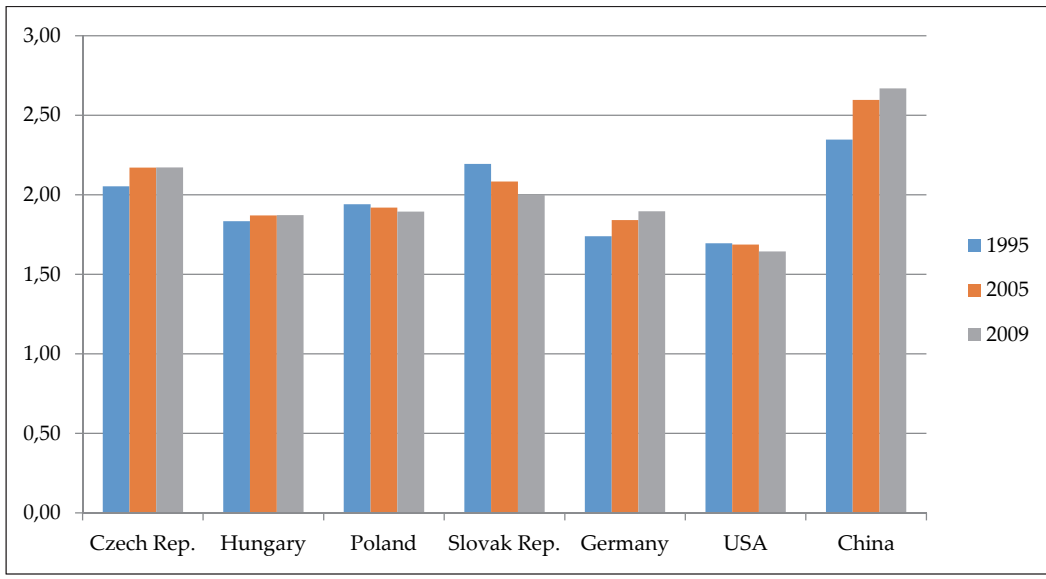
At country level the length of GVCs is a weighted average of the different industries and reflects the composition of those industries. As the figure demonstrates, the longest value chains are in China, the shortest are in Germany and the United States. This reflects the fact that China is involved in longer chains with more vertical linkages (more fragmented), but also for the V4 countries the GVCs have more vertical linkages than GVCs in developed countries. Thus, not only is the value of imported goods which are further processed in other countries (the backward participation index) high, but their production is more vertically fragmented upward in the chain. In the V4 countries, the international production stages are significantly longer relative to

the domestic part. This is not only true for the overall country level, which might be affected by the bigger share of industries with higher number of production stages such as the "Electrical and Optical Equipment" or "Transport Equipment" sectors), but also at the level of those industries where the international part is bigger further up the chain. Recently, debate has emerged about whether the value chains are global or, rather, regional. Data indicate that GVCs are becoming more global than regional over time based on the origin of the value added embodied in the exports (Los et al., 2015).

Another method of measurement which is available among the GVC indicators is the index of distance to end consumers' demand. This index has been constructed based on the measure of "upstreamness" by Fally (2012) and Antras et al. (2012). The ''upstreamness'' at industry level shows how much of the output goes directly to the end use. In other words, "how many stages of production are left before the goods or services produced by this industry reach the final consumers" (de Backer and Miroudot, 2013). The upstream activities are the ones at the beginning of the chain and involve the processing of raw materials, or R&D and design. The downstream activities on the other hand involve logistics and other services such as marketing. Assembly is usually located in the middle (see fig 1). At country level the upstreamness indicates the position of the countries in the value chain.

The index corresponds to the average number of production stages by industry, weighted by the contribution of each stage of production, and it gives an idea where the countries are positioned and specialized in the complete GVC. The higher the number the more upstream activities are performed by the given country. In general, over time as the length of the GVC increases, most countries move upstream. When the supply of inputs is outsourced, the value added moves to the industries producing these inputs, and the distance to the final customer increases (since the length of the GVC also increases).

Figure 5: Index of distance to the final demand in selected countries



Source: OECD, 2015

In most countries there has been an increase in upstreamness, particularly among many Asian economies. However, some countries have witnessed a minor decrease, e.g. the United States. This can be caused by offshoring activities located upstream in the chain. In the case of the V4 countries, both the Czech Republic and Hungary have witnessed increased upstreamness, but there was a minor drop in Poland (by over 2%), and in the Slovak Republic by 9%, most significantly in the industries of "Manufacturing NEC; Recycling" and "Electrical and Optical Equipment". This indicates that these countries now specialize in goods and services more downstream.

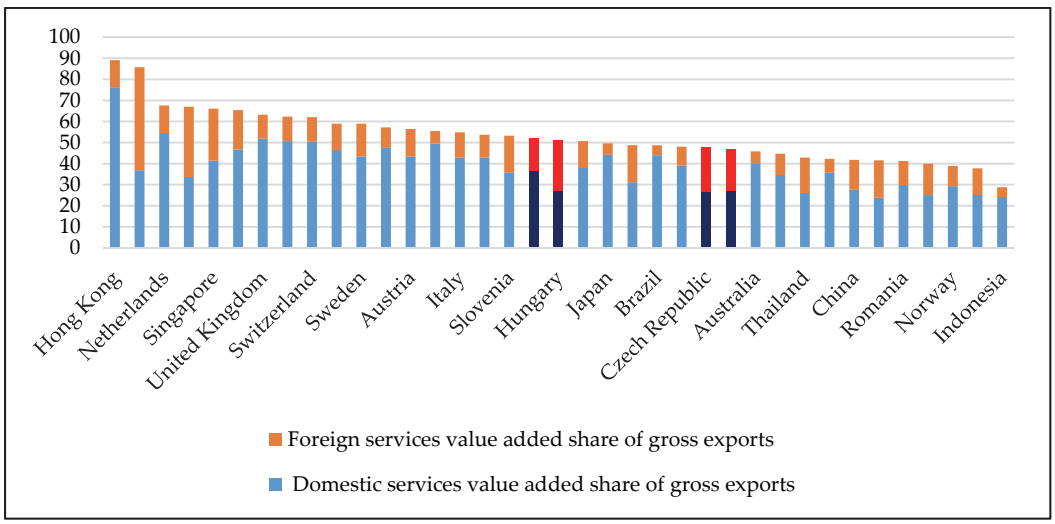
Nonetheless, doubts remain about the construction of these GVC indexes, and about the interpretation of the results. As was illustrated in section 2, especially in the case of China, the results based on the latest adjustments of the dataset will be probably much different. Overall, using these indexes (with the exception of the participation index, which is more straightforward) for comparing countries, and drawing conclusions; is, according to the author, so far, not advisable.

3.3. Services

Manufacturing plays a big role in the Visegrad countries. Manufacturing products embodies value added originating from the service sector, and the share of services in these products is constantly rising. Such services involve

design, R&D, branding, marketing, logistics, financial services, etc. In developed countries the value added by the services content of exports, which includes both direct exports of services, as well as those services embodied in the manufacturing of products comes to around 60%, whereas in developing countries it is around 40% (see fig 6). In the Visegrad countries it ranges from 47% to 52%, and it did not change much in the observed period. Nonetheless, also in Germany the value added by services share of gross exports reaches only 52%, and it has not changed in recent years.

Figure 6: Services value added share of gross exports in 2011



Source: OECD, 2015

What is problematic is the large foreign value added share embodied in the services exports in the Visegrad countries. The share of foreign value added in services is roughly the same as the share of FVA in the gross exports of the Visegrad countries, and is increasing at a similar pace. In developed countries, the FVA share in the service sector is, in general, lower than in overall gross exports with a few exceptions, such as Ireland. For example, in 1995, the share of foreign value added of service exports reached 29–30% in Hungary, the Czech Republic and the Slovak Republic and only 16% in Poland. In 2011, almost half of the value added in services exports in Hungary originated in foreign countries. In the Czech and Slovak Republics, it was around 44 %. In Poland it was only 30%, though the number almost doubled over the examined period. In other developed countries the results are mixed. In some countries, the share of foreign value added in services exports remains stable. Examples are: the United Kingdom, USA or Sweden. In other countries, for instance, Germany, Japan or

Luxemburg it is rising. This is probably related to the countries' involvement in GVCs and types of products that are exported. Despite the fact that the foreign services value added share of gross exports belongs among the highest of the developed countries, including the new EU members. Most of the foreign value added in the services exports of the Visegrad countries originates in Germany. This illustrates the existence of circular trade, and also the role of regional value chains among the Visegrad countries and Germany.

Services generate a large share of the value added in the GVCs, and this share is increasing over time (see fig. 6). In terms of increasing the value added, the Visegrad countries should focus more on the service sector. Functional upgrading is thus a way to maximize the gains from GVC participation (Beugelsdijk et al., 2010). The majority of FDI is directed towards the service sector, but mostly to the banking sector which serves the home market (UNCTAD, 2013). Despite the fact that shared service centers are often built in the Visegrad countries (Lacity et al., 2008; Aggarwall et al., 2008), their contribution to the creation of knowledge is considered to be limited (Capik and Drahokoupil, 2011).

3.4. Other Data

Other data, too, can be used to assess the position of countries in the GVCs, in other words, the upgrading in the V4 countries. Those are the indirect measures which affect the overall environment in the country, and include data on educational attainment, productivity, R&D, FDI, innovations, labor supply, wages and many other factors (the situation in the Czech Republic was mapped by Vlčková et al., 2015). Since the position in GVCs is also highly dependent on the overall institutional framework (Dicken, 2015); widely available international comparisons which often contain not only indicators related to the business environment and institutions, but also other data such as innovation, education, market and overall competitiveness etc. can also be used. Among the major ones belong the Global Competitiveness Report (WEF, 2015), or Doing Business (WB, 2015b). Although there are many others, such as the Atlas of Economic Complexity (Hausmann et al., 2014), or the reports of the European Commision (e.g. European Commision, 2015). Nonetheless, the reports are often based on qualitative surveys, and this is also their major disadvantage, since these surveys are not always representative.

Before the wide availability of the input-output datasets, highly detailed trade statistics were often used. Their main limitation is that they do not reflect how much value was actually generated, or added, in the region since even these exports often contain imported components (more in section 2). This makes

them unsuitable for international comparisons. On the other hand, if these data are used for firm level analysis as a supplement to other detailed firm level data, their usage is still relevant.

One of the areas that requires more attention, and which is not yet available from input-output databases is related to the value capture. Due to the big role of foreign owned companies in the Visegrad countries, this is highly interesting. The balance of payments helps to reveal the repatriated profits (this is described in more detail in the next chapter). The dataset "Trade in Income" which is being prepared by the OECD will help to map in future were the value is really retained.

4. Policy Implications

The Visegrad countries need to be able to measure the extent of participation and other aspects at both country and industry level. In order to strengthen the positive impact on the economies, the Visegrad countries should then reassess the current policies accordingly. Relevant policies include mainly education, innovation, investment and other structural and framework policies. Nonetheless, these policies need to be in compliance with each other and with general strategies.

One of the basic preconditions for upgrading, especially functional upgrading, is the educational and skill level of the labor force. In the V4 countries, the FDI inflow since the transition, was mostly driven by cheap and qualified labor. Currently, most of the jobs in foreign affiliates in manufacturing are low to medium skill jobs (OECD, 2015). Vocational training collapsed after the transition, and the links between the institutions of education and business are weak at all levels including that of higher education. Vocational training is not popular, mainly because industrial work is underpaid. Lack of a qualified labor force is considered to be a problem among employers in all the V4 countries and companies are pushing governments into supporting vocational training (in the Slovak Republic, and also in the Czech Republic). On the other hand, the aim of the investors is to maximize profits and therefore keep low wages for as long as possible.

In all the Visegrad countries the number of university graduates has been steadily rising. Whereas in 2000, on average, 11% of the adult population received tertiary level education (in Hungary 14%); by 2013 the numbers had doubled in most of the Visegrad countries. It still remains below the OECD average, though (OECD, 2015). Similar to other OECD countries, humanities and social sciences are more popular than the areas of science and technology (OECD 2014, 343). Nonetheless, due to the manufacturing orientation of the Visegrad

countries, this is even more important. Another problem is the fact that university graduates often do not have practical skills. This could be solved by the introduction of compulsory internships. Other problems are related to funding.

In general education only gets formal priority in the Visegrad countries, although it is crucial to the countries' competitiveness. The views on whether governments should support vocational training and technical majors differ. Whereas some believe that this is up to the market, i.e., the private companies, most scholars and companies call for government intervention. There is a need for coherent education policies which would be in compliance with the orientation of the country and other strategies and policies. In case of low and semi-skilled jobs in basic assembly, there is risk of reducing the skills of the labor force (so called deskilling). Technological progress also needs to be taken into account. The major comparative advantage of the Visegrad countries lies in their relatively cheap and skilled labor force. The increasing computerization leading to mechanization and robotization in the manufacturing industries (industry 4.0, or the fourth industrial revolution) will probably affect employment in manufacturing. Companies in the Visegrad countries might be pushed towards greater flexibility, productivity and a higher pace of innovation (Ihned, 2015). Low-skilled jobs are at the greatest risk, whereas the demand for a highly skilled labor force, especially for technically educated workers, will increase. The extent of such changes is unknown. However, location decisions are already being affected by the increasing mechanization. BMW was thinking about opening a factory in Eastern Europe due to lower production costs. In the end, the production was located to Netherlands, thanks to the more widespread automation there (Ihned, 2013; Reuters, 2014).

In order to increase the value added that is created; research and development and innovation are crucial. In general, in the Visegrad countries, the funding of R&D is considered to be a major constraint. The gross domestic expenditure on R&D as a percentage of GDP is below 1% in Poland and the Slovak Republic, whereas in Hungary it is almost 1.5% and in the Czech Republic it is almost 2% (OECD, 2015). For innovative start-ups and technological firms there is lack of venture investment. However, often the constantly changing conditions and overall inconsistent funding policy is even more problematic (at least in the Czech Republic). Other big limitations are the low linkages between the private and public sectors and the commercialization of R&D in general. In all the Visegrad countries patenting activity is very low, and the majority of patent applications are under foreign control (EPO, 2013). The role of foreign companies in R&D is also problematic. Firstly, they usually

do not perform core R&D. Secondly, the value is captured in other countries. Considering the technology transfers from TNC's, however, the knowledge spillovers to host economies are limited (Pavlínek and Žížalová, 2014).

The Visegrad countries have benefitted from the EU funds in terms of innovation, as well as the fact that many innovation centres have been built. This also brings many problems. The absorptive capacity of recipients is low, and the funds are often not exhausted, or are used inefficiently (iDNES, 2015a). Furthermore, Prague and Bratislava are not eligible recipients due to their high GDP per capita. In the case of the innovation centres, the funding was directed towards infrastructure and not operations. Dozens of research centres have been established in the Czech Republic and many now already face problems related to their profitability and sustainability (MSMT, 2014).

In terms of R&D and innovation, there many things that the Visegrad countries should do to improve the situation. Funding is one of the major issues. Nevertheless, attention should be given to long-term and sustainable projects. In this respect the question arises whether all technological capabilities should be supported, or whether only those research areas/industries with prospects should be preferred – the so called smart specialization (EC, 2015). In the Czech Republic, the establishment of a Ministry of Research and Development is under consideration. This could lead to more unified and constant innovation policy. With respect to value creation and retention, there is a big role to be played by the SME's. Therefore, the role of these companies in the Visegrad economies should be supported and stimulated to promote entrepreneurship (Elteto et al., 2015). Entrepreneurship plays a big role in the economy. The Visegrad countries are lagging behind the developed countries in terms of entrepreneurship, although the Czech Republic is doing slightly better (Ács et al., 2014). A lack of funding is often a major constraint, thus support for domestic innovative SME's should be ensured. The mood seems to be changing slightly, at least in the Czech Republic, where economic magazines often present articles on successful domestic companies. One of the reasons might be the fact, that due to low interest rates and the global situation, business people are looking for other investment opportunities. This could be beneficial not only for innovative domestic SME's, but also for the whole economy.

The institutional settings of an economy correlate with its position in the GVCs. The business environment is one of the key aspects. All Visegrad companies have implemented structural reforms which are inadequate. According to the report Doing Business, the business environment is below the OECD average in all V4 countries, with Poland doing best at 32nd place, while Hungary is worst at 54th place (WB, 2015b). Whereas the ranking based on the

Global competitiveness report (WEF, 2014) is different, all V4 countries, except Poland, have the lowest ranking in the pillar institutions. Business environment, inefficient government bureaucracy and corruption, followed by policy instability remain the major obstacles for doing business in most V4 countries. In Poland corruption is not as problematic, whereas tax regulations are the major negative aspect (WEF, 2014; Micek, 2015). Therefore, there is a need for clear long-term goals, which would result in coherent policies and predictable conditions. In this aspect, questions are also related to the existence of industrial policies. Successful countries are those with strong industrial policies such as Germany or Singapore.

The Visegrad countries have witnessed large inflows of FDI, which peaked after their accession to the EU (UNCTAD, 2013). In official documents, in general, the positive effects of FDI, especially in terms of new job creation are stressed (e.g. Czechinvest, 2015). Nonetheless, research confirms that these effects are often overstated, and there are also negative effects of FDI (Micek et al., 2011; Pavlínek, 2008). Investment incentives also contribute to the situation whereby foreign supplier companies replace the positions in GVCs which would otherwise be taken by domestic companies (Pavlínek; 2008). Despite the pronounced goals to support activities with higher value added, manufacturing still attracts large FDI inflows. Furthermore, in the case of investment, it is often stressed that a new research or design centre is about to be built, despite the fact that most of the investment will be directed towards increasing production capacities and low-skilled jobs. More attention should be given to the overall impact of each (larger investment) on the economy, especially on employment, economic growth, local companies and innovation.

Investment should thus be assessed in terms of value creation, control and capture. Firstly, activities with value added should be preferred, in order to ensure that more value is being created. The Amazon logistics centre which has recently started operating in the Czech Republic has attracted a lot of attention (e.g. iDNES, 2015b). On the other hand, it is not yet clear whether the Czech government will support the logistics centre for the Galileo project, which apart from creating highly qualified jobs, is strategically important (Ihned, 2015b). Secondly, to be able to have at least some control over the value that is created, either the companies need to be domestically owned, or if foreign owned, the companies need to be located higher up in the chains (such as a first tier supplier). Foreign ownership is, generally, not necessarily favorable to functional upgrading in the host economies (Gereffi, 1999). Nonetheless, we need to bear in mind, that the Visegrad countries are small economies and ordinarily serve as export platforms, which bring less benefits (Grabher et al.,

1994). This further limits their bargaining power. Neo-liberal market policies contributed to the reduction of that bargaining power, whereas integration into the EU through the implementation of regulation enabled the Visegrad countries to retrieve some of their bargaining power (Coe et al., 2008). Last, but not least, better measures need to be developed to be able to assess the value capture. There is a strong positive relationship between the repatriated profits from a host country, and its participation in the GVCs due to the big role played by TNC's in the GVCs (UCTAD, 2013). In the long run reinvestment is thus often higher than investment. Globally, in 2010, about 60 per cent of total FDI income on equity was repatriated (UNCTAD, 2013). Thus, despite large FDI inflows, most Visegrad countries have negative current account balances, mostly driven by profit repatriation (OECD, 2015b). Investors' reluctance to reinvest earnings in the Czech Republic is mostly explained by the institutional weaknesses of the Czech economy (Vlčková et al., 2015). Data for 2014 show that the trade balance in the Czech Republic outweighed the profit repatriations for the first time in modern Czech history; but export volumes are clearly connected with Czech National Bank's efforts to devaluate the Crown in this period (Hnát and Tlapa, 2014). The Visegrad countries need to avoid the race to the bottom, the situation when countries and firms in order to attract economic activity, lower taxes, deregulate the business environment, etc. This often leads to lower wages, worsening of labor conditions, rising inequality, and often environmental problems.

Conclusion

New datasets enable a much more profound assessment of GVCs in the Visegrad countries, which is highly relevant for such export-oriented economies. In this paper, the OECD-WTO TiVA was explored in detail. Apart from TiVA, the WIOD database also offers quality data, though it requires more adjustments, and is less user-friendly than the TiVA. Nonetheless, some of the OECD GVC indicators are questionable. Despite major improvements in the data and measuring the GVCs, it is necessary to bear in mind that these data are highly dependent on the construction of the input-output tables, and need to be interpreted with caution. So far, these datasets do not enable us to assess the value capture in individual countries. Thus, other data are also needed, especially those related to FDI and the current account balance in general. Overall, both qualitative and quantitative methods are required to assess the extent and impact of GVC participation on the economy.

The data indicate that all the Visegrad countries are getting more integrated into the GVCs. The participation index belongs to the highest in the world.

However, large participation in GVCs is mainly caused by the high share of foreign value added (high backward participation index). Another disadvantage is the low share of services in their exports, which are to a large extent of foreign origin. Thus, the Visegrad countries seem to rather focus on activities at the bottom of the so called smiling curve, such as assembly, which generate low value added. The lower share of DVA in the V4 countries is, to a large extent, caused by the size of their economies, manufacturing orientation, and the fact that they serve as export platforms. There are only slight differences between the Visegrad countries, though Poland is doing relatively better. This is probably related to its bigger market. Nonetheless, services are also more important in their exports and contain more domestic value added.

The V4 economies should maximize the domestic value added that is created and retained. In order to catch up to developed countries, knowledge economies need to be developed (Hardy et al., 2011). In general, labor-intensive tasks in GVCs take place primarily in emerging and developing economies with abundant labor, while knowledge-intensive activities remain concentrated in developed economies (UNCTAD, 2013). In this sense, the Visegrad countries are still emerging economies. This causes several problems. Such activities generate lower value added. There seems to be already a mismatch on the labor market. Due to technological progress and higher automation there is a risk of reshoring activities to the EU15 countries. Last but not least, is the big role played by foreign companies, leading to large profit repatriation.

There are many things that the Visegrad countries should do to increase the benefits resulting from GVC participation. Firstly, there is a need for an educated and flexible labor force. Education and R&D should become a priority. However, upgrading is not only related to innovation. The main obstacle in all the V4 countries seems to be the business environment. The Visegrad countries need to strengthen and stabilize their institutions. Furthermore, the role of FDI should be more critically assessed. Domestic ownership is highly relevant and does not lead to profit repatriations. Therefore, having control over what, how and for whom goods are being produced should be the goal.

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Upgrading in the Global Value Chains: The Case of the Czech Republic

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Abstract

Since the completion of its economic transformation, the Czech Republic has become an export-oriented economy and belongs among those countries with the highest participation in GVCs in the world. The aim of this paper is firstly to assess upgrading of the Czech Republic in the GVCs since the transition. Furthermore, to identify upgrading possibilities and major obstacles to upgrading and summarize policy implications. In terms of education, R&D and innovation, labor productivity and competitiveness the Czech Republic has made progress. Nonetheless, increasing the share of foreign value added embodied in exports and profit repatriations limit the value that is captured in the Czech Republic. Upgrading possibilities were mainly identified in research areas and sectors where the Czech Republic already has comparative advantage and, innovative domestic SME's. Unstable regulatory frameworks and mismatch between the needs of employers and orientation of students have been identified as a major obstacle for upgrading. There is a need to strengthen linkages between business and the public sector, although, strategies of TNC's remain an important variable for upgrading.

Keywords: global value chains, Czech Republic, upgrading, business environment

Introduction

Since the transition period, the Central and Eastern European countries have become more deeply integrated into the global economy. Their proximity to Western Europe, and having a skilled and relatively cheap labor force and a rather stable economic and political environment, reinforced by the accession to the EU have been the most important factors affecting the inflow of foreign direct investment (FDI). Furthermore, the attractiveness for FDI has been enhanced by a developed infrastructure and governmental incentives. Last but not least, the labor laws in the V4 countries (the Czech Republic, Slovakia, Hungary and Poland) have been more flexible and the power of trade unions is relatively weak (Pavlínek, 2004).

The Czech Republic is an export-oriented country, its exports of goods and services reached 83% of GDP in 2014 (World Bank, 2015a). Around 20% of the exports are intermediate goods, and on average only 55% of the value of total exports is created in the country, though there are differences between industries (OECD, 2015a). The country's participation rate in GVCs is relatively high. As a result, it is essential to assess not only how much the country exports but more importantly what it "produces". Participation in GVCs means that either the countries are exporting products that involve intermediate inputs produced in other countries, or they export intermediates that are used in the exports of other countries. This signifies that exports can embody value created in other countries. How much value is created has a direct effect on the economy in terms of employment, income and also economic growth. In general, activities requiring special skills and knowledge generate more value added than those low-skilled jobs such as basic assembly. The objective of the countries is to increase the domestic value added that is created and also captured in the country. Increasing the value added that is created and improving the position of firms in the GVCs is referred to as upgrading (e.g. Humphrey and Schmitz, 2002). Measuring global value chains, particularly upgrading within them is highly problematic. Usually upgrading is being measured at the firm level, either based upon questionnaires and interviews or other types of data. These are often based on the changing value and structure of exports. Others, for instance, Pavlínek and Ženka (2010), used more reliable indicators such as R&D intensity, factor productivity or wages and salaries. We believe that a combination of both methods is needed in getting a complex overview of the situation.

Following this, the aim of this paper is to assess the upgrading of the Czech Republic in the GVCs. The transition period is set as a milestone while trends in recent years are of particular interest. Secondly, to identify upgrading possibilities and major obstacles to upgrading and summarize policy implications.

The structure of the paper is as follows. The subsequent section provides a literature overview dealing with GVC's in general, and the involvement of the Czech Republic in the GVC's. The following section maps the overall environment in the Czech Republic both at macro and micro-level (firm-level), as well as its policies. For the macro-analysis we apply the quantitative approach, analyzing data relevant to upgrading (data on education, labor force, R&D, FDI, value added exports or productivity) to characterize the conditions in the country. Then, we focus on the impact of firms participating in the GVCs on the domestic economy and their linkages to local firms. Generally, most of the

studies focus on one selected industry (e.g. Pavlínek et al., 2009; Pavlínek and Ženka, 2010; and Pavlínek and Žížalová 2014; map very well the situation in the automotive industry) and assess the upgrading based on qualitative surveys in individual firms. This is reasonable, since upgrading occurs at firm level. In this paper we followed a similar approach. We illustrate the value added creation, capture and upgrading in the case of a Czech innovative SME in transport equipment industry (the Company X). The last section discusses and elaborates policy implications.

1. Literature Review and Current State of Knowledge on Upgrading and the Situation in the Czech Republic

Over the last three decades the production process has been broken down into many geographically separated steps. This process has been often called "slicing up the value chain" (Dicken, 2015). There are several terms used to describe the fragmentation of the production process. Global supply chains, global value chains and global production networks are the major ones (e.g. Gereffi, 1994; Coe et al., 2008). Their common feature is that these chains/networks are highly geographically extensive and functionally integrated across national boundaries. Although, there are differences between these terms, they are often used interchangeably. In this paper the term GVCs will be employed. There are many fields of interest related to GVC. Some focus on the organization of the GVCs (Gereffi et al., 2005; Antrás and Chor, 2013), others on trade policy implications (e.g. Baldwin, 2011). However, much attention is given to geographical themes, especially on the way how production process is distributed over space and how GVCs affect local economies.

In general, the effect of GVCs on local economies is highly dependent on the nature of GVCs operations as well as the characteristics of the economy. The goal of the firms (and also regions and countries) is to improve their position within the GVCs and the value added − the so-called upgrading. The highest value added is generated at the beginning and end of the chain (visualized in the so called smiling curve). Another important goal is to increase the number and quality of linkages to domestic firms within the local economy. Humphrey and Schmitz (2002) distinguish four basic types of upgrading: process, product, functional and chain upgrading. Process upgrading is the more efficient transformation of inputs into outputs either through improved technology and/or better organization of the production process. Product upgrading refers to diversification into more sophisticated, higher-value products. Functional upgrading describes the situation when firms take on new functions, which indicate, moving up the skill ladder. Chain (or inter-sectoral) upgrading denotes

a shift to a more technologically advanced production chain and involves moving into new industries or product markets. These forms of upgrading can occur at the same time. Often product upgrading requires process upgrading. Unlike economic upgrading, which refers to firms, social upgrading indicates getting access to "better" work, but also working conditions and rights at the level of individual workers (Barientos et al., 2011). Participation in GVCs does not necessarily lead to upgrading; sometimes the opposite, the so called downgrading, occurs. Upgrading possibilities are to a certain extent affected by the types of governance of the GVC. Currently, five basic types are being distinguished: market, modular, relational, captive, hierarchical (Gereffi et al., 2005). In general, upgrading is more difficult in captive than in a modular GVCs.

The benefits associated with participation in GVCs and upgrading are not distributed evenly. They can bring costs to certain groups of people and even geographical areas (Baldwin, 2006; Blinder, 2006). Low-skill jobs, especially, are most at risk. According to many scholars (e.g. Feenstra and Hanson, 1996; and Grossman and Rossi-Hansberg, 2006), trade contributed to rising wage inequality. Other major risks are the power of TNC's and the dependence on configuration of the GVCs and its changes, especially in such a small export oriented economy as the Czech Republic. This can also mean higher dependence on their knowledge, technology and capital. Last but not least, the major benefit associated with upgrading – the increase in value added – can be captured predominantly by the foreign companies.

Furthermore, there are many obstacles to upgrading. It is not easy to move into activities associated with higher value added such as strategic services. There are entry barriers in becoming a first (or even second) tier supplier. In general, functional upgrading increases the value the most, whilst it is the most difficult one (Gereffi, 1999). On the other hand, product upgrading is, relatively speaking, the easiest whereas, the value increases only slightly. The basic preconditions for upgrading are a stable business environment, political stability and, especially, knowledge, skill base and education.

R&D belongs to geographically the most concentrated activities (UNCTAD, 2005). Technology spillovers are best channeled through inter-firm linkages (Dicken, 2015). In this way spin-off effects to other firms in the region can emerge. However, this requires the cooperation of foreign affiliates with local firms. The so called "cathedrals in the desert" usually only contribute to the increase in employment and can have many adverse effects on the economy (Hardy, 1998). The incidence of local linkages is thus especially dependent on the strategy of TNC's, the nature of the economy and time. Technology and knowledge spillovers are also highly dependent on the so called absorptive

capacity of firms. This means that in order to be able to absorb the knowledge diffused, the firm needs to be able to recognize the value of new information, assimilate it and apply it commercially (Cohen and Levinthal, 1990). Participation in the GVCs can also lead to the demonstration effect. Domestic firms can learn from TNC's and imitate also their business models, marketing strategies or export processes (Taglioni and Winkler, 2014).

In the Czech Republic the big share of backward linkages (high share of foreign value added in exports) indicates that TNC's import a large proportion of intermediate inputs. This signifies that procurement from local suppliers is limited. Investment in the CEE has been, in general, oriented towards export-production, taking advantage of relatively skilled and inexpensive labor (Humphrey and Memedovic, 2003). Thus, most TNC's located in V4 countries are export platforms, where linkages with local firms are less likely to develop. Also the possibilities of chain upgrading for local (domestic) firms are less probable. In the automotive industry, higher order suppliers often co-locate in the same region as lead firms (Pavlínek and Janák, 2007). This intensified regional disparities, and also regional economic instability within the CEE countries in the 1990's (Pavlínek, 2004). Later studies (e.g. Domanski and Gwosdz, 2009; Jürgens and Krzywdzinski, 2009) suggest that foreign companies became more embedded in the V4 countries, at least within the automotive industry. Regional embeddedness is also important for knowledge diffusion and skill upgrading.

There are many reasons why V4 countries have become integrated into the global economy. As the entire region is close to the Western European markets, the combination of a skilled and relatively cheap labor force and relatively stable political and business environment is attractive for the investors. Furthermore, with the accession of the CEE countries to the EU in 2004 the V4 region became a part of the EU internal market. Unlike China, V4 countries did not require joint ventures or other follow-up network configurations that should guarantee the benefits for the state (Liu and Dicken, 2006). The question is, whether TNC's would be willing to fulfill these requirements due to the weak bargaining power of such a small economy vis-à-vis the TNC. In the Czech Republic most of the companies linked to the GVC belong to tier 3, and to a lesser extent, to tier 2 companies. Thus upgrading is of key importance for these companies and there is big risk of getting locked into these unfavorable positions (Blažek, 2012).

Since the automotive industry is the major driver of Czech exports, and is also highly integrated into the GVCs, most of the studies so far have focused on this industry. In the automotive industry there was a larger increase in production and employment than in value-added, which is associated with R&D

employment and R&D expenditure. In the Czech automotive industry upgrading was highly selective. Process upgrading was the most widespread, followed by product upgrading. Functional upgrading based on R&D took place only in one fifth of the analyzed firms (Pavlínek and Ženka, 2010). Most of the R&D located in the CEE countries is thus a part of routine research, whereas, key R&D functions remain in the home countries of foreign TNCs. Main suppliers often co-locate their R&D functions close to automobile producers. In the Czech Republic strategic R&D can be found in Škoda Auto or Visteon Autopal. It was one of the conditions of the acquisition of Škoda to keep the R&D in-house (Pavlínek, 2012). Nonetheless, TNCs are not a homogenous group, and there are big differences between them. For example, US-owned subsidiaries perform more comprehensive R&D functions than Western European companies (Pavlínek et al., 2009). This can be affected by both cultural differences as well as geographical distance to the headquarters of firms.

In general, the aim is to attract and create the so called 'high-road' jobs (Pyke and Sengenberger, 1992), which are characterized by efficiency, quality and skill, whereas so far the jobs where closer to "low-road" manufacturing jobs typical for low waged and semi-skilled work. Jurgens and Krzywdzinski (2009) focused on labor in the automotive industry in the CEE region. According to them, in the CEE countries, both low-road and high-road models coexist. Fortwengel (2011) found signs of industrial upgrading in the CEE countries in the automotive industry, though for the overall upgrading (including social upgrading) there is contradictory evidence.

The Czech government has not required TNCs to establish R&D facilities in return for entry, yet. Even if it did, its conditions might have not been met due to several reasons. Firstly, the Czech Republic is a relatively small economy, and secondly fulfillment of such requirements is more probable in countries where the affiliates serve the host-country market itself. Furthermore, domestic suppliers often lack size and resources needed for product and process innovation required by leading firms, which limits their upgrading (Pavlínek, 2012). Vertical technology spillovers from foreign to domestic firms were so far limited. This can be either caused by limited absorptive capacity of domestic firms, which often do not perform any R&D, but also by the fact that most capable domestic firms were acquired by foreign companies (Pavlínek and Žížalová, 2014). Overall, domestic firms in the automotive industry lag behind foreign firms.

Several studies focused also on other industries. Javorcik and Spatanerau (2009) found that the productivity of Czech manufacturing companies supplying TNCs was higher than among non-suppliers, and that they have learned from

the TNCs. Capik and Drahokoupil (2011) focused on the service FDI in the V4 countries and the way it contributed to skill and knowledge building. Overall, the majority of companies used local skills, however, their contribution to knowledge creation was limited. Social and institutional embeddedness of such companies was usually absent. Most of the companies provided services for TNCs located in the country, or to their customers globally, indicating that both backward and also forward linkages were weak.

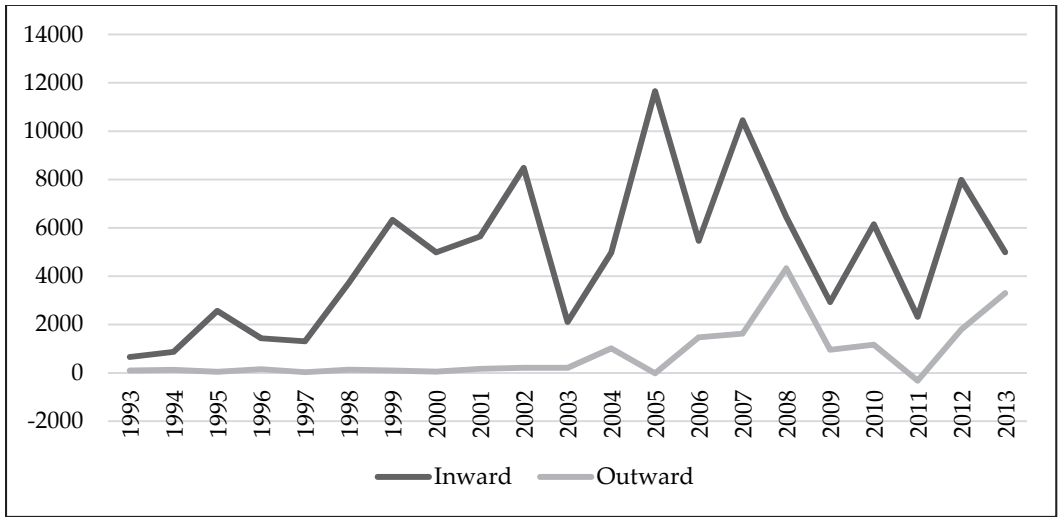
Making general conclusions about the upgrading of Czech companies within GVCs is very problematic. There are huge differences not only between industries, but there is also large heterogeneity of firms in the same industry. Nonetheless, previous studies indicate that, so far, upgrading was limited, which reduced the value created and captured in the Czech economy.

2. Upgrading in the Czech Republic

2.1. Environment in the Czech Republic

Foreign Direct Investment – The Czech Republic belongs among the most globalized countries in the world in terms of trade and FDI flows. Since the transition it has captured the largest amount of FDI among the transitioning countries in the CEE region. FDI represented an important source of capital, and supplements finance for ownership structure and capital formation. The EU accession enhanced the FDI inflows and therefore they peaked in 2005. The world economic recession had a negative impact on the FDI flows worldwide due to lack of available capital and insecurity which resulted in a slowdown of FDI inflows also in the Czech Republic. In 2012, FDI inflows returned to almost as high a level as before the crisis (CNB, 2014).

Figure 7: FDI Flows in the Czech Republic 1993–2013 (US Dollars at current prices and current exchange rates in millions)



Source: UNCTAD (2014).

The main investors in the Czech Republic have originated in the developed, mostly European, countries. Those constituted around 80% of all FDI inflows during the transition (UNCTAD, 2003: 9), and even today they represent over two thirds of FDI inflows. Traditionally, the largest investors include Germany, Netherlands and Austria. Yet, in 2013 Germany registered disinvestment despite some of the reinvested earnings. In the past decade there has also been an increasing involvement of Asian investors such as Japan, Taiwan, Korea and lately, China (CNB, 2014). However, their investments are rather volatile.

Since 1998 the Czech Republic has established a program of incentives aiming to target potential investors in the country's preferred industries and geographical locations. As for the inward FDI structure, services play a major role. They have attracted over 70% of all FDI with major beneficiaries being financial services, logistics and telecommunications, and tourism. Manufacturing has accounted for about 30% of FDI in 2012, but in 2013 it faced some disinvestment (CNB, 2014) which might be attributed to the above mentioned trend in the case of Germany. The manufacturing sector has been particularly significant for the Czech economy. It comprises 25% of GDP and almost 35% of employment (World Bank, 2015). The inward FDI flows in this sector have mainly focused on machinery (CNB, 2014).

The Czech Republic, as well as other European transitioning countries, has witnessed large profit repatriations since the transition as a result of former investments. This led to a negative current account balance even though the

country's trade balance has been positive since 2004. Yet, in 2014 the Czech Republic has, for the first time recorded a sufficiently high positive trade balance to outweigh the profit repatriations. This was most likely linked to the continuing weakening of the Czech currency, a policy of the Czech National Bank since 2013, which induced Czech exports. Nonetheless, this reveals one of the negative aspects for the Czech Republic's upgrading possibilities. While it would be beneficial for the country to capture extra profits and reinvest them, many still tend to leave the economy in the form of profit repatriation and have limited impact on the country's shift upwards within the value chains. Hence, there is a need to increase the reinvested earnings and thus possibly also value added produced in the Czech Republic.

Overall, the FDI have had a positive as well as negative effect on the economy. On the one hand, they have enabled the transfer of technology, know-how, skills from more developed countries, and have helped local enterprises to expand into foreign markets (particularly those in Western Europe). On the hand, they have intensified competition for local suppliers and have not secured the automatic technology transfers in all cases. Increasing labor costs also present a potential threat to the country's future FDI attractiveness.

GVC participation and value added – The FDI inflows have been associated with an increasing participation in the GVCs since the transition. Between 1995 and 2009, Czech participation increased from 51 to 62%. The backward linkages (FVA – the foreign value added embodied in gross exports) has played a predominant role. In 2011, the FVA content of Czech exports reached 45% (OECD, 2015). Even though the rise of FVA is a global trend, related to the rise of production fragmentation, and increasing role of GVCs in general, the Czech Republic's participation in GVCs, especially the backward participation, belongs among the highest in the world.

Regardless of the large participation in the GVC, the service value added in gross exports is relatively low and the majority of value added originates from other countries. This is highly problematic, since services in general belong among the activities located upwards and downwards in the chain, and they produce more value added than basic manufacturing. The domestic services value added share of exports reached only 27% in 2011, compared to 35% in 1995 (OECD, 2015). Similar numbers are found among developing countries such as Thailand or China, but also Hungary and Slovakia. On the other hand, in developed countries this number exceeds 40%. More on this is discussed, for instance, in Vlčková (2015). The above mentioned trends are worrisome and certainly warrant more attention.

Education and labor force – The competitiveness of a country, its future growth, population's skills and knowledge development, and last but not least the reduction in income inequality can be induced by governmental investments and public spending. Education, in particular, plays a crucial role in this matter. Trends indicate a constantly increasing share of expenditure on education in the Czech Republic relative to GDP. The crisis did not negatively impact public expenditure on educational institutions as has occurred, for example, in Hungary or Poland (OECD, 2014: 228). In the Czech Republic total public expenditures on education represented about 4.5% GDP in 2011, compared to the OECD average of 5.6% GDP. Less than 1.5% of GDP is spent on tertiary education, which is slightly below the OECD level. Over one third of the expenditure on tertiary education goes towards R&D (OECD, 2014: 229). Nevertheless, the height of expenditure on education does not necessarily secure better outcomes, or the quality, of the education. Based on the international comparison of young people's knowledge and skills under the Program of International Student Assessment (PISA), the Czech Republic ranks around the OECD average (mathematical knowledge – average, reading skills – slightly below average, science knowledge – above average) (OECD, 2015).

The country's competitiveness can be partially examined by educational attainment reflecting human capital and skills available in the population and labor force. Most of the population[1] in the Czech Republic has attained upper secondary[2] or post-secondary non-tertiary education[3] with a vocational orientation (OECD, 2014: 34). Since 2000 there have been visible trends of a rising share of tertiary educational attainment. The share of adults with tertiary level education has increased from 11% in 2000 to 20.4% in 2013. Yet, it still remains below the OECD average of 33.3%. Conversely, the share of those with below upper secondary education and partially those with upper-secondary and post-secondary non-tertiary education has been declining (OECD, 2014: 47%). The new entrants to tertiary education follow the general OECD trend, with overrepresentation in the social sciences, business and law fields (30%). Humanities, arts and education (17%) are second most pursued programs and engineering, manufacturing and construction (15%) are the third. The scientific branch (13%) shares its popularity with health and welfare (13%). On the

[1] Over 80% of young people up to 25 years-old are expected to finish their secondary education (OECD, 2014: 56).

[2] Based on the OECD (2002) definition it is the final stage of secondary education (ISCED 3) lasting 3 to 5 years preparing students for working life or tertiary education. Students starting this level of education are usually 15 or 16 years old.

[3] More advanced program (ISCED 4). The aim is a broadening knowledge gained at ISCED 3 level (OECD, 2002).

contrary, services (6%) and agriculture (4%) account for the smallest share of new entrants (OECD, 2014: 343). Yet, in 2005 the majority of students who completed tertiary education, graduated from the fields of engineering, manufacturing and construction followed by the social sciences, business and law, and by education. The rising popularity of non-technical fields in the past years has had an impact on the number of graduates from social sciences, business and law which have overpassed those who graduated from the technical fields (CSU, 2014). In comparison, the structure of upper vocational graduates provides a different picture. The field of engineering, manufacturing and construction still has quite a large representation among Czech students, and male students predominate there (OECD, 2014: 72).

In terms of upgrading, the fields of science and engineering in particular, play a crucial role. Taking into account the orientation of the country, specializing mainly in manufacturing, there is a need to further motivate students to pursue technical fields. In this matter, the Czech Republic already faces a problem, in that there is a declining popularity of vocational education at the secondary school level (Český rozhlas, 2013). Another problem stems from the fact that students pursuing vocational education study the wrong fields, causing mismatch between supply and demand of graduates on labor market, or they lack the motivation to finish their studies (Novinky.cz, 2013). At the tertiary level of education there has been a declining number of graduates in the fields of engineering, manufacturing and construction since 2011. Despite the negative trend, there are more students and graduates in those fields than in science. However, the amount of science students and graduates, both males and females, had been increasing until 2012. The most popular field for studies is computing followed, with a large gap, by physical sciences and life sciences.

Table 2: Human Resources in Science and Technology (thousands of persons, headcount)

Indicator/Year	*2005*	*2010*	*2011*	*2012*	*2013*
Total	1920	2249	2178	2227	2285
Persons with tertiary education	907	1236	1337	1411	1495
Science, engineering, manufacturing and construction fields of education	306	391	407	430	460
Persons employed in science and technology occupations	1555	1726	1569	1572	1595
Scientists and engineers	172	184	232	257	283

Source: CSU (2014).

The doctoral programs in general contribute to the country's innovative and economic growth. The advanced research is one of the factors that attracts the prospective investors. However, the capacity to attract and retain talents in the Czech Republic is still rather limited (Table 1 provides an overview of human resources within science and technology sector). The higher education system faces the need for improvements (GCR, 2014: 24). In 2012 the entry rate to advanced research programs was about 3.5%, almost 1% above the OECD average but about 2% below Germany. The majority of students who are enrolled in the doctoral programs in the Czech Republic are domestic students, and they enter the programs before the age of 30 (OECD, 2014: 337–338). This indicates that the Czech Republic has not been successful in attracting the best international students in its advanced research programs. However, there are differences in fields. Some programs, such as technology, biology, physics (specializing in nanotechnology, biotechnology or nuclear physics) belong among the best in the world, and the Czech Republic is able to attract foreign students and researchers in those fields.

Hand in hand with education go employment and wages. Currently the majority of the population in the Czech Republic lives in the productive age between 15 to 64 years-old. About half of the population is active. The groups with the largest share of unemployment are generally those with basic education and secondary education without the A-level examination (CSU, 2014). There has been a trend of increasing wages in the Czech Republic. The increase started from a relatively low level. "In comparison to other CEE countries, the Czech Republic has higher labour costs but very well educated, skilled and multi-lingual labour force." (CzechInvest, 2015) However, the monetary policy of the Czech National Bank has kept the Czech currency weakened since 2013. Hence, the wages have become more competitive to other Central European countries such as the Slovak Republic, which has already adopted the Euro as its currency (CzechInvest, 2015). Nevertheless, as an innovation driven economy, the Czech Republic must compensate for the rising wages by new, more sophisticated production and innovation (GCR, 2014). The Czech Republic records one of the highest shares of non-wage costs (27.1%). The average hourly labor cost was 9 EUR in 2014, compared to the EU28 average of 25 EUR (EC, 2015a). There are differences in wages for males and females among the majority of occupations, and they were identified as one of the highest among the EU countries accounting for 22.1% (EC, 2015a).

The rise in wages has been also accompanied by increasing labor productivity. Statistika & My (2014) reports a two thirds increase in labor productivity in real terms between 1995 and 2013. The largest increase occurred

within 1996 to 2008. The productivity increased on average by 3.6% per year. In the post-crisis period it has been rather stagnant with average 0.2% increase a year.[4] Despite the overall productivity growth, it remains behind the EU average. According to the Ministry of Regional Development this is a result of the fragmentation of global value chains, where the activities generating higher value added remained in the EU15 countries while those with lower value added were moved to the new EU member countries including the Czech Republic. Furthermore, in comparison to developed countries, the Czech Republic also lacked capital endowment and in general foreign owned enterprises generated higher value added than domestic enterprises, with the exception being the electrical engineering industry (MMR, 2009). The largest contribution to the increasing productivity was made by the manufacturing industry. Between 1995 and 2012, the productivity in this sector increased by 247% as a result of investments and innovation in the production, with a large contribution of foreign capital. Other sectors were wholesale and retail (increase by 124%), and the information and communication sectors (increase by 64%) (Statistika & My, 2014).

R&D and innovation – In order to maintain its competitiveness, the EU set a target to devote 3% of GDP to R&D. Even though, the Czech Republic's R&D expenditure, as a share of GDP, has been increasing from 1.22% in 2005 to up to 1.91% in 2013, it has remained below the EU's **Europe 2020** strategy target (EC, 2010). The total amount of R&D expenditure in absolute terms has increased three times since 2000 (Table 2). The Czech Republic follows the EU pattern of R&D financing with the largest role being played by companies (covering over one half), followed by government (one third) and foreign funds.

The largest R&D expenditures in the Czech Republic are made, first and foremost by foreign-controlled enterprises, others by private national enterprises and last by public enterprises. Generally, large enterprises employing more than 500 employees, and those with 50–249 employees, are the most financially involved in R&D (CSU, 2014). As regards the orientation of the enterprises, the largest investors in R&D are in activities regarding "ICT services (about 14% of the total BERD), the manufacturers of cars and other means of transport (12%) and mechanical engineering (almost 11%). Škoda Auto, Siemens, Honeywell, Robert Bosch, IBM, Zentiva TEVA are some of the main R&D spenders in the Czech Republic (Srholec, 2014). Apart from large enterprises, Srholec (2014) also mentions smaller "privately owned R&D organizations working primarily on contract research for industrial partners and/or subsisting on domestic and

[4] There was a larger decline in GDP growth in comparison to the number of hours worked.

international R&D grants. The largest number is in chemistry, electrical and mechanical engineering; others are in food and agriculture."

Table 3: R&D in the Czech Republic (selected years 2000–2013)

Year	*2000*	*2005*	*2010*	*2011*	*2012*	*2013*
R&D (% GDP)		1.22	1.40	1.64	1.88	1,91
R&D expenditure, total (CZK mil.)	26 487	38 146	52 974	62 753	72 360	77 839
R&D financed by government (CZK mil.)	11 789	17 248	23 539	26 179	26 616	26 973
R&D personnel, total (persons)	53 506	65 379	77 903	82 283	87 528	92 835
Researchers (persons)	30 165	37 542	43 418	45 902	47 651	50 945

Source: CSU (2014)

The governmental expenditures on R&D have more than doubled since the turn of the millennium (Table 2). Therefore, the Czech Republic belongs among the EU countries with the highest governmental R&D expenditure relative to GDP along with Germany, Slovenia, Finland, France and Luxembourg (EC, 2015a). The national target for **Europe 2020** in government budget appropriations, or outlays on R&D, is 1% of GDP but the goal has not yet been met. Most of the support goes towards public research organizations (specializing predominantly in basic research), and higher education (especially in engineering sciences) (Srholec, 2014).

The share of foreign funding in the Czech Republic is one of the highest within the EU. In 2013 it exceeded 20% of total GERD (gross domestic expenditure on R&D). This places the country at the level of Latvia, Bulgaria, Ireland, the United Kingdom, or Luxembourg (EC, 2015a). According to Srholec (2014) "the share of foreign-controlled businesses of the total private R&D investment is very high (roughly 50%), which makes the Czech business R&D sector one of the most internationalized in the EU. Here, the domination of the automotive industry is even more apparent, since a fifth of this amount comes from foreign-controlled businesses in the automotive industry." There is also a relatively strong role of EU public programs funding, but the Prague region is excluded. However, Prague records the highest concentration of R&D activities in the Czech Republic. Other regions (able to draw financial sources from the EU funds) include the Central Bohemia region and the South Moravia region (Srholec, 2014).

Despite the fact that expenditure on R&D is relatively high, and the number of R&D personnel and researchers is increasing (see Table 2), research and its inputs are lacking adequate quality and interaction between the private sector and research institutions. Historically, some of the current problems stem from the transformation (when public spending was cut) and privatization which both resulted in R&D expenditure reduction (Srholec, 2014). Even though there has been an increase in applied research, supported by the Technology Agency of the Czech Republic (established in 2009), and greater involvement of the Academy of Sciences of the Czech Republic, there is a relatively low connection between the research institutes and universities with companies. In terms of innovation, other major problems also include uncompetitive salaries in higher education and research, resulting in a lack of human resources. However, the number of graduates in science and engineering has been increasing (see previous section). Other problems include: the lack of complex metrics for measuring research results, defragmented infrastructure caused by the inability of the Prague region to apply for EU funds, etc.

In 2005 the Czech Republic granted total 2305 patents, out of which 347 came from Czech applicants. In 2013 the total number of granted patents more than doubled to 5213, but the patents of Czech origin grew only marginally to 435. The share of patents granted to the Czech applicants, as part of the total granted patents comes to only about 8%. This confirms a strong role of foreign subjects in R&D in the Czech Republic. Granted patents are attributed mostly to the business enterprise sector. The amount of patents originating in the higher education sector has rapidly increased since 2005, and was almost twice as high as in the governmental sector in 2013. Most of the domestic patents are granted in ICT, hi-tech and biotechnology (CSU, 2014). According to MSMT (2014), the Czech Republic is highly competitive in photonics, material science and nanotechnologies when patenting or publishing. As perspective sectors for investment we can name: transport equipment, machinery, electronics, IT services, production and the distribution of electricity, pharmaceuticals and medical technology (MSMT, 2014).

Based on the Innovation Union Scoreboard, the Czech Republic, as well as other V4 countries, belong among the moderate innovators (EC, 2015b). The technological readiness remains low and Czech businesses are less sophisticated and innovative than in other EU economies. In the regional context they are doing relatively well (GCR 2014, 24). The technological advancement and catch-up of the Czech Republic is very closely linked to its involvement in supply chains, particularly those led by Germany (OECD, 2014b: 18).

The innovating enterprises amount to 44% of all enterprises. While several years ago most of them focused on organizational innovation; currently their interest in innovation is more evenly spread among product, process, marketing and organizational innovation (CSU, 2014). While foreign-controlled and large enterprises mostly conduct product, as well as process, innovation, national enterprises and small enterprises are more similar among product, process and marketing innovation (Table 3). Most of the enterprise innovation occurs in the sectors of information and communication (65%), financial and insurance activities (56%) and manufacturing (48%) (CSU, 2014).

Table 4: Innovating Enterprises by Ownership, Size Group, and Economic Activity in 2010–2012 (share in the total number of enterprises in the respective group)

		Type of innovation			
	Total	*Product innovation*	*Process innovation*	*Marketing innovation*	*Organizational innovation*
Enterprises, total	44	25	24	22	20
Ownership of enterprise:					
National enterprises	41	23	22	21	18
Foreign-controlled enterprises	54	32	32	26	28
Enterprise size group:					
Small (10–49 employees)	38	21	19	20	16
Medium (50–249 employees)	58	35	35	29	30
Large (250+ employees)	79	56	57	37	49

Source: CSU (2014)

The World Economic Forum's Global Competitiveness Report repeatedly mentions innovativeness and institutions as the most important barriers to the innovation-driven competitiveness of the Czech Republic. "The Czech Republic needs to explore ways to transition to a knowledge economy in view of its present stage of development: compared with other economies at the same stage, technological readiness remains low (36th) and Czech businesses — although doing comparatively well in a regional context — are less sophisticated and innovative than other economies in the European Union. The country's competitiveness would be further enhanced by improvements to its higher education system, where the Czech Republic, at rank 35, features among the 10 lowest ranked EU economies" (GCR, 2014: 24).

2.2. Case Study of a Czech SME – The Company X

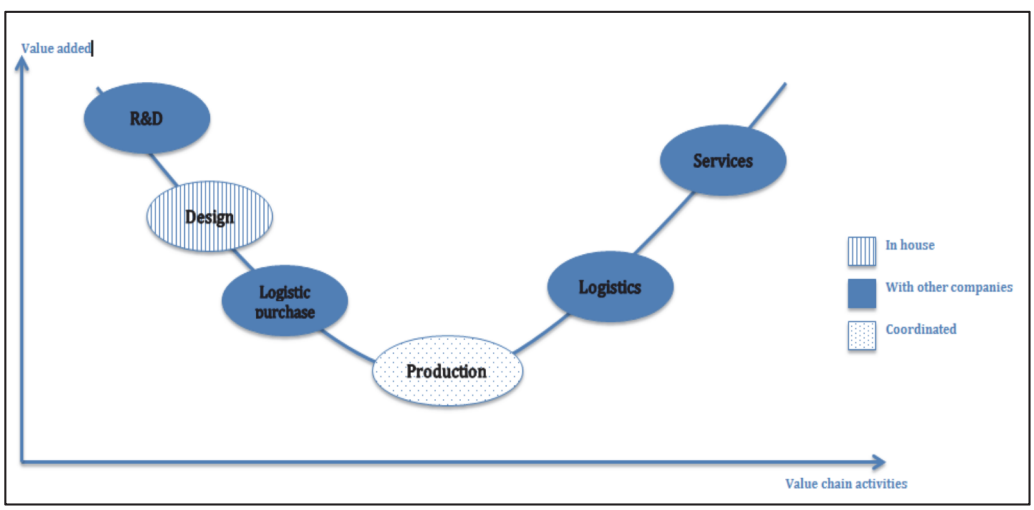
The Czech Republic is known for its traditional manufacture of machines and heavy industry. Apart from the automotive industry, which has experienced massive inflows of FDI in recent years, and nowadays more than half of the production in this sector is being exported, manufacture of other transport equipment represents also an important industry for the Czech economy. In 2013 the machinery industry (car production excluded) accounted for 37% of Czech exports. The Czech companies have a long tradition in transportation and tramways, buses and trains production, which is exported worldwide. Therefore, the above mentioned sectors are highly relevant for value added analysis. Since the automotive industry has been relatively well mapped in the Czech Republic (see section 2), this section provides an analysis of Company X – a representative of machinery of other transport equipment (CZ-NACE 30). The company is unique for its production targeting, particularly of foreign markets (based on traditional quality), an assumption of innovation and research (for technologies constructed at the request of a client), and potential, as it is an innovative SME. The assessed industry has gone through rapid changes. It is highly dependent on public procurement and the interests of local and national public bids. The company under examination is a design studio for rail vehicles, and it is a part of a larger conglomerate. The Czech Company X was founded in the 1990s, and currently employs around 250 people, 50 people in the design studio (the employees are mostly engineers and salespeople).

The main business of Company X is trams and rail vehicles production based on the build to order approach. Its core functions involve the development and engineering of the product. Furthermore, they also provide business services, which consist of the purchase of used vehicles and reselling them to other companies, including the provision of all necessary documents and logistics. In terms of production of rail vehicles, the core activity of Company X is the design of a new product, including the technical drawings, based on the client's requirements. The construction itself (assembly) is done by another company and supervised by technicians of Company X. Company X is responsible for the purchase of all components. Several components need to be designed and developed specifically for the given product. In this scenario, Company X requests the development of such components from its suppliers based on their technical specifications and requirements. Then, Company X provides the financial requirements for the order such as bank credits and guarantees, it coordinates logistics, and provides all customs and other necessary documents (packing is done by other companies but supervised by Company X on site). Thus, in terms of the whole tram value chain, most of the

non-manufacturing activities are conducted by Company X. Those are the activities with the highest value added (see figure 2).

Over the past 10 years, Company X constructed around 35 trams. Approximately a third of the production was determined for the domestic market, the rest were exported to the USA, Bulgaria and one tram to China. Currently, the whole production is for exports to the US. Since some of the US contracts have been financed by federal funds, there is a need to apply the "buy American" rule. According to this rule 60% of components and also assembly needs to be done in the US. Procurement itself is thus often more complicated and time-consuming than the design and development, especially for the US market. Several aspects need to be taken into account such as the quality, the costs of components, and the location of the manufacturing plant in the US, which on its own does not guarantee the American origin. Some product components may come from other countries. There are also exceptions to the Buy American rule, e.g. if a similar component can be bought outside the US and is cheaper by 60%.

Figure 8: Activities performed by the Company X



Source: Own graphics

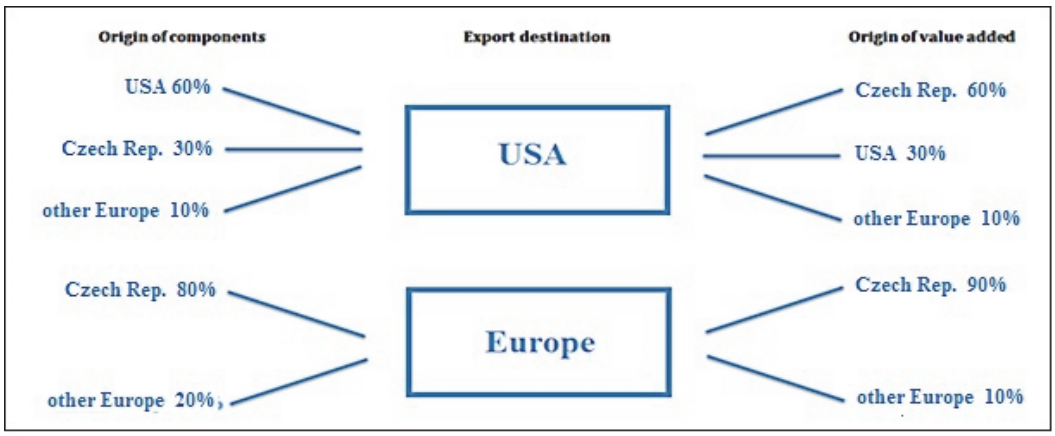
In terms of origin of the components and value added, there are big differences between the products destined for the US, and the European markets. Despite the fact that the Buy American rule does not apply to all trams exported to the US market, the trams are very similar and using other components would require new technical documentation and further development. Thus, due to scale economies all trams to the US now apply the

Buy American rule. On average the "US" trams contain 60% of components from the US, 30% from the Czech Republic and 10% from other European countries (see fig 3). The origin of components does not correspond with the value added. Firstly, the highest share of value added is captured by such activities as design and development. Secondly, also the components can include foreign value added despite the fact that they were manufactured from start to finish in one country (e.g. the design of such product can be located in another country, or the raw materials come from other countries). In terms of value added, approximately 60% of value added is captured either by Company X or Czech supplying companies. On the other hand, the trams for the European market consist of around 80% of components from the Czech Republic, the rest of the components are from elsewhere in Europe. Czech suppliers are preferred for high quality and low prices. Nonetheless, the company also faced some problems with local suppliers, e.g. when TPCA attracted the most skilled workers and it took some time before new skilled workers were found. In terms of value added of these trams, approximately 90% originate from the Czech Republic.

Apart from tram production, Company X also reconstructed 10 rail units for Austria. In this case the majority of components came from the Czech market as well. The above mentioned shares are estimates. There are constraints on getting the accurate data on components' origin and identification of Czech suppliers. However, the involvement of local suppliers significantly affects the domestic economy.

Since Company X focuses on custom production, each order requires different specifications and several product and process innovations. Two major product innovations in recent years were requested by the US clients. The first one was the introduction of completely low-floor trams. The second one was the tram without trolleys, which required powerful lithium-ion batteries. Company X did not provide the core R&D of the battery, however, they designed and specified the parameters. Process innovations are connected with every product innovation since there is a need to change the design, technical parameters and the whole production process. Additionally, every order requires slightly different security parameters etc. Company X has also witnessed functional upgrading. This includes for example the above mentioned packaging, which started with the exports to the US. Chain upgrading is also occurring at the level of the conglomerate, which regularly takes on new activities in different sectors.

Figure 9: Origin of Components and Value Added Based on Export Destination



Source: Own graphics

In terms of public policies, Company X views as the biggest obstacle for further growth, and upgrading, the limited availability of technically qualified personnel. This view has been given by many manufacturing companies in recent years (e.g. AMSP, 2015), and it points out the shortcomings of educational policies. In terms of local linkages and upgrading of local suppliers, this example signifies that even the policies in the country of final demand may significantly affect the origin of the components.

2.3. Policy implications

A complex framework, vision and engagement of all actors starting with institutions, political environment and society is crucial to providing favourable conditions for businesses and enhancing value added. The character of industries and upgrading possibilities in general are significantly affected by national level rules and institutions (Gereffi et al., 2005). Discussion on upgrading would not be complete without looking into policies with direct impact such as education, innovations, investments, as well to industrial policies and their setup.

Structural reforms need to be implemented in order to improve conditions that could contribute to an increase in domestic value added, and raise the attractiveness of investment in higher value added activities. The most crucial areas are reforms of the educational system, coherent support of R&D, achieving efficiency of the public sector and fighting corruption. In this regard the Czech government has prepared several documents that identify the most problematic areas, although reforms and action are often lacking. Preparation of new

legislation is too slow and is often in contradiction with political goals that are based on short-term results. Therefore, there is an urgent need to boost structural reforms, improve legislation and ensure their efficient implementation. Consensus among the actors involved in policy-making, particularly political parties, is required in order to achieve a successful and competitive innovation-driven economy.

In 2005, the Czech government approved a "Strategy of Economic Growth for the period 2005–2013". According to the strategy economic growth should be accompanied by sustainable development and major attention was given to innovations, infrastructure, macroeconomic stability, healthcare, education, labor market, financial services, efficiency of the goods and services market and business environment, pro-export strategy and cohesion policy (Jahn, 2005). In 2012, the National Economic Council[5] came with a complex Framework of Strategy for Competitiveness which identified the main issues, where reforms need to be implemented. This became later a base for the entire strategy of competitiveness. The analysis brings up seven main pillars − institutions, education, effectiveness of goods, services and labor market and their relations to taxes, financial market, technological preparedness and improving features for business and innovations. In 2012, the Ministry of Industry and Trade introduced another umbrella document, which defined the goals that need to be achieved in order to become one of the 20 most competitive economies in the world. The government sees as priority areas the institutions, infrastructure and innovations (the so called triple I). However, implementation of such a complex agenda has its limits, and is very often overshadowed by the ambitions of particular ministries that do not take this complex strategy into account by developing single policies. Yet, in all strategic documents, the Czech government emphasizes a growth driven by innovation and research.

In 2014, the National Program of Reforms was introduced. In terms of research and innovation the interest is to "systematically strengthen the significance of research and innovation activities and production with higher value added as the key presumption for enhancing the competitiveness of Czech businesses" (Office of the Government of the Czech Republic, 2014). Reforms in three areas have been identified. Firstly, focus is on the improvement of conditions for excellent research in areas where strategic investment in R&D could benefit from local comparative advantages. International cooperation and contact with excellent research is considered to be helpful. The government is preparing new legislation, which should introduce new tools for funding excellent R&D activities in 2015. The second area involves strengthening

[5] National Economic Council is an advisory body working with the Czech government

cooperation between businesses and research organizations. Generally, the linkage of local educational institutions are weak, not only with TNCs, but also with domestic firms. In this regard the government approved a new law on income tax for the purposes of technical education and contract research, which facilitates purchasing research activities from public research institutions. Companies can deduct more tax (from 100 to 110%) when investing in R&D (OECD 2015). The third area focuses on innovatory entrepreneurship and the development of startups. Innovative SMEs (such as Company X) play a crucial role in innovation driven economies, particularly in the Czech Republic, where their share in the added value of the Czech Republic is about 55% (MPO, 2014). Hence, attention should be given to the promotion of "success stories" of Czech companies that became globally successful in order to encourage entrepreneurship among young people as well as inspire existing SMEs to be more ambitious. Therefore, the government wants to support activities that directly help innovation infrastructure and contribute to development of startups. New legislation providing flexible tools for funding financially demanding projects of innovative SMEs should be introduced. One of the options is to establish a Seed Fund, a venture capital fund co-financed from the EU funds. Another challenge is the support of the so called endogenous champions. These are companies that have a great potential and are driven by global demand, while owned by Czech citizens. Often they are active in new dynamic sectors such as IT, or new technologies, and are highly innovative. As the National RIS3 strategy[6] states "supporting and raising such companies is a long term process, which needs a systemic approach, long term work needed in identifying and gaining their confidence."(RIS3 Strategy: 24). Moreover the RIS3 strategy highlights three main issues that need to be tackled: 1.) low level of entrepreneurship and low performance of business sector (Czech companies with global activities); 2.) a high degree of dependence of the economic growth in the Czech Republic on activities under foreign control; 3.) the instability of the regulatory framework and administrative burden in fulfilling regulatory rules.

The government is considering the establishment of a new ministry, which would only focus on R&D, because this agenda is currently integrated within the Ministry of Education and Sports. Higher education is of key importance in an

6 National Research and Innovation Strategy for Smart Specialization of the Czech Republic (National RIS3 Strategy) should help to target funding from the EU, national and private sources in the Czech regions. This document is one of the preconditions of the European Commission for using EU funds in research and technology. It builds on previous strategic documents of the government and covers almost all fields that directly or indirectly affect R&D and innovation funding. In the strategy, concrete steps that need to be undertaken in order to boost and enhance the allocation of funds for the regions are described.

innovation-driven economy. The negative demographic trend has in general generated a lower number of applicants for university degree courses. At the same time, requirements for the new entrants and students in general have been softened and as a result the university degree became more "mass" rather than elite as several private universities have gained state accreditation. This puts a lot of pressure on the diploma's quality because in many cases graduates hold a degree, but often lack the competence, particularly practical skills. Therefore, a lot is expected of the proposed reform of the system of higher education.

A new amendment to the Higher Education Act is about to bring more complexity in support of quality, as well as the instruments which can better prepare graduates for the labor market. Employers in the Czech Republic often criticize the low quality of graduates and their practical and social skills, flexibility, etc. (French-Czech Industry Chamber, 2015). The issue of low preparedness is also being criticized by the OECD (2015). Science and technology study programs are less popular in the Czech Republic (as indicated by the statistics in the section 3.1), though it is a common feature of the whole of Europe. Nonetheless, due to the significant role of manufacturing in the Czech economy, this is even more problematic. The question remains whether technical and engineering study programs should be favored. Crucial industries such as the automotive and machinery industries will need experts in these fields and the current situation shows, that without government efforts, this sector will be lacking in a qualified labor force with suitable education. In fact, this is already happening. Due to little action by the government, several companies have decided to take some action and started supporting selected secondary schools which are focused on manufacturing and industry. There has been an important role played by the regions in this regard, especially their engagement in developing scholarship frameworks and continuous support for students of machinery and engineering programs. Apart from the above-mentioned new things, the new law will also introduce institutional accreditation; this will focus on internal quality assurance (more independence in accreditation processes) and on higher efficiency of financing. However, the European Commission identifies a risk in the implementation of available funding due to the expected high expenditures required by the reforms (EC, 2015a).

Based on international comparison, and indexes of competitiveness, as well as the business environment in the Czech Republic, the major issues are hidden in areas such as infrastructure, bureaucracy and corruption − in general in the institutional framework. The bureaucratic burden is also mentioned among the recommendations of the European Commission: "Despite recent improvements, inefficiencies in the business environment still hold back the competitiveness of

the Czech economy" (EC 2015a). This is related to low political stability in recent years, and inefficiencies in government regarding the implementation of the new regulations. Another issue was the missing Civil Service Act, which should bring more stability and independence to the experts (which have often been exposed to political interest) at all levels in governmental agencies. However, the concerns go to the systematization of the civil service.[7] This is directly intertwined with corruption, which is also mentioned in the European Commission overview of recommendations for fulfilling the Europe 2020 strategy. This includes acts on financial control, public prosecution, the financing of political parties, the protection of whistle-blowers, a new policy on the management of state-owned companies and the introduction of an Amendment on free access to information (EC, 2015b).

Conclusion

The situation of the Czech Republic has improved in most areas under study, which is a sign of upgrading. In terms of education, R&D and innovation, labor productivity and competitiveness, the Czech Republic has made progress. There is an increasing share of foreign value added in Czech exports, but the ratio of backward to forward linkages remains stable. Nonetheless, the country also faces major limitations. Despite the large number of graduates in the social sciences, the domestic services value added share of exports is very low (at the level of developing countries), and has dropped since 1995. Since service activities produce higher value added, this is extremely problematic. Overall, mostly product and process upgrading prevails (CSU, 2014; Pavlínek and Ženka, 2010). Science and engineering plays a crucial in upgrading. However, most business R&D is currently carried out by foreign owned companies (over 90% of patent applications and around 50% of expenditures). This means that it is usually not core R&D which is performed, and it directly affects who controls and captures the value added. Considering the business environment and policies, an unstable regulatory framework is a major problem. Applied methodology does not show signs of downgrading since this is usually happening at firm level. Nonetheless, it has been proven that downgrading is also occurring among Czech companies (Pavlínek, 2012).

There are sectors where the Czech Republic has a comparative advantage, and where it is competitive. Czech scientists and companies excel in areas such as nanotechnologies or biotechnologies, ICT or medicine. We believe that those

[7] Questions are rising on bonuses for experienced servants as well as entry levels for new staff. An NGO Rekonstrukce státu therefore expect further changes of this legislation. Statement of Rekonstrukce státu http://www.rekonstrukcestatu.cz/publikace/stanovisko-pn-sluzebni-zakon.pdf

sectors should be preferred (as elaborated in the RIS document – MSMT, 2014) since they provide further possibilities for upgrading. Company X, in our case study, is a designer of trams and it is an example of a successful SME involved in upstream activities within the GVC, thus creating the largest share of value added. So far, Company X is Czech-owned, therefore the value is not only created but also captured in the Czech Republic. Company X is a small company with small profits due to the limited number of tramcars. On the other hand, even SMEs can affect the local economy through their linkages with domestic companies. Company X sources most of the components from Czech (local) companies for European production. In terms of US exports, the procurement is affected by the buy American rule. We believe that more attention should be given to innovative domestic SMEs, such as Company X in our case study, and their role in creating and capturing domestic value added and promotion of entrepreneurship. In spite of many strategies aimed at improving the business environment and supporting innovation, continuous action has been lacking. In our view the government should ensure that education and practical skills correspond with specific needs of employers. Furthermore, linkages between private and public institutions at all levels should be strengthened. Another important area is investment policies. Officially, the positive impact of FDI surpass the negatives ones. Despite the pronounced support for investment in activities with higher value added, most of the investment is in basic assembly creating low- to semi-skilled jobs and limited value added. The negative current account balance confirms the role of profit repatriations. All investment incentives should thus be carefully assessed especially in terms of how much value should be created, controlled and captured to avoid the race to the bottom.

As the global value chains are continuously evolving, increasing the capabilities of (Czech) suppliers can affect the architecture of GVC, as well as the forms of GVC governance towards lower power asymmetry (Gereffi et al., 2005). On the other hand, the GVCs and the distribution of production activities is also induced by technological development. The increasing computerization leading to mechanization and robotization in manufacturing industries will have an impact on employment in manufacturing. Czech companies might be pushed towards greater flexibility, productivity and higher pace of innovation. Low-skilled jobs are at the greatest risk, whereas the demand for a highly skilled labor force, especially the technically educated one, will increase. The extent of such changes is unknown, however location decisions are already being affected by increasing mechanization (e.g. the location of the BMW plant in the Netherlands instead of in Slovakia). Despite suggestions for improving policies related to the upgrading of Czech companies in GVCs, it is necessary to point out that improving the regulatory framework may have limited impact on the upgrading

possibilities of firms within GVCs in small countries like the Czech Republic. Unlike China, the bargaining power of the Czech Republic is relatively weak. Thus, the strategies of TNCs remain an important variable for upgrading.

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Global Value Chains and Upgrading: The Experience of Hungarian Firms in the Heavy Engineering and Automotive Industries

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Abstract

Global networks shape international manufacturing and trade. The main question which our paper deals with is how Hungarian companies can improve their positions within these global value chains. The production and export parts of the automotive and heavy engineering industry sectors are dominated by foreign multinational corporations. Therefore, these sectors were chosen as examples. Research is based on interviews that explore local manufacturing subsidiaries' production processes and functional upgrading experience. Our findings show that there are differences among the firms regarding the extent of the upgrading. This depends, on the one hand, on the owner's global strategy, as well as on the type of final product being turned out. On the other hand local capabilities are of vital importance among the factors that influence the volume of intangible transfers. Furthermore, our interviews have suggested that upgrading is not a mono-directional process: previously gained mandates can also be lost. Economic policy should support the business development and entrepreneurial learning, as well as providing adequate conditions for suppliers and subsidiaries of leading multinational enterprises.

Keywords: Global Value Chains, Hungary, multinational companies

Introduction and Methodology[8]

Today, global production networks are widespread. Their activities form a new phase of globalisation characterised by fragmented production, transfer of technology and decreasing transport costs (Kaplinsky, 2013). The Central European countries have been actively participating in the chains of multinational firms since the 1990's. The benefits accruing from this

[8] The study was supported by the International Visegrad Fund, project no. 21420039: "How to benefit from Global Value Chains? Implications for the V4 countries".

participation varies across the sectors and their firms. In this paper we analyse the experience of Hungarian companies in the heavy engineering and automotive industries.

Since around 2000, intra-industry trade turnover data reveal a strong expansion between the Visegrad (V4) countries and their main trading partners (Germany, Austria) in the automotive and heavy engineering industries. This suggests an increase in cross-border activity by global value chains (GVCs).[9] The role of foreign enterprise in both industries is dominant; such companies often operating for over two decades in Hungary. While in the automotive industry large foreign corporations play a decisive role; in the heavy engineering sector the picture varies. This gives us an opportunity to analyse the large, medium and small foreign-owned subsidiaries. Upgrading is strongly related to both industries, thus providing ideal terrain for its analysis.

The inclusion of Hungarian firms in the global value chains is a fact. The question is how these companies can improve their position. We are trying to assess the process of upgrading and the role of the given supplier firms, as well as mother companies in this process. Therefore, we asked questions relevant to product, process and functional upgrading during personal interviews, which were carried out at the respondent companies.

Our methodological approach is to apply company case studies. Personal interviews can reveal factors accumulated during the upgrading process (such as the transfer of tacit knowledge), which are hard to measure. Sample firms in the sector of heavy engineering were selected with the aim of demonstrating the heterogeneity of successful development trajectories even within one single area of industry. Affiliates of large corporations in the automotive industry offered good samples for detecting differences behind the similarities. Being an established company was an important selection criterion, since upgrading is based partly on demonstrated subsidiary capabilities. We have included small, medium and large corporations in our sample, in order to identify possible correlations between size and upgrading. Interviews were based on open-ended questions that focused on the histories, drivers and outcomes of upgrading.

The structure of the paper is as follows: First a literature review is provided, then we introduce the participating companies, as well as reviewing the product, process and the experience gained through their functional upgrading. Finally, we discuss our findings and propose some managerial and policy implications.

[9] WIOD table data for the years 2000 and 2011 show a significant increase in the exports and imports of each individual V4 country, especially towards Germany, but for their intra-industry trade relations as well.

1. Literature Review

As we already know, during recent decades, international trade and manufacturing has become controlled by global value chains. There is a large and growing body of literature on the activities, measurement and upgrading of the global value chains. We focus now on the last mentioned.

Participants in the global production network are constantly developing their activities. Suppliers to global value chains are often multinational companies themselves. Thus, GVCs are mostly not controlled by one single leader; the direction itself can be fragmented. One affiliate of a multinational can have several roles within its function (Sass-Szalavetz, 2014). It can have higher (global) and lower level tasks within one segment.

We analyse upgrading by applying the widely used and accepted definition of upgrading, which is a move from a lower value-added activity towards a higher value-added one (Barrientos et al., 2010, Milberg-Winkler, 2011).

Economic upgrading was organised into *four main types* by Humphrey-Schmitz (2002) and this typology is usually applied since then (in addition to economic upgrading „social upgrading" also exists[10]). According to these authors upgrading of a firm may be:

1. product upgrading: moving into more sophisticated product lines (which can be defined in terms of increased unit values);
2. process upgrading: transforming inputs into outputs more efficiently by reorganising the production system, or by the introduction of superior technology;
3. functional upgrading: acquiring new functions in the chain (or abandoning existing functions) to increase the overall skill content of activities;
4. intersectoral upgrading: using the knowledge acquired in particular chain functions to move into different sectors (often called 'inter-chain' upgrading taking place in one strand of a value chain, also).

Certainly, these groups overlap or derive from each other. Therefore, it is sometimes difficult to distinguish product and process upgrading, especially

[10] Social upgrading is not discussed in this paper. It means improvements in working conditions and rights. It includes such measurable standards as health, safety, working hours, and enabling rights, like non-discrimination and freedom of association (Barrientos et al., 2011). As some authors claim, economic upgrading can lead to social upgrading, but not necessarily (Barrientos et al., 2010, 2011, Bernhardt – Milberg, 2011, Bernhardt, 2013, Goger, et al., 2014). Several factors affect the interaction of economic and social upgrading, like the type of work, status of workers (Barrientos et al., 2010). There are cases when economic upgrading in a GVC can lead even to social downgrading, labour exploitation, and a manufacturing shift to lower-wage areas.

where the introduction of new processes generates new categories of products. Apart from that, the manufacturing process can also be improved by matching safety, technical or environmental standards that may lead to products with better qualities. However, these are not necessarily of higher-value to the producer (Ponte-Ewert, 2009). Economies of scale can also increase profits in value chains, but not only from process upgrading, but also via aggregating orders to increase the volume of sales. This can actually lead to product 'downgrading' (lower value products sold in larger amounts; see Gibbon – Ponte, 2005).

Regarding the manufacturing sector, the largest number of articles have concentrated on functional upgrading [which can be voluntary, but in most cases the mother company expects that its affiliate fulfils a greater quantity of more complex tasks]. Functional upgrading can be realised in three main ways: *widening* of functions (several other functions have been joined to the production process itself; the extent of diversification depends on the company size and age), *deepening* of a given function, by increasing its complexity, or *widening* the *scope* of a given function (an affiliate can itself become regionally or globally competent and responsible).

It is important to stress that upgrading of affiliates often takes place together with the changing and development of the whole production chain. As external conditions change, mother companies react and modify value chains, develop certain parts, as well as reorganising and diversifying them. Innovation activity is continuous. From the participant firm's aspect upgrading is crucial for survival.

More recent contributions have highlighted the links between different forms of GVC *governance,* as well as the possibilities for upgrading, particularly functional upgrading. Governance is a top-down process starting from the leading firms, while upgrading is bottom-up concept, designed to improve initial positions (Lee–Gereffi, 2015). According to the first typology from decades ago, governance can be producer-driven or buyer-driven (Gereffi–Korzeniewicz, 1994). As GVCs became more and more widespread, the increasing complexity of production networks made it necessary to create a more refined typology. Thus five types of governance were defined (Gereffi, et al. 2005): market, modular, relational, captive, and hierarchical. Each governance type can exert different effects upon the upgrading of a supplier firm.

Market governance involves simple transactions with no formal cooperation between participants and the cost of switching to new partners is low. The organisation of the chain presents low barriers to upgrading, though it may not be easy without the support of lead-firms (technical, financial support, market

information, etc.). In the case of *modular* governance, suppliers make products or provide services to a customer's specifications. Here the product is more complex, but sufficiently modular in design. *Relational* governance types involve complex interactions between the lead-firm and supplier. The buyer and supplier develop intertwined relationships involving tacit knowledge exchange and knowledge spill-overs (Cattaneo et al., 2013). *Captive* governance is characterised by a high degree of monitoring and control by the lead-firm, with small firms dependent on those larger buyers for trade. In captive relationships, significant product and process upgrading by local suppliers takes place. At the same time, functional upgrading is either discouraged, or limited to some functions (Schmitz, 2006). *Hierarchical* governance is characterized by vertical integration and managerial control within a set of lead firms that develop and manufacture products in-house. This usually occurs when product specifications cannot be codified, products are complex, or highly competent suppliers cannot be found (Cattaneo et al., 2013). Hierarchical structures provide regular employment, guarantee quality and build producer capacity.

The economic literature on global value chains contains some articles concerning certain sectors where upgrading and GVC participation of the firms in the Central-European region are analysed. Here we have included those that deal with Hungary.

Upgrading in the electronic sector, with regard to Hungary and Romania, is the subject of the article by Plank–Staritz (2013). As low-cost export production platforms, CEE firms were integrated into the global electronic production networks with support by domestic government policies. Later these countries were also hit by outsourcing to Asian, and other, countries, where costs were lower. Often the transnational corporations brought foreign suppliers to their host countries, and this had an effect on domestic suppliers. Sass–Szalavetz (2014), found successful R&D based upgraders among Hungarian subsidiaries, as well as stressing the importance of proactive behaviour, the local business climate and highly skilled employees.

Concerning the upgrading process in the automotive industry in the CEE countries, Pavlínek and his co-authors (2009), analysed long-term structural changes in exports. They revealed that the structure of Hungarian exports between 1996 and 2006 moved to high value added products. Based on company research, he added that the characteristics of production have an influence on the prospects for industrial upgrading. When the product is designed locally, more added value is created in the host country (2009, p. 54.). At the end of the 2000's the picture in the Hungarian automotive sector is rather heterogeneous: there were companies with medium to high local content (e.g., Magyar Suzuki),

and companies with very low local content (e.g., Audi Hungaria Motor). This draws our attention to the heterogeneity of the upgrading process. Jürgens and Krzywdzinski (2010) highlighted the fact that updating in the narrow sense does not necessarily mean updating in the broader sense. Based on case studies and surveys, the upgrading of the organization of work and the transfer of best practices (e.g., working time flexibility) into the CEE countries, were realized as part of the standardisation of the production process (Krzywdzinski 2008).

Concerning the transfer of research and development r to affiliates, Winter (2010) draws attention to the constraints placed on such transfers; namely that R&D is a core competence, which remains located in the MNC's' home countries. Smahó (2012) also confirmed this while focusing on the knowledge-transfer system of the automotive industry in six Central and Eastern European countries, as well as in Austria and Germany. She pointed out that FDI has led to a modernisation of processes in the automotive industry. However, R&D activities cover only applied research. Basic research remains at the home headquarters of the MNCs.

2. Case Study Findings of three Hungarian Subsidiaries in the Heavy Engineering Sector

In this part we analyse the findings of interviews carried out with the CEOs of three multinational companies' Hungarian subsidiaries in the heavy engineering sector. Our interviews' aim was to reveal details about product, process and functional upgrading.

We have included a small company (TIPA Vezérléstechnikai Kft), as well as a medium-sized (IGM Robotrendszerek Kft) and large company (Grundfos Magyarország Gyártó Kft.) in the sample. Two of them are export-oriented with export shares above 95%. One company is integrated in global value chains through selling the majority of its products (70 % of total sales) to the local subsidiary of a large global company.

The sample companies, their ownership and governance structures are to some extent heterogeneous. IGM and Grundfos are both vertically integrated into their MNC's' organisation, i.e., they are subject to explicit coordination in a hierarchical form of governance. TIPA enjoys high levels of autonomy in all functions (see later), and its transactions can be characterised by relational governance, especially in the case of its dominant buyer.

Two companies are integrated into the multinational organisations of a rapidly globalising IGM, as well as a global Grundfos company, respectively. TIPA has a domestic (minority: 30%) owner, which partly explains the relatively

higher autonomy of its local management. Another factor that influenced the development trajectory and the autonomy of TIPA is that its current foreign owners are two Austrian private equity firms.[11] Table 1 summarises the main data of the companies in our sample.

Table 5: Data of the surveyed heavy engineering companies (2014)

	TIPA	*IGM*	*Grundfos*
Owner's nationality	Austrian (70%) Hungarian (30%)	Austrian	Danish
Number of subsidiaries of the MNC	3 (*)	24	80 + companies in 55 countries
Products	production equipment (automotive), customised machines and industrial electronic equipment	welding robot systems	pumps (and components thereof) for diverse applications (industrial, construction, utilities, agriculture etc.)
Foundation	1995 / 2006 (2)	1990 / 2000(4)	2000
Number of employees	47	166 (1)	2,200 (1)
Sales 2013 (€ million)	4.6 (3)	19.7	428.4
Share of exports (%)	15	99.5	97

Note: (1) at the time of the interview
(2) predecessor established in 1995; since 2006 the company is in its current form (ownership, activity portfolio etc.)
(3) 2014
(4) entered through privatisation, major development through greenfield expansion
(*) portfolio companies in a diverse range of industries

Source: Interview data and income statements for sales

2.1 Product Upgrading

The interviewed managers were unanimous in reporting a substantial qualitative and quantitative expansion of the product mix during the past

[11] As is evident from the management literature, there are large differences between private equity firm owners and vertically integrated MNC's in terms of governance arrangements; i.e. between the degree of autonomy granted by private equity firms to portfolio companies, and the patterns by which MNC headquarters coordinate their subsidiaries (Barber–Goold, 2007; Klein et al., 2012).

decade. While the evolution of the product mix was the outcome of TIPA's local management's, own strategic initiative; in the cases of IGM and Grundfos, expansion was the result of the owners' relocation decisions.

Specialised initially in the manufacturing of control units to be integrated in industrial production equipment, TIPA decided to upgrade and to also include the complex task of manufacturing its own self-designed production equipment into its product mix. Upgrading in this case required, first of all, business development capabilities: the ability to persuade customers that the small Hungarian factory is a reliable supplier of production equipment, complete assembly lines, and of newly designed, customised solutions.[12]

Conversely, the expansion and the upgrading of the product mix at IGM and Grundfos were driven by the mother companies' relocation decisions. Production at Grundfos expanded rapidly with the relocation of additional products from the investor's home country, as well as from its other facilities. Product upgrading took a qualitative turn when the MNC owner's newly developed products were also located to the Hungarian facility. At the time of the interview, two thirds of the MNC owner's newly developed products were being manufactured in Hungary.

IGM has a "textbook-type" product upgrading history. The initial entry mode of its owner was through privatisation of the Győr facility of a socialist state-owned enterprise. Mechanical metal processing activity was transferred to the privatised facility in 1990. Positive experience motivated the owner to engage in greenfield expansion in the Győr Business Park for the assembly of complex welding robots, followed by the transfer of the production of control systems. Currently the subsidiary is in the process of substantial product upgrading with the partial relocation of the MNC owner's most up-to-date (electron beam) technology from its German subsidiary. Expansion (in both IGM and Grundfos) was continuous, and of such a large extent that it required not only the enlargement of the initial facility, but also the construction of new production facilities (Grundfos has already four production facilities in Hungary; IGM recently completed the construction of its third facility). As a result of consecutive (re)location turns, Hungary has become the largest European manufacturing location for both IGM and Grundfos.

[12] Interestingly, the crisis contributed to the fulfilment of TIPA's upgrading objectives. During the crisis years automotive companies (the main customers of 'A') would opt for improving the efficiency and the reliability of their production equipment instead of investing in new machinery. Demand increased for TIPA's solutions such as camera control systems (automatic optical inspection and handling solutions), and dedicated retrofit solutions of existing production systems.

Decisions on the expansion of production, and on the location of newly developed products, were in several cases the outcomes of intra-MNC competition:[13] the result of already demonstrated subsidiary capabilities. However, once the decision on the expansion of the Hungarian location was taken, and investment was made (i.e. production technology was deployed to the newly established manufacturing facility), it became self-evident that the production of specific newly developed products will be located to Hungary. In short, the deployment of the new production technology created a path dependent trajectory for further product upgrading.

2.2 Evolution of the Production Process

As has been already stated in the previous section, product and process upgrading are strongly interrelated. The improvement of process efficiency started with the effective absorption and mastering of the transferred technology. The considerable subsidiary capabilities have proven to be a precondition for further product upgrading.

A conspicuously common thread running through our interviews was that the surveyed companies co-evolved with their mother companies. Subsidiaries kept pace with the technological development of the production and testing of equipment related to their core activities: irrespective of size, they purchased (several times during the surveyed period) new production equipment which was state of the art. They invested in enterprise resource planning solutions, where the manufacturing modules contribute to production scheduling, material requirements planning, engineering data management and the like: in short to process optimisation.

We found strong positive relationships between size and commitment to adopt formal process development techniques, such as lean practices[14].

TIPA has not invested in the introduction of formal process improvement techniques. Nevertheless, its products perfectly comply with the non-negligible formal requirements of Audi, its main customer, even without these practices.[15]

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[13] In the case of Grundfos, for example, competing locations included partner subsidiaries in Romania, Slovakia, Serbia, and Bulgaria.

[14] As highlighted in the operations management literature, the combination of advanced manufacturing technologies and lean practices may result in synergistic effects on operational performance (see review by Khanchanapong et al., 2014). Lean practices have a positive impact on multiple dimensions of operational performance: product quality, lead time, flexibility and costs.

[15] Notice that in TIPA's case, the lack of formal process management techniques can be explained by the fact that TIPA outsources a large volume of manufacturing tasks to

TIPA's experts keep monitoring the technological development that takes place in their industry (e.g. in control technique), and transfer information about the newest innovations to their core employees through targeted seminars.

IGM, the medium-sized company, employs highly skilled engineers for development tasks, as well as a group of quality control managers. A major process development objective at IGM was the reduction of the time requirement for manufacturing customised, special purpose machinery. The reduction of the lead time required a comprehensive review of the processes, and the optimisation of both the core and support processes (e.g. logistics). Consequently, the time requirement for the full assembly of an industrial welding robot was reduced to 3–4 months (previously, full assembly took 5–8 months).

Process development is even more formalised at Grundfos. Formalisation is manifested in the systematic introduction of up-to-date quality control & quality improvement techniques, which at the same time, ensure the continuous enhancement of process efficiency. Investment in the work environment (health and safety) also contributed, albeit indirectly, to process efficiency improvement. Moreover, Grundfos has adopted advanced approaches to measuring business excellence. Production (quality, sustainability) and productivity improvement, in short: the improvement of *the company's own* (company-specific) *production system* is driven ahead, not by individual projects (i.e. by implementing from time to time the latest production concepts); it constitutes one of the objectives of *lasting strategic programmes*.

In 1996, the Danish headquarters launched an overarching performance management programme using the manufacturing PROBE; a best practice benchmarking solution. PROBE implementation starts with a review of the operational and management practices which are benchmarked with the help of a database of more than 7,000 companies in 40 countries. The method helps to identify inefficiencies and proposes solutions for improvement. In the second half of the 2000's new group-level reviews started, and that time, the Hungarian subsidiary was already audited as well.

In 2008, Grundfos started a systematic business excellence development programme (EFQM Excellence) in order to try to improve on all aspects identified by the PROBE benchmarking tool. The outcome was a non-negligible

processing (turning, forging) workshops in the region. TIPA specialises rather in the know-how of the design of customised special purpose machinery, and in the final assembly, deployment and installation thereof.

productivity improvement. This programme has also opened up a variety of functional upgrading opportunities.

Another channel of process upgrading was related to Grundfos's environmental programme, which transcends the 'simple' implementation of the ISO 14001 Environment Management System (implemented in 2004). In an effort to reduce CO^2 emissions, the Hungarian subsidiary invested heavily in solutions that improve sustainability, reduce emissions and enhance energy efficiency[16]. A positive side-effect of this was additional process upgrading: investments made in order to achieve sustainability objectives turned out to have a considerable impact on process upgrading as well.

2.3 Functional Upgrading

The expansion of production has, to some extent, automatically triggered functional upgrading at the surveyed companies. Support activities such as HR, accounting, administrative and clerical work, factory maintenance, quality control, etc. were immediately delegated to the local level.

The involvement of the Hungarian management in the procurement and deployment of new production machinery was already a function of the subsidiary's great capabilities at Grundfos. Hence, it can be considered as a primary example of functional upgrading. The development of this function was a long and gradual process at Grundfos, since the first milestones in the expansion of local production were marked by the relocation and the local deployment of the foreign investors' own production machinery from Denmark. Later on, the further expansion of local production already necessitated the purchase of new production machinery. The subsidiary's proven capabilities contributed to the increased involvement of the local process engineers and procurement officers in the selection and procurement of the new production machinery. However, although the local experts at Grundfos participated in the selection of the new equipment, the assembly lines were first delivered to the headquarters' premises, installed and tested (pilot production runs were carried out) by the engineers and the technicians of the headquarters, before being transferred to Hungary. Later again, following several successful upscaling

[16] In 2008, the strategy of 'no increase in CO^2emission' was announced by the headquarters. Although the Hungarian subsidiary has increased its production volume by more than 50 % since 2008, its CO^2 emissions have declined in absolute terms. This was achieved through investment in factory buildings, e.g. heating and lighting; adoption of green solutions (deployment of solar panels, and heat pumps etc.); substitution of old production equipment for new, energy efficient machinery; systematic analysis of energy consumption and waste and dedicated improvement steps.

operations, the Hungarian engineers were entrusted already with the design, procurement and deployment of the technological equipment, without the involvement of their Danish colleagues. This kind of functional upgrading was facilitated by another functional upgrading achievement: by the introduction of the process development function. Local engineers were given responsibility for designing the layout of the assembly lines, as well as for optimising the manufacturing processes of the new products.

This gradual development (functional upgrading in breadth and depth[17]) was not characteristic for TIPA. Upon its establishment, the CEO of the local subsidiary was entrusted with the building up of the firm. Ever since, he has been responsible for finding and hiring experts in all the necessary business functions, including procurement, finance, HR, logistics, training, engineering, R&D, business development and sales. Consequently, TIPA resembles a family managed, autonomous, domestic-owned company rather than a subsidiary integrated through hierarchical governance arrangements in a multinational company's organisation. This can be explained by the fact that the owners of TIPA are private equity investors. The upgrading trajectory of TIPA required rather entrepreneurial learning (e.g. Wang–Chugh, 2014). Integration in global value chains was a similarly strong driving force of TIPA's performance: many of its new business partners have been acquired, directly or indirectly, through its major business partner: through Audi's Hungarian subsidiary.

IGM is an in-between case from the point of view of autonomy. There is a clear division of labour between the Hungarian subsidiary and the Austrian owner: the latter is responsible for sales, logistics and also for general engineering and strategic R&D issues. The Hungarian subsidiary assumes responsibility for operational procurement tasks (strategic procurement decision making powers are retained by headquarters), and for all the operational support activities that are related to the local core activity (except for logistics and sales). Local responsibility is accompanied by a relatively high degree of autonomy in a number of (auxiliary) functions.[18]

The current division of labour is the outcome of substantial functional upgrading by the Hungarian subsidiary: in terms of transferring new products, transfer/purchase of the necessary production equipment, and the transfer of new business functions. As for the latter, over time the Hungarian subsidiary

[17] Functional upgrading in breadth refers to the increase in the number of business functions a given company is responsible for. Functional upgrading in depth denotes the increase in the complexity and knowledge-intensity of a given business function (Szalavetz, 2012)

[18] The degree of autonomy was fairly high already in the very beginning – note that the Austrian owner's first investment (privatisation of an existing facility) took place in 1990!

has gradually taken up several business functions, including engineering; the design of the internal robot base (welding cables, control lines, etc.); IT: programming of the industrial robots; and various support functions, including procurement, controlling, process and product development.

R&D is carried out jointly with the Austrian owner's engineers and the product developers. The increased role of the Hungarian subsidiary in MNC-level R&D activities is reflected by the increased share of the highly qualified Hungarian engineers in the workforce. The Austrian engineers decide on the division of the R&D tasks with their Hungarian counterparts: they provide their Hungarian colleagues with the technical specifications of the robots to be designed and manufactured.

The three most recent examples of functional upgrading at IGM was the take-up of joint responsibility for the programming of the robot systems; the hiring of a sales specialist (he/she is responsible for the Hungarian customers and reports directly to Head Office), as well as the further development of the electron beam technology, which is in the process of being partly relocated from Germany to Hungary.

Grundfos has followed an even longer functional upgrading trajectory, assuming responsibility for product development and testing; for the development of the software embedded in the production machinery; for selected procurement tasks and for the localisation of procurement (i.e., for finding domestic or CEE suppliers instead of the traditional advanced economy suppliers). As the Hungarian subsidiary had become the largest European manufacturing facility, the Danish headquarters decided to locate distribution and logistics to Hungary as well. Hungarian customer service was organised from the local distribution centre, where not only the locally manufactured products were stored, but also the full product mix of the MNC owner. Over time the local distribution centre became responsible for other CEE economies too.

In 2007 a training centre was inaugurated at the 'headquarters premises' of the Hungarian subsidiary. Grundfos organises courses for, among others, architectural engineers that provide deep insight into the ways Grundfos's products can be used in buildings, about environmental friendly solutions that apply Grundfos's products, etc. The e-Academy site operated by Grundfos serves a similar purpose.

Functional upgrading took a new turn with the location of a shared services centre (specialised in finances and IT) to Hungary. Though similar to local sales

and after sales activities, it is performed by a separate legal entity.[19] From the point of view of the Hungarian location, this decision can still be considered to be functional upgrading.

As mentioned earlier, the EFQM Excellence Programme opened up a variety of opportunities for functional upgrading in depth. As for workforce management, the absorption and local implementation of the mother company's corporate culture required a fair sized development of the related functions, often in a formalised and standardised manner. Workforce management, for example, is being improved through the implementation of the Occupational Health and Safety Management System (OHSAS 18001 certificate), which requires the implementation (and the documentation thereof) of all the required procedures. Needless to emphasise here, that the transfer of the corporate culture,[20] and the development of the HR function, involved substantial intangible investment, addressing for example workforce development, and the improvement of employee commitment.

Another function that was even more systematically developed at Grundfos was supplier development. The localisation of supplies required the development of supplier screening and system audit skills.[21]In the Hungarian case it also necessitated support to suppliers in order to help them meet the requirements. In 2011, the Hungarian subsidiary developed a supplier excellence programme. In addition to auditing suppliers' business processes; transport quality; cultural, ethical, and environmental requirements; as well as monitoring performance; this multi-year programme included the transfer of best practice solutions; design of customised development programmes (jointly with suppliers); consultation, coaching and evaluation of the results. The outcome of the programme (that, again, necessitated substantial intangible investment by Grundfos) was a spectacular increase in the share of local suppliers: currently (in 2013) the share of locally procured input is 27 %.

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[19] Grundfos has three subsidiaries in Hungary. Our interview was made with the CEO of the manufacturing subsidiary (four factories, a distribution centre, a training centre and the 'headquarters' responsible for support functions). Another subsidiary is responsible for sales, targeting the Hungarian market, and maintenance and repair services. Finally, the third subsidiary is the shared services centre specialised in group-level financial transactions and IT-services.

[20] The Hungarian subsidiary is relatively autonomous in designing and implementing its corporate social responsibility (CSR) policy. It finances various local community (social, environmental and educational) projects. As a result of deliberate corporate policy, 5 % of Grundfos's employees are handicapped or workers with other disabilities.

[21] System audit refers to auditing existing and potential suppliers' performance including quality, social and environmental dimensions.

Grundfos is, however, also an example of functional 'downgrading', i.e. of the loss of previous mandates. Due to headquarters' decision on organisational renewal and the concentration of specific business functions in shared services centres (SSC); the first loss of mandate concerned finance and accounting. This function was transferred to the newly established SSC that provides services for all companies in the group. Later IT-related tasks were also transferred to this SSC, which involved a reduction in the number of IT employees and a partial loss of Grundfos's IT-related mandate.

The most recent decision on organisational restructuring involved the concentration of the procurement tasks in one centralised organisational unit. This entailed the partial loss of Grundfos's mandate in procurement (irrespective of the recognised successful local management of this business process). Similar global consolidation is expected in distribution and in the organisation of internal transactions.

3. Case studies on Automotive Companies

Our sample companies are remarkable players in the Hungarian economy (i.e., in terms of volume of investment, value added, employment, export), and due to their continuous investments they are also good examples of the upgrading process. This group of automotive companies includes final assemblers, as well as main parts manufacturers.

One company is directly owned by the parent company (Mercedes-Benz Manufacturing Hungary Kft.), the other is a subsidiary of a Group's company (Audi Hungaria Motor Kft.), and the third belongs to a European affiliate of a global company (Opel Szentgotthárd Autóipari Kft.).

Table 6: Data of the surveyed automotive companies (2014)

	Opel Szentgotthárd	*Audi Hungaria*	*Mercedes-Benz Hungary Kft.*
Owner's nationality	U.S.	German	German
Number of subsidiaries in the MNC	10 (Opel AG)	16 (Audi Group)	26 (Daimler AG)
Activity	production and sales of internal combustion engines; production of cylinders; production and repair of transmissions; production of engine components/parts	final assembly of passenger vehicles; production of internal combustion engines; tool making	final assembly of passenger vehicles
Foundation	1990	1993	2008
Number of employees (2014)	813	10,954	3,428
Sales 2014 (€ million)	150	7,420	2,815
Share of exports (%)	96.00	99.98	99.68

Source: Interview data and income statements for sales

3.1 Product Upgrading

Opel Szentgotthárd and *Audi Hungaria* were brownfield investments in the early 1990's, while *Mercedes-Benz Hungary* is a classic greenfield investment from the late 2000's. The evolution of product mix is substantial in the case of all subsidiaries since their establishment.

Regarding *Opel Szentgotthárd,* engine production and final assembly of cars started at the beginning of 1992. Thanks to consecutive investments from the beginning, the product portfolio has been expanding. Even so, there were some turning points in the history of the Hungarian affiliate when new production started, some activities ceased, and when the position of the Szentgotthárd plant in the global value chain changed (both upwards and downwards). Shortly after

GM acquired full ownership in 1995[22], it announced new investments and the doubling of the capacity of the engine plant. In the following years the manufacturing of some other components (cylinders) started. The final assembly of passenger vehicles ceased at the plant and production was relocated to Poland and China.

In 2000 the production of Allison transmissions began. 2003 saw the commencement of the production of all own-use cylinders. Between 2000 and 2005 the company was owned 50-50 by Fiat and GM respectively. The corporate network (Pavlínek et al. 2009) and the position of the Hungarian affiliate have played a key role regarding product upgrading. While in joint ownership with the Italian automaker, Fiat, the reputation and the position of the Hungarian plant in the company's global value chain declined.[23] Production stagnated; furthermore, in this period significant stock piled up at the factory. Cooperation ended in 2005 and the Hungarian factory was returned to GM as part of GM Powertrain Europe, which is responsible for manufacturing engines and transmissions.

Since the establishment of the *Opel Szentgotthárd* plant, the General Motors Company has invested more than 700 million euro in the development of production technology (i.e., evolution of the production process). The construction of the Flex-plant in 2012 made fast and flexible product changeovers possible. The favourable Hungarian business environment has played an important role in this investment. The introduction of flexible working hours into labour law has increased the competitive advantage of the Szentgotthárd plant. At the same time, the old engine factory also produced the former "FAM1" engines, which are exported to China. In 2014, with an investment of 60 million euro, production capacity of the Flex-plant grew by 60 percent; i.e., up to 650 thousand engines per year. Together with the production of the "FAM1" engines, the Szentgotthárd plant may become the biggest engine factory in Opel AG.

Both the growth of the production and the dynamic expansion of the product assortment are relevant at *Audi Hungaria*. Regarding upgrading process, due to the positive experience (i.e., high profitability and quality of the Hungarian subsidiary) gained over the past decade, the parent company Audi AG has been continuously financing the development of the production plant

[22] The company was established in 1990 by the General Motors Corporation (GM) as a joint venture, the minority stake (25%) was owned by the Hungarian company, Rába.

[23] http://www.autoipari-klaszter.hu/2009/04/28/szentgotthard-sem-orulne-a-fiat-es-az-opel-autoipari-fuziojanak/

with a record high investment of 7.4 billion euro. The establishment of *Audi Hungaria* was based on relocating the engine production plant from Ingolstadt (Germany) to Győr. Today, besides the production of small-series engines for Lamborghini in Italy, *Audi Hungaria* is the only engine producer within the Audi Group.

The main profile of *Audi Hungaria* is engine production; it started with 1.8-litre four-cylinder five-valve engines. In the following period new technologies and products were introduced in the Győr factory. Use of existing capacities, as well as increasing capacities in Győr was dependent on global market conditions. The production highly depends on global markets because within the GVC, the *Audi Hungaria* plant is a worldwide supplier and exchange partner. The tool making department was established in 2005. Its main task is to supply all production plants belonging to the Volkswagen Group. In 2011 the tool making part was further developed. It is a major asset and technological development, employing more than 580 people. They are engaged in tool making in Győr in various shift models.[24]

The position of the Hungarian factory within passenger car production has been improving from the very beginning. The Audi TT is produced exclusively in Győr, and over the past 7–8 years the final assembly of several new models[25] has begun. Since the beginning there has been upgrading in technology of the production of passenger vehicles as well. In 2013 the production of the Audi A3 sedan started in the new factory building. This investment is proof of progress in production, as this is the first vehicle completely produced in Győr.

Mercedes-Benz Hungary was founded in 2008 as a subsidiary of the German Daimler AG. The main activities are final assembly and production of parts. There is also a tool making department that can make important corrections to existing tools in cooperation with Daimler AG plants in Sindelfingen and Bremen in Germany. In addition to these two sites, parts are also delivered to Rastatt in Germany, and to Valmet Automotive in Finland. Car production started in 2012. The current strategy of Daimler AG is to increase the compact class within the total production portfolio in order to be dominant by 2020–2025.[26] Therefore the Hungarian plant is a new production place for the future portfolio.

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[24] https://audi.hu/en/profil/termekek/szerszamgyar/

[25] TT Sport Coupé, TT Roadster, A3 cabriolet, RS 3 Sportback

[26] http://www.portfolio.hu/vallalatok/magyar_mercedes-vezer_az_elektromos_hajtase_a_jovo.1.214633.html?utm_source=index_main&utm_medium=portfolio_box&utm_campaign=portfoliobox

The task of *Mercedes-Benz Hungary* in the global value chain of Daimler is not only final assembly: the production plant cooperates with the affiliate in Rastatt in Germany and the independent manufacturer Valmet Automotive in Finland (Daimler AG 2013).

Most of the upgrading activity of *Mercedes-Benz Hungary* is focused on the development and expansion of final assembly capacities. Thanks to the favourable Hungarian conditions now pertaining (politics and local factors of production), the production management has decided to expand existing capacities. Mercedes CLA Class is produced exclusively in Hungary, but further expansion of demand, and the possible option of producing it in Mexico may change this situation.[27] Competition among the global production plants is rather strong.

Corporate issues are the main driving force behind product upgrading. Mergers, or inter-industrial cooperation (in the case of *Opel Szentgotthárd*), determine the potential of development. Further, competition, and in some cases cooperation, among production places influences the evolution of the production mix. In the case of *Audi Hungaria,* competition factors like cost pressure also continuously play an important role in specifying the local product mix. Intra-firm competition plays an important role in all companies measured. In the case of *Mercedes-Benz Hungary,* the short term development prospects of the newly established factory are obvious. Tax holidays, state/EU investment incentives (grants), training contributions and the liberalization of labour law[28] (using flexible working hours) also play an important role in investment and development decisions. However, *Mercedes-Benz Hungary* was not fully satisfied with the level of vocational training in Hungary. Therefore, the company started a training program for both prospective and current employees.

3.2 Evolution of the Production Process (Production Process Upgrading)

Opel Szentgotthárd introduced a SAP system in 1996 to provide support for globalization among factories, offering interoperability. The factory's Environmental Management System obtained the ISO 14001 certificate in 1997, and the QS/ISO 9000 certification for Quality Management Standards in 1998. In 2014, when production started in the new Flex-plant, new types of machines were installed and new methods of organizing work were introduced to increase

[27] http://hvg.hu/gazdasag/20131008_Amerikaban_is_meno_a_kecskemeti_Mercedes

[28] http://m.portfolio.hu/vallalatok/szentgotthardi_csillagok_szazmilliardokat_hozott_az_onfelaldozas.201482.html

the effectiveness of production. One of these new features, for example, is to increase the number of tasks carried out by machines.

Thanks to the investment made in 2014, Opel Szentgotthárd achieved energy savings by developing certain parts of the processing machine lines serving the central cooling and lubricating systems. Modernization of the machines installed in 1996 with a new computer controlling system means that the factory can save energy and reduce errors during production.

Audi Hungaria uses the SAP system and also the ISO 9000 system, and in 2000 introduced lean production. The factory has had its own environmental management system since 1999, and obtained ISO 50001 in 2011. The main driving forces in the evolution of the production process are the takeover of standardized production processes, using local ideas to increase affectivity. Last but not least, local decisions based on the strategy set by the Audi AG are another driver in the process. Since 2013 Audi Hungaria has been a fully-fledged company, and so the elaboration of local strategy is the responsibility (elaborating and implementation) of the Hungarian affiliate.

The production development process is also helped by the exchange program in the Group. Engineers from Győr visit worldwide production places to exchange experiences. Audi Hungaria also hosts engineers from other factories. Process upgrading also focuses on increasing energy efficiency. Projects on reducing waste generated during production and using renewable energies are completed, or are in progress.

SAP and ISO 9001 monitoring and quality assurance is applied by *Mercedes-Benz Hungary.* In 2011, before starting production, the factory obtained the ISO 140001 environment al certification. During production the factory uses the best available technology (BAT). Thanks to continuous monitoring, the factory is committed to reducing emissions. All models fulfil the ISO 14062 regulations (eco-friendly product design). Following the environmental protection goals of Daimler AG, a low CO2 emission program was started in the Kecskemét factory. The main target is to reduce the CO2 emission by 20 percent by 2020. Up to now the optimization of transport activities was realized by giving up road transport and using rail transport from 2013. As a result, the factory has reduced its carbon footprint.

3.3 Functional Upgrading

Production support activities like maintenance, controlling and production management functions, product introduction, as well as human resources; are usually delivered at local level. The expansion of local responsibilities, and the

carrying out of new functions within the value chain are confirmed by the interviews and corresponding company reports.

The subsidiary position of *Opel Szentgotthárd* has been changing.[29] As mentioned earlier, the development of the product-mix of *Opel Szentgotthárd* is continuous. Parallel with the expansion of production (variety and volume as well), support functions have been developed. In 2001 logistical infrastructure was developed. Other supporting functions like industrial engineering responsibilities, were also expanded. Monitoring and developing the production processes is one of the tasks delegated to local engineers. In addition, quality management and environmental management were expanded, by the application of IT solutions in the last period.

Audi Hungaria has been undergoing functional upgrading. In a period of ten years the company became the central engine supplier of the Audi Group. The most important steps were the creation and expansion of R&D facilities and the tool factory. However, the R&D activities in Hungary are mostly applied research as has been already mentioned Smahó (2012). The core competences are located in the home country/parent company (Winter 2010). Even so, these activities are important for the creation of higher added value in Hungary, and also for strengthening international cooperation and moving the position of the Hungarian subsidiary within Audi AG forward. In 2001 the Department of Internal Combustion Engines started. Regarding R&D, in addition to series-produced engines, test engines have been built in Győr since 2010. As mentioned earlier in the literature review, the complexity of the production has been increasing within the GVC from the beginning. In 2011 *Audi Hungaria* expanded its development activities with the Complete Vehicle Development department, which has responsibility for testing vehicles close to production. Developments are also utilized in higher education by supporting the practice-oriented educational concept at the Technical Faculty of the Széchenyi István University in Győr.

Since 2011 *Audi Hungaria* has been taking part in dual vocational training. Cooperating with Győr's vocational schools, in the framework of dual education, 100 students complete their practical studies at Audi annually (HITA 2012). In 2011, after a history of cooperation, and as a step into a new phase, a new department called the Audi Hungaria Internal Combustion Engines Department was opened at István Széchenyi University in Győr. Its research

[29] In 1997 the trade department of Opel Hungary in Budapest was given regional functions. The newly created organization became independent under the name Opel Southeast Europe Ltd. Its responsibilities include organizing sales-related tasks for Hungary and several Central and Eastern European countries as well.

profile is the design and development of internal combustion engines, along with the development of alternative automotive drive systems and automotive industrial technologies.[30]

The inter-firm tasks of *Mercedes-Benz Hungary* have been expanding from the beginning. The tool making department cooperates with German plants; parts are delivered to the German plants and to those of the Finnish partner. Because of the importance of the product segment and increasing demand for models, cooperation has been deepening since 2012. In the area of functional upgrading, *Mercedes-Benz Hungary* is very proactive. In 2009 *Mercedes-Benz Hungary* made the strategic decision to introduce dual vocational training in the factory. In 2011 Mercedes-Benz Hungary signed an agreement with the Faculty of Mechanical Engineering and Automation (GAMF) of the College of Kecskemét to cooperate in dual education. Additionally, an exchange program was started which enables students from all the plants around the world to visit the factory in Kecskemét. There is close cooperation between the German and Hungarian factory sites not only for students, but for engineers from the R&D departments as well.

3.4 Changing Subsidiary Position and Embeddedness

Examples of product assortment expansion have been mentioned above. This leads to the allocation of certain functions to local subsidiaries and changing the position of the affiliate within the global value chain. New functions increase embeddedness, providing the affiliate as well as the local suppliers with more functions. Functional upgrading, i.e., cooperation with local organizations and educational institutions, also increases embeddedness.

Opel Szenttgothárd started final assembly of cars in 1992. Due to the optimisation of production within the global value chain, and improved market and production conditions, the owner considered developing final car assembly capabilities in Poland and China, and to cease assembly operations in Hungary altogether. In other cases, relocation was favourable for the Hungarian affiliate. As a result of the former crisis, GM reorganized its global value chain, and with it optimized European production. In Bochum (Germany), employees and IG Metall did not agree to the bailout program, and GM management decided to close the factory by the end of 2014. Contrary to this, as a result of good relations between employers and employees due to additional investments, Szentgotthárd will become the primary engine producer of Opel AG in the medium-term. Expansion of engine production from 2012 saw some functions being outsourced

[30] http://tmk.sze.hu/department-of-audi-hungaria-internal-combustion-engines

to suppliers. As such the factory has approximately 400 subcontractors and employees working in the field of engine production.

Continuous development has led to even more functions being delegated to *Audi Hungaria*. The Győr plant became the leading engine producer within the Audi Group, serving other Volkswagen factories as well. The company's global position was improved in 2013 when complete car production started, making *Audi Hungaria* a fully-fledged company.

We attempted to classify the three companies based on the type of governance introduced by Gereffi and his co-authors (2005). They defined governance models based on three factors: the complexity of information exchange; the codifiability (adoption of technical standards) of knowledge; and the capabilities resident in the supply-base. As the author concluded, the type of governance depends on the technological characteristics of the product, i.e., the complexity of production.

Sturgeon and his co-authors (2008) highlighted the complexity of the investigation of governance as global integration continues to drive the complexity of the analytical problem upward. Schmitt and Van Biesebroeck in a current piece of research[31] are investigating the governance in the automotive supply chain using empirical analysis. They separate profit, value added and research and development linkages. They find that in the case of the profit and the value added activities, the relations show *modular* type while in the case of R&D the relations are *captive*. Using this approach in terms of value added, Opel and Audi have modular and Mercedes-Benz has hierarchical governance. Concerning R&D, the governance of Opel is captive, while those of Audi and of Mercedes-Benz are relational and hierarchical, respectively. Differences can originate the position of the subsidiaries within the MNCs, and also the type/complexity of the final products.

4. Policy implications

Our study, which is based on the cases of heavy engineering and automotive firms, has some implications for managers. It seems that the three best ways for local subsidiaries striving to gain access to additional resources and engage in further upgrading are as follows:

[31] "Relationship governance in the automotive supply chain" http://www.rug.nl/research/ggdc/activities/workshops/eframe/slides/session2_vanbiesebroeck.pdf based on a work in progress: Schmitt, A. - Van Biesebroeck, J. Relationship governance in the automotive supply industry - an integrative approach. University of Leuven, Faculty of Economics and Business.

1) Excel in absorbing the mother companies' transfers and continuously demonstrate local capabilities;
2) Be aware that the various upgrading channels (product, process and functional) are interrelated: try to identify the interrelated aspects of past specific upgrading results and 'push' to achieve new opportunities in the given fields;
3) Lay particular emphasis on intangible transfers: try to gain additional intangible investments in a variety of conventional (footnote 10), and unconventional, fields by taking initiatives and gaining the attention of headquarters (Bouquet–Birkinshaw, 2008). This latter recommendation led us to the policy implications of our findings.

First of all, the surveyed cases have demonstrated the importance of plugging into global value chains, which need to be supported by all possible means (including support to both inward and outward FDI, and the promotion of MNC subsidiaries' backward linkages –Antalóczy et al., 2011).

Secondly, TIPA's case demonstrated the importance of business development and entrepreneurial learning. This finding highlights the often neglected difference between upgrading by subsidiaries integrated in the global value chains as part of their MNC owner's organisation, and industrial upgrading (see e.g. Kawakami–Sturgeon, 2011). This latter requires the promotion of entrepreneurship or, in broader terms, the development of the national system of entrepreneurship (Ács et al., 2014) that needs to *complement* the FDI-based modernisation trajectory Hungary has been following.

Thirdly, and finally, as the case of Grundfos has demonstrated, large local subsidiaries of blue chip, global companies have a special role in driving growth and industrial upgrading in Hungary. As Bouquet and Birkinshaw (2008) have demonstrated, weight is a strong explanatory factor of headquarters' attention and commitment: these flagship subsidiaries have greater-than-average upgrading perspectives (see also: Birkinshaw et al., 2007). (Notice that IGM is equally in a special position in terms of weight, being the largest production site in Europe).

Consequently, policy should treat these companies with special care, for example, initiate regular regional and national level consultations with the representatives of these companies, in order to ensure that the framework conditions of their operation becomes, and remains, optimal.

Conclusion

This paper discussed the experience of three machinery suppliers and three automotive OEMs. Industrial upgrading, global learning and transfer of general production principles can be observed in all of the automotive companies. The upgrading process appears mostly through changing the position/role of the subsidiaries within the firms' global value chain. There are differences among the firms in terms of the scale of the upgrading. It not only depends on the owner's global strategy, but also on the type of final products.

That *Mercedes-Benz Hungary* is a final assembler closely cooperating with two other production plants, therefore using global solutions as well as implementing new methods and technologies is beyond question. Technological and organizational upgrading means using and implementing Daimler AG's global solutions during the whole production process (from procurement to sales). *Audi Hungaria* has become a strategic subsidiary, not only in the case of the internal combustion engines (gasoline and diesel), and R&D activities, but in the final assembly, as well as the exclusive complete production of certain classes. The upgrading process is continuous, using not only the innovations of the MNC's global solutions but also the know-how of local employees. *Audi Hungaria* is the textbook example of global learning and transfer. *Opel Szentgotthárd* – after an optimisation/rationalisation process – maintained its engine production and expanded its portfolio with the production of transmissions. The negative effects of global trends were most conspicuous here. The impetus of the upgrading process is precisely reflected in the changes (relocations) within the global company. After the inauguration of the Flex-plant it became able to increase and change its engine production more flexibly to keep in step with changing market conditions. This was a great upgrading leap forward, raising the affiliate in the company's hierarchy.

An overarching finding of our interviews was that plugging into global value chains accelerates the development of local subsidiaries: in a continuous *technological, organisational and management learning* process they *co-evolve with their MNC owners*. Owners provide the necessary means for subsidiary learning and upgrading, in the form of tangible and intangible investments, and through providing markets for the subsidiaries' products. In terms of product upgrading, the surveyed subsidiaries depend on their mother companies: products developed in the central and/or regional research departments are transferred to the premises of the Hungarian production facilities. Nevertheless, some of the surveyed companies host R&D and testing facilities, hence they contribute to a smaller or larger extent to overall R&D activities.

'Entrepreneurial' subsidiaries (Birkinshaw, 1997, 1998) compete (internally) for additional resources and upgrading opportunities, by successfully absorbing the transferred resources, demonstrating their capabilities and taking initiatives on their own.

Another finding was that there is a strong, positive relationship between size and intangible investments: large and powerful global MNCs are more inclined to invest both in 'conventional' knowledge-based assets[32] and in intangible assets the returns from which is ambiguous[33] (such as corporate culture, CSR, supplier development programmes). This finding is important given that a large and increasing number of studies contend that intangible investments have substantial spillover effects; and contribute to productivity increase (as intangible assets are complementary to tangible assets, such as up-to-date production machinery – Corrado et al., 2014; Goodridge et al., 2012; Khanchanapong et al., 2014).

Furthermore, our interviews suggested that upgrading is not a one directional process: external factors, such as changes in the business environment and/or in parent companies' strategic decisions may result in the partial loss of previously gained mandates. For example, globalisation tendencies often force large MNCs to centralise selected functions and improve thereby the efficiency of support activities. Consequently, the loss of certain areas of competence is in most cases independent of the local companies' performance.

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[32] Traditional intangible assets include innovative property (R&D and design-specific intellectual property rights, and technological competencies); organisational assets (embodied in firm-specific human capital, organisational practices, reputation, brand equity and business network) and computerised information (firm-specific information solutions and databases) – Corrado et al., 2005; Görzig–Gornig, 2013; OECD, 2013.

[33] Or, at least, return on investment in these intangible assets seems more elusive than the return on traditional intangible investments.

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Global Value Chains: The Case of the Software Industry in Poland

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Abstract:

There is mixed and uneven evidence of Polish software companies moving up the value chain. The most common indicators are: process, product and functional upgrading. One of the main causal drivers of the inclusion of Poland into the GVCs of the software industry is the cost-capability ratio; especially in terms of skill-seeking considerations. Buyer-driven GVCs are dominant in terms of the number.

Keywords: global value chains (GVCs), global production networks (GPN's), upgrading the software industry, Poland.

Introduction

In this paper I shall attempt to combine two interrelated approaches: global production networks (GPN's) and global value chains (GVCs) by conceptualising them around three pillars: the causal drivers of global networks (Yeung & Coe 2015); analytical categories that constitute the GPN (value, power and embeddedness), and the outcomes of the inclusion of companies in global GVCs presence, as represented by the upgrading mechanisms.

The conceptualisation of the global chains is based on the case of the software industry in Poland. The industry consists of various companies in terms of their technological and operational sophistication; although it is suggested that most of them represent advanced business services.

The growth of the software industry in Central and Eastern European (CEE) countries might be treated as one way of diversifying the industrial base (Tödtling et al 2013). In the CEE countries, the economic activities which were analysed represent a new and fast-growing industry. It is also argued that the software industry has a positive impact impact on other economic sectors, including the traditional ones (Tödtling et al 2013). Moreover, with the rapid rise of foreign-owned software development centres (Micek 2009), the Polish software sector is becoming more involved in global value chains. Poland, as one of the largest CEE countries, has been selected, due to the rapid growth of the software industry in recent years. To sum up, the main aim of this paper is to

present the causal drivers of GVCs, their main characteristics in terms of value, power and embeddedness and changes represented by the upgrading processes in the Polish software industry since the 2004 round of EU enlargement (2004).

The paper consists of seven sections. Literature review on GPN's, GVCs and upgrading; which is followed by two chapters that discuss the data and methodology. The causal drivers and foundations of GVCs/GPN's in the software industry in Poland are analysed in next two chapters. Finally, the upgrading processes in the software industry are followed by the conclusion and policy-related remarks.

1. Literature Review

1.1. Global Value Chains (GVCs)

The global value chain approach has received greater attention after the publication of Gereffi's and Korzeniewicz's (1994) earlier works. Theorising about GVCs has also benefited from M. Porter's (1985) value chains perspective. The GVC approach requires the identification of all economic activities. The next step is to analyse how economic relations with these stakeholders are organised and consequently affect company's costs, profits and the value delivered to customers. The idea of the value chain is system-based. A given manufacturing (or service providing) company is treated as a whole, consisting of subsystems with various inputs, transformation processes and outputs: resources (financial funds; land, plant and machinery; and labour) as well as supplies (materials, services). Being purely economic, the GVC perspective avoids looking at knowledge spillovers, which matter for value creation.

Generally, there are two general modes of interfirm relations of companies within the GVC. Firstly, companies adopt the strategies of mergers and acquisitions, takeovers or joint-ventures, in order to gain control over the value chains. The second method is to establish cooperative relations. In some cases the cooperation is a necessary and sufficient prerequisite to achieve efficiency and cost reduction in the GVC.

The GVC perspective usually neglects the spatial perspective. However, from a logistics point of view, global value chains perform at least one of the operational processes (supply, production or distribution) on a global scale. Following Cooper (1993) and Rutkowski & Ocicka (2011), four types of global value chains may be identified:

- Local supply and production, global distribution (1);
- Global supply, local production and distribution (2);

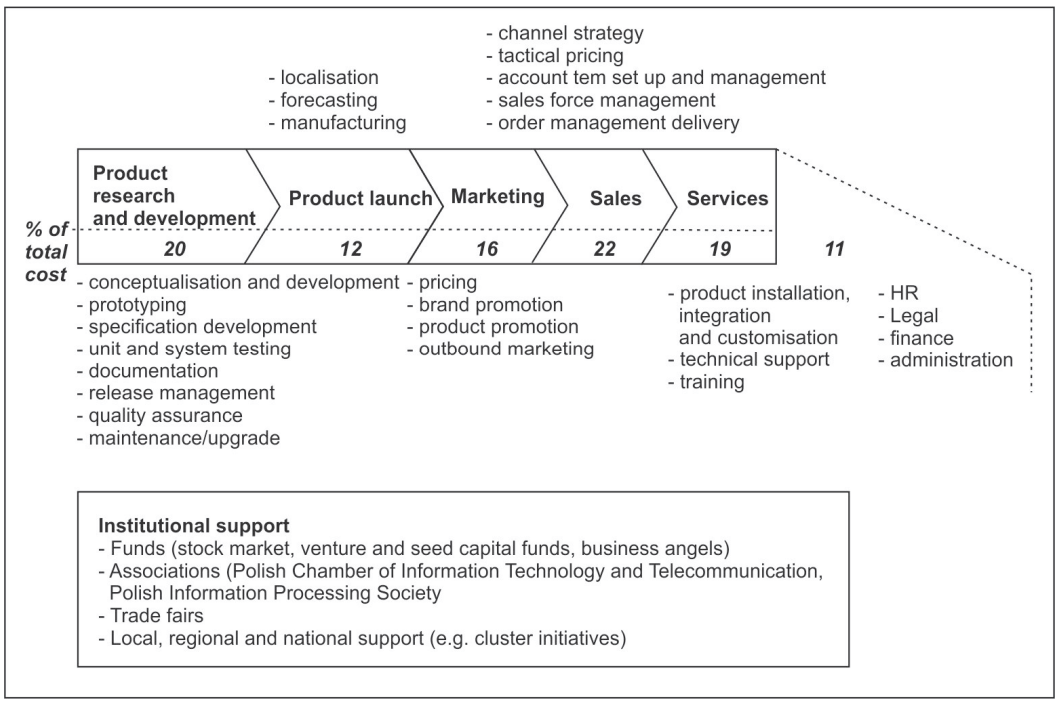
- Global supply and distribution, local production (3);
- Global supply, production and distribution (4).

The first type entails manufacturers of luxurious products with recognized brands (eg. Swiss watches, Ferrari). The second type of chains is characteristic for companies that produce and distribute products locally but use distant supply sources of raw materials (eg. refineries, clothing, to some extent the consumer electronics industry). The third type of chain is gradually diminishing, and includes well-known companies (eg. Boeing, Airbus) with global brands. These companies produce or assemble their products in a limited number of places (outreachers), but they use supplies worldwide, and distribute their products on a global scale (Cooper 1993). Finally, the fourth type consists of chains that are purely international. They carry out their supplying, production and distribution on a global scale. These include majority of those multinational corporations engaged in computer services (including the software industry), chemical, pharmaceutical and food industries. The operational and geographical structures of such GVCs are highly sensitive to market changes and transform themselves frequently.

Gereffi (1999) has introduced the distinction between producer- and buyer-driven chains. In the first type, the critical governing role is played by the customer, whereas in the latter, the key producers in the chain play this role. These producers generally command vital technologies and coordinate the various links in the chain (Kaplinsky & Morris 2001). For Gereffi (1999), producer-driven chains are more likely to be characterised by foreign direct investment (FDI) than are buyer-driven.

In comparison with other industries, the breakdown of costs and value added is relatively even (Fig. 1); with slightly greater costs at the R&D, sales and intangible services stages.

Figure 10: Value chain of the software industry



Note: This chain applies mainly to the packaged software industry.
Source: KPMG (2004), modified.

1.2. Global Production Networks (GPN's)

Yeung and Coe (2015: 31) argue that the GVC and GPN strands of research are '*closely related and connect across the cognate social science fields of economic geography, economic sociology, development studies, regional studies, international economics, and international business*.' Yeung and Coe (2015: 29) recognize GPN as '*organizational platforms through which actors in different regional and national economies compete and cooperate for a greater share of value creation, transformation, and capture through geographically dispersed economic activity*.' In a slight contrast to the GVC approach, the global production networks are widely studied from a spatial perspective. The GPN approach does not only focus on how global industries are organised by identifying and analysing relations within the networks between the set of actors involved in the production and distribution of a particular good or service. Rather, GPN is a tool for analysing the global economy and its impact on territorial development. The GPN perspective leads to the study of the profound impact of the production networks on individual firms, or establishments, and consequently on the communities in which they are located. In a regional development context, it broadly results in a 'strategic

coupling process', when GPN's and regional development interact with each other.

The global production networks perspective goes beyond simple top-down, nested relationships, and investigates dynamically inter-connected and simultaneous processes, driven by asymmetries of power. Following Dicken's (2004), and Yeung's (2005), views; Coe at el (2008) argue that it is a deeply relational view of the world. It is not only the analysis of corporate power by explaining how dynamic firms can alter the *status quo* in GPN's through exploiting '*the fragility of the power relationships and [upgrading] into higher value-added activities despite discouragements that are imposed by the networked relationships*' (Tokatli & Kizilgun 2004: 222). The GPN perspective allows us to study institutional and collective power (e.g. labour unions).

The GPN perspective offers several advantages for analysing global relations (Henderson et al. 2002, Dicken 2004), that are summarised by Coe et al (2008). Firstly, it does not avoid non-corporate actors, but includes all the major players. Secondly, it involves all geographical scales and their bundled relationships. The variety of institutions gives rise to the need to combine the diverse spaces and spatial scales (local, national, supranational and subnational) of firms, state organizations and institutions (Hudson 2004). Thirdly, it recognizes that the nature of GPN's is shaped by the concrete socio-spatial contexts, especially in the natiowide context. Coe et al (2008: 279) go further and argue '*every element in a GPN—every firm, every function is, quite literally, grounded in specific locations*'. The literature pays '*little attention to the institutional and geographical environments within which networks not only operate but are also formed*' (Coe et al. 2008: 279). It is argued that GPN's exist within a diversity of multiscalar structures (e.g. systems of governance and regulation) within the global economy. Fourthly, the GPN perspective requires distinguishing between spatial embeddedness and network embeddedness. 'The particular territorial embeddedness of individual firm units/subsidiaries may play a significant role in that unit's ability to create or maintain a specific intra-firm role. A unit's level of competence determines the strength of its influence within its firm's network. Such competence is driven (at least partly) by environmental factors derived from the dynamics of the location in which it is situated. The competencies of a corporate unit are created over extended periods as a firm interacts with its surrounding environment' (Dicken & Malmberg 2001: 356).

Existing conceptual frameworks on GPN tend to focus on governance typologies (e.g., modular, relational, and captive modes), or analytical categories (e.g. power, value and embeddedness). Hence, power relations and their asymmetries are studied from the classical GPN perspective. This approach

helps to address the question of how the value is shared between the actors[34], and to what extent inter-firm relations are geographically, socially and institutionally constructed and embedded. The classical GPN 1.0 approach has recently been criticized by Yeung and Coe (2015). They argued that a more dynamic theory of GPN (GPN 2.0) is required in order to better explain the emergence of different firm-specific activities, strategic network effects, and territorial outcomes in the global economy. That is why Yeung and Coe (2015) suggest carrying out analysis of the **causal drivers** of GPN in terms of their competitive dynamics. The three crucial dynamic forces which drive GVCs/GPN's towards specific network and organizational forms include:

- Optimization of cost-capability ratios;
- Maintaining market development;
- Focus on financial discipline.

Interwoven in various ways, these three dynamic forces are the necessary explanatory factors for actor-specific strategies in configuring GPN's. In order to improve their competitive positions in the global economy, companies have to **optimize their cost-capability.** It cannot be conducted by the exclusive use of cost-reduction rationalities, or by technological leadership in governing GPN's. Yeung and Coe (2015: 34) argue that only '*a few studies have brought together these two considerations and integrated them in a dynamic concept such as the cost-capability ratio*.' Cost reduction alone, cannot be the fundamental driver of evolving GPN's. '*Rather, both costs and firm-specific capabilities (labour, technology, know-how) are relative and subject to change over time under global competition*'. (Yeung & Coe 2015: 37)

The evolution of firm-specific strategies and GPN's are driven by **market imperatives** which include several forces (Yeung & Coe 2015):

- developing and sustaining the market reach, access and position;
- sustaining market dominance by leading firms;
- time-to-market deliveries;
- customer behavior and preferences**.**

Firms involved in GPN's must face up to **financial discipline**. It involves: access to finance and investors and the issue of shareholder pressure. Capital markets (including the stock market), as well as the financial objectives of investors, often determine the reconfigurations of GPN's. Coe and Yeung (2015: 39) emphasize '*the causal role of finance in disciplining the organization of capitalist production in the global economy*.'

[34] It makes the GPN perspective similar to the GVC approach.

1.3. Upgrading

Economic upgrading allows for a better operationalization of the GVC approach. In order to keep their competitive advantage, companies continuously try to improve their global position by attempting to move from low-value added to more skill-intensive and technologically sophisticated, and consequently more profitable activities (Gereffi 1999).

Based on Humphrey's and Schmitz' (2002) contribution, economic upgrading might be more broadly understood. It is usually divided into four main types[35] (Humphrey & Schmitz 2002):

1. process upgrading: efficient transformation of inputs into outputs which requires reorganising the production system, or introducing superior or more sophisticated technology;
2. product upgrading: moving into more higher-value added products. It may stem from the introduction of new products, or improving old products, faster than competitors (Kaplinsky & Morris 2001);
3. functional upgrading: acquiring new higher value-added functions in the chain (or abandoning existing low end functions); it might be provided through "*changing the mix of activities conducted within the firm (for example, taking responsibility for, or outsourcing accounting, logistics and quality functions) or moving the locus of activities to different links in the value chain (for instance, from manufacturing to design)*" (Kaplinsky & Morris 2001: 38);
4. inter-sectoral upgrading: using the knowledge acquired in particular chain functions to move into different sectors or new value chains; the latter form is also called chain or inter-chain upgrading (Kaplinsky & Morris 2001).

In practice, these types of upgrading overlap and coexist to some extent. Some authors (Gereffi 1999, Lee & Chen 2000) argue that firms follow upgrading paths: from process, through product and functional to chain upgrading.

The software industry analyses has suffered from the scarcity of GVC approaches. India's successes in software development are an exception (Kumar 2001).

2. Data and Methodology

There are substantial data problems surrounding the analysis of the software industry. This concerns both Eurostat SBS data and foreign trade data.

[35] Social upgrading is not discussed in this paper.

The latter includes inconsistencies – foreign trade in services data usually entail broader types of activities – computer and information services (Francois et al. 2009). Hence, in order to select firms that belong purely to the software industry, the database of companies has been constructed based on the Dun & Bradstreet database. It enabled researchers to avoid contacting companies that are not included in the software development value chain. The research is based on the long-term studies of the software industry which have been carried out by the Jagiellonian University team since 2005. The research consisted of a series of 50 interviews with representatives of both foreign and domestic software companies. The research has been carried out within the 6th European Union Framework Programme project entitled '**MOVE Moving Frontier: The Changing Geography of Production in Labour-Intensive Industries**'[36]. The primary data and information about competitive advantage of companies, factors of relocation, upgrading, the role of suppliers firms and mother companies and their position in GVCs, have been acquired for the purposes of the research. The discourse analysis has been carried out on the basis of interview transcripts. The sampling procedure was selective, and a non-representative sample was obtained in which the large companies were over-represented.

For the business statistics, secondary data from three main sources have been used:

- Eurostat data on structural business statistics;
- WTO-UNCTAD trade in the services database;
- Data and information referring to the state of the IT service sector in Poland (Association of Business Service Leaders report, Górecki 2015).

For auxiliary information, the author has analysed the annual reports of the ComArch company, as well as other business reports, Polish economic journals and daily economic news reports.

3. Software Industry in Poland – key data

It must be kept in mind that the software industry consists of various subsegments, including; among others; the antvirus software industry (Beblavy & Kurekova 2014), as well as the digital (or computer) games industry (Kerr & Cawley 2012). Depending on the type of companies' products one may discern: packaged ('box') software and customized industrial applications.

[36] In order to keep the research up-to-date an additional small number of interviews has been conducted during the past 3 years.

The software industry belongs in the ICT services sphere. This area includes the following categories (NACE Rev. 2 classification): software publishing (NACE 58.2); computer programming, consultancy and related activities (NACE 62); data processing, hosting and related activities, web portals (NACE 63.1); wholesale dealing in information and communications equipment (NACE 46.5); telecommunications (NACE 61); as well as the repair of computers and communications equipment (NACE 95.1). The first three types of economic activities constitute the software industry, whereas the rest involve strongly diversified businesses (from wholesale to repair, to telecommunications services)[37].

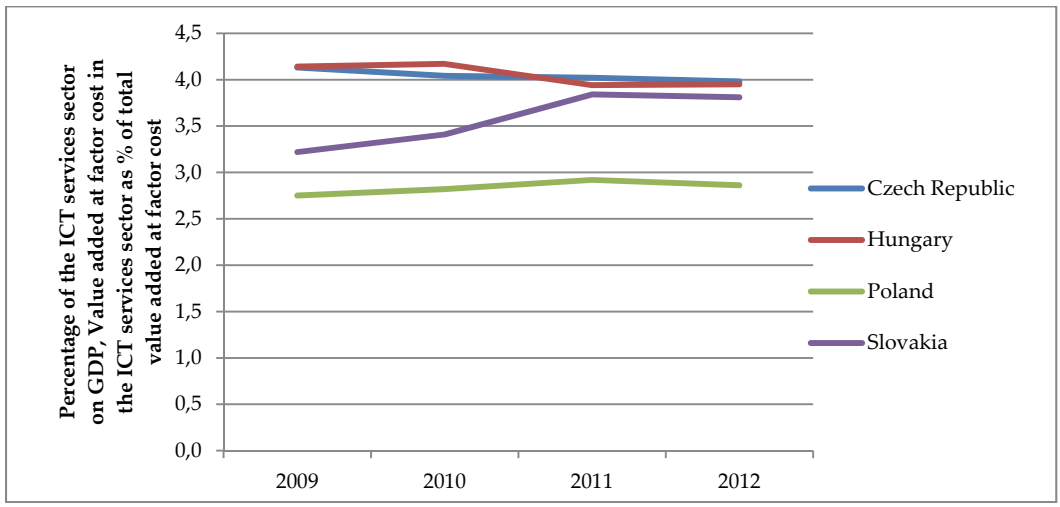
The position of the Polish software industry in the global economy has recently become more significant. IDC data (IDC Poland IT Services Market 2014–2018) has revealed that the IT services market value in Poland is equivalent to 3.14 bn USD, and contributes to 1.7% of the value of IT services on the global market (Górecki 2015). In 2013, employment in IT services exceeded 140,000 (Górecki 2015)[38]. The structure of the IT services market value is relatively modern; the largest value is generated by system integration (Górecki 2015, IDC Poland IT Services Market 2014–2018). A growing number of companies declare the use of IT solutions to solve business problems (65% in 2013; **KPMG Zupełnie nowy świat outsourcingu usług IT**. **KPMG IT Outsourcing Service Provider Performance & Satisfaction Study 2014**). ABSL data show that the share of companies which in recent years have improved the level of sophistication of offered IT services, total 95% (Górecki 2015).

However, due to the large size (population, economy) of the analysis subject country's comparative indicators with the V4 countries' position; Poland is ranked last (Fig. 2, Tab. 1). Value added in the ICT services sector as a share of the total VA has not grown significantly in Poland between 2009 and 2012 (Fig. 2).

[37] The indicators which were analysed for ICT services differ from those for the software industry and are biased mainly by the presence of wholesale activities.

[38] It concerns the most popular firms established by individuals, usually freelancers).

Figure 11: Share of the ICT services sector of GDP



Source: Eurostat (SBS).

Table 7: Share of the ICT services personnel of total employment and change of value added by ICT sector

Country	*2009*	*2010*	*2011*	*2012*
Number of persons employed in the ICT services as % of the total employment				
Czech Republic	2.1	2.1	2.2	2.3
Hungary	2.2	2.2	2.3	2.4
Poland	1.3	1.4	1.5	1.5
Slovakia	1.3	1.9	2.2	2.2
Year-on-year percentage change of the value added as a factor cost of the ICT services sector at current prices				
Czech Republic	-7.7	2.8	3.9	-3.3
Hungary	-12.6	4.3	-2.5	-2.6
Poland	-19.9	16.3	8.4	1.0
Slovakia	-11.4	11.8	16.3	2.9

Source: Eurostat (SBS)

Trade data (WTO-UNTAD database) reveals dynamic export growth rates. The computer services industry[39] exports from Poland has grown at an annual rate of 20.5% in the period 2011–2013. Whereas CAGR imports figures have been

[39] Computer services are divided into hardware and software related services, as well as data processing services. Hence, the software industry is a narrower term in this respect.

lower; coming to 8.6%. There is a negative balance in trade in computer services (628.8 million USD), which grew rapidly from 101.9 million USD in 2011.

In this paper the focus is on two types of software companies[40]:

1) Foreign companies producing for foreign markets (2/3 of enterprises in the sample; mainly American companies)
2) Domestic companies involved in GVCs (1/3 of firms in the sample)[41]

Foreign companies are mainly engaged in software development and are integrated in the larger-scale development operations of their owners. Polish-owned firms develop enterprise-specific applications for industry and packaged software, but the latter product is usually not distributed abroad.

Foreign software development centres are not a new phenomenon: their entrance to the Polish market dates back to the mid 1990's. Surprisingly, some segments of the software industry (e.g., the antivirus software industry in Slovakia and Estonia) have been dominated by domestic companies (Beblavy & Kurekova, 2014). Among the domestic firms, there are also cases of companies that cater to large foreign IT service providers operating in niche industries.

4. Causal Drivers of GVC/GPN. Motivations of Investors and Aspects of Competitiveness in the Software Industry

The software industry consists mainly of buyer-driven GVCs, although there is a limited number of producer-driven chains. The dominance of buyer-driven chains stems from the significant role of customers and their requirements, in particular in the field of customised applications. Larger, technologically sophisticated, transnational companies are involved in rare, although producer-led chains are an important exception. They include producers of packaged software (e.g., Microsoft[42]) and technological niche firms of different sizes and origin. The latter type controls the chains to some extent.

In terms of **optimizing cost-capability ratios**, cost reduction alone is not the fundamental driver of evolving GPN's. According to managers, who were interviewed, competition on the software market is based on quality and innovativeness (Fig. 3): "*The company was successful in Poland in acquiring new*

[40] For a more detailed typology based on company ownership, size and their engagement in exports; see Guzik and Micek (2008).

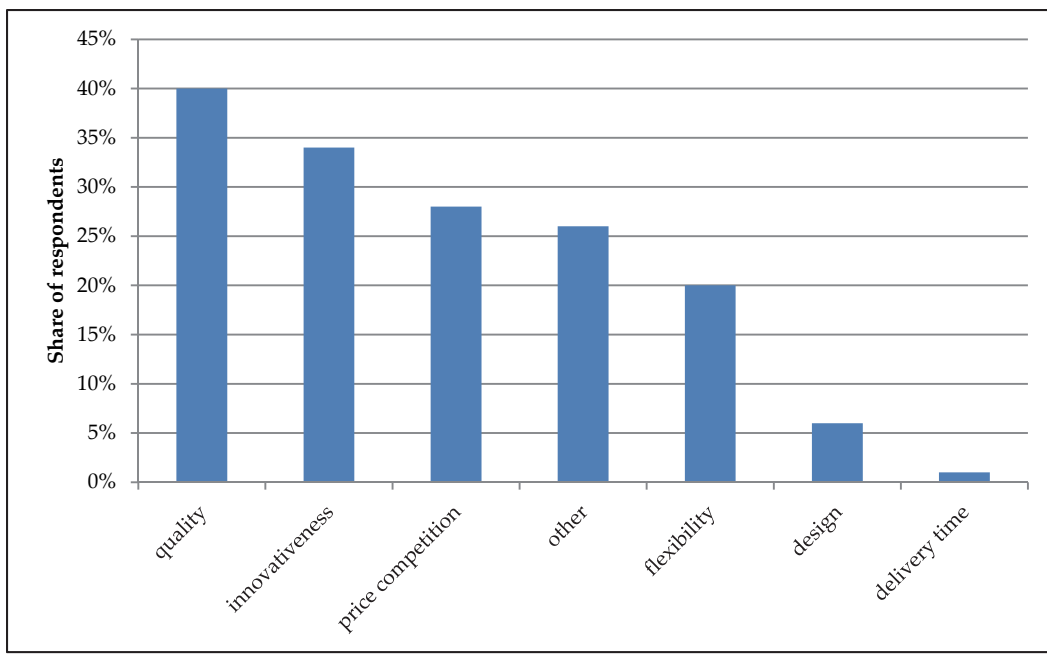
[41] In order to get a deeper understanding of the drivers of GVC's, it would be better to distinguish between software companies based on their position within the value chain. However, such data has not been collected.

[42] Microsoft does not carry out software development in Poland, although there are some Polish subcontractors which work for the American company.

projects because of the very high quality of solutions which were developed in Poland (our main project was moved here from India). (Small American company)

Only over 1/4 of the companies, which were interviewed, listed cost-related considerations. There is a growing number of companies which argue that they do not base their advantage on cost considerations only, but on technological leadership: *The strategy for entering the market was consciously not based on price competition. We introduced Western European prices for our product and focused purely on new technologies*. (Medium sized Polish company)

Figure 12: Nature of Competition in Companies involved in GVCs in Poland



Note: The two most important factors may have been indicated.

Source: Authors' own research.

The firm-specific capabilities shape the dynamics of global chains. These capabilities include the human resources. Company managers emphasize the role of skilled staff. The general manager of a large American software development centre emphasized the fact that Polish employees finalized projects quicker than expected: *'people from American HQs wanted to develop a 'laboratory' in 3 weeks; our people did it in 3 days.'* An American small software company *'hires only highly skilled employees, well trained and with previous experience in software companies. We have acquired all our staff from other companies by offering very good wages and excellent working conditions*. Wage pressure is summarized by one of

the managers of a Polish company, who argues that he must '*raise salaries each time a foreign company enters the local market'*.

On the other hand, there are still some resource-seeking companies that tap into the local labour market in order to take advantage of the cheap talents on offer: *Our firm has a policy of employing only very good graduates without experience in order not to have to pay them too much. The owner saves money on everything; e.g. computers, furniture, company car – everything is low cost and underinvested.* (Medium American software development centre, Guzik & Micek 2008).

Quick reaction to **market needs** is pointed out by some representatives of foreign centres, especially those who meet with customers. It is even the case of some foreign software development centres whose managers have face to face contacts with clients in Western Europe.

What shapes upgrading in global value chains is the financial stability of companies. The corporations operating in Poland are **financially stable.** This applies both to domestic[43] and foreign companies: *Stability of financial flows that come from the mother-company is our advantage.* (Swiss medium-sized company). Polish companies usually use their own financial sources. However, the larger companies have joined the Warsaw Stock Exchange in order to get extra funds and grow. Established in 1991, Polish owned company, ComArch, underwent its IPO on the WSE eight years later. In 2014 the capital group of ComArch financed 57.6% of its operations with external funds. This helped the company to launch its international expansion. With 4,211 employees ComArch generates over 46% of revenues from foreign contracts and it reaches over 40 countries on five continents. Rapid expansion is not associated with a lowering of profits, as ComArch's EBITDA rate has increased from 9.6 million EUR in 2005 to 36.5 million EUR in 2014. This enabled ComArch to enter into more sophisticated and value-added contracts.

5. Categories that Constitute GVCs/GPN's

In the classical approach, three dimensions describe global production networks: value, power, embeddedness. Hence, the following question may be posed: what are the values that shape global chains in which companies operating in Poland are involved? The majority of respondent companies reported a skill-seeking imperative. The generation of innovation is the core

[43] There are numerous cases of Polish micro companies, which thanks to venture capital funding (eg. Intel Capital money for mobile solutions provider Wind Mobile) have introduced new, innovative products and entered foreign markets.

value for one third of companies. However, for some firms (especially these with foreign ownership) the development is profit-based.

Power in software development lies in the hands of leading firms as major players (e.g. Microsoft), and inequalities of power stem from their position. Power is indirectly distributed to firms by national authorities as the public sector becomes an important customer for software companies. Power is also held by the most innovative (often small) foreign companies who can afford to acquire the most talented staff. Polish-owned firms do not hold enough power to influence and shape GVCs.

Local embeddedness of foreign companies in Poland is limited. Guzik and Micek (2008) have identified the types of GVC foreign companies which operate in Central and Eastern Europe. Most usually, GVCs are linked to operational relations within transnational corporations, and there are no local subcontractors (over 45% of foreign firms in Poland). ''*We don't order anything from local companies. There would be a communication problem, because the software we develop is sophisticated, and requires a lot of meetings and contacts among programmers. It is also very difficult to test the software and to check whether the work that the subcontractor does is done properly''.* (Medium-sized American company).

In ¼ of foreign companies, the number of local subcontractors has significantly increased. These are foreign firms which are managed by people of Polish origin who usually put emphasis on local linkages. However, the number of local suppliers is limited, so the first Cooper's (1993) type of GVC (local supply and production, global distribution) is very rare in Poland. **Network embeddedness** is stronger than a territorial one. Foreign companies admit that they take part in large business global networks of interconnected firms.

6. Upgrading in the Software Industry

Upgrading of software companies is typical for foreign software development centres in Central and Eastern Europe (Micek 2009). Companies move up the value chain, acquiring new areas of competence. Upgrading in the Polish software industry is represented, to varying degrees, by all four types. **Process upgrading** is common: the majority of foreign companies introduce new technologies and consequently new processes: "*The number of our processes is increasing so we have to recruit new employees".* (Small-sized British company). A smaller instance of process upgrading can be observed in domestic firms. Upgrading is also manifest in the length of the projects. Some subsidiaries report moving from short-term, simpler and smaller, tasks to longer, larger projects.

Product upgrading is less common: development of higher added value services in the past 5 years have been reported by 1/3 of respondent managers. Among those Polish subcontractors which have a large international customer base there was a tendency to maintain the range of services on offer. It is well-illustrated by the following quotation: "*As we have only one large, global customer, the company has no policy, nor willingness, to offer full products. We have been providing, and will provide, high quality software that is necessary for our customer, who then offers the final product".* (Polish micro firm)

There are also some foreign companies that have entered the Polish market in order to tap the national, or regional, labour market. Half of the respondent medium-sized companies have no plans to move up the value chain. It is especially common among foreign managers: '*We have never considered the opportunity to move up. We do not expect the government to help us.* (Medium-sized German foreign software development centre).

Managers of Polish origin usually express willingness to acquire new, more value-added, operations. One medium-sized Polish affiliate of an American company follows the strategy of being more self-reliant by employing "*…business analysts in order to be wholly responsible for projects''.* However, it is also not uncommon to hear that the company: "*…thinks that development of its own solutions cannot be the award for the company".* **Functional upgrading** is definitely observed in foreign companies: ''*There is a slow upgrade. Now, we employ some business analysts in Poland and we will employ more. In the beginning (five years ago) teams were composed of 20% Poles and 80% Americans; then it was 50/50%; while now there are projects with 90% of the employees from Krakow and 10% from the USA; all under a Polish team leader. We also have some people; who meet with customers on behalf of the US HQ; located in Central and Eastern Europe* (American-medium sized company). The shift towards new functions is also described by the manager of one of the largest American software development centres operating in Poland:

"Within the past four years we have made a substantial shift from being a provider of a workforce for the mother company, to becoming a provider of solutions, as well as becoming the owner of the product. The aim was to build up expertise on the system level and to get to know market requirements… The other affiliates are attempting to gradually move from being a partner which exclusively supplies software for the mother company, to developing their own projects. In the Polish centre, an increasing number of decisions is taken on how the final product, as well as all its components and modules, are designed and developed''. (Medium-sized American centre)

However, there is a functional limit to moving up the chain which cannot be overcome. One of managers of a large foreign company argued: ''*It is difficult to say whether we want to move up the value chain. We would rather not enter the next*

stage of operations (business talks, marketing, face to face contacts with the final customer). There is a lack of people who know how to take part in business talks with the final customer which has been operating on the market for 25 years''. Hence, some foreign affiliates prefer to focus on the growth of the same outsourcing capacities than to move up the chain. In recent years, some foreign companies grew very quickly – in 7–8 years from about 50 employees to 1,500–2,000.

Some Polish small-sized niche companies have managed to move from simple subcontracting to the development of their own product. This is usually a move from the routine, standardized, well defined low-end processes (partial coding work) to more creative, specialized processes (eg. solution provision), which require their own innovative contribution. However, the majority of Polish firms report no intentions to move to more sophisticated services and offer their own solutions.

Concerning chain upgrading; of the 50 software firms analysed, only 12% have entered new, different chains in the past 5 years. From this evidence, it is not clear what percentage of firms follow the upgrading path: from process, through to production and functional to chain upgrading. However, it seems that there is little movement towards entering new chains.

Conclusion and Policy Implications

The main causal drivers of the inclusion of Poland into the GVCs of the software industry include cost-capability ratio, especially in terms of skill-seeking considerations. Buyer-driven GVCs are dominant in terms of their number. There is mixed and uneven evidence of Polish software companies moving up the value chain. Concerning the spatial organisation of GVCs, the first two types identified by Cooper (1993) are not typical for the Polish software industry. Companies do not see any government action being taken to make firms move up in the chain. Among the most common potential governmental actions listed by managers were:

- lowering labour costs (both in Polish and foreign firms): *It would be great to have labour costs reduced: ''labour costs in Poland with PIT (personal income tax) and ZUS (compulsory pensions and health insurance scheme) is approaching the labour cost in Oregon'';*
- simplifying tax procedures and lowering VAT on services;
- simplifying the procedures for obtaining financial support;
- political and fiscal stability is a very high priority;
- stabilizing exchange rates.

It is necessary to adopt more practice-oriented strategies in industrial policies. There is a lack of established policy for embedding investors in Poland. Promotion of Poland (not only during large events, but also during investors' meetings and niche conferences) as a technologically-advanced country is also essential.

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Global Value Chains: Upgrading of the Slovak Clothing Industry

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Abstract

The economic transformation has a strong influence on the clothing industry in Slovakia. Formerly, one of the major manufacturing sectors in the Slovak economy, it has lost this position, and today the clothing industry is coping with high cost sensitivity and strong competition from low cost countries in Europe (e.g. Ukraine, Romania and Bulgaria), as well as from Asia. The future of Slovak clothing production could be in upgrading to technical clothing and in high quality original fashion design production. This paper uses a global value chains perspective to analyse the clothing industry in Slovakia, as well as its upgrading in recent years. Furthermore, we analyse the value chain in Slovak fashion design in the Bratislava region. Despite the negative development in the Slovak clothing industry, we can see the upgrading possibilities in Slovak clothing production, as well as in Slovak fashion design production. In the final part of the paper we have included policy implications, and we also summarize the conclusions and empirical findings.

Keywords: global value chain, firm upgrading, clothing industry, fashion design

Introduction

One of the remarkable features of the Slovak economy during the transformation period after 1989 was the decline in labour-intensive industries, e.g., the clothing industry. The Slovak clothing industry has gone through notable changes, especially privatization and liberalization of the home market, as well as competition from Asia. This latter development since 2005 after the removal of quotas under the World Trade Organization (WTO) Agreement on Textiles and Clothing (ATC). Restructuring of the clothing industry has resulted in the upgrading of a more innovative and specialised type of clothing production, e.g. original Slovak fashion design production.

This paper uses the GVC's (global value chains) framework to explain the upgrading of the Slovak clothing industry on the firm level, followed by Slovak fashion design with a focus on the case study of the Bratislava region. We argue

that original fashion design production represents the higher stage in the value chain of the clothing industry.

The value chain approach gained a lot of attention through the pioneering work of Michael Porter in the early 1980s, where the value and its competition over space were at the centre of global production. The idea of the value chain is based on the process view of organisations; the idea of seeing a manufacturing (or service) organisation as a system, made up of subsystems each with inputs, transformation processes and outputs. Inputs, transformation processes, and outputs involve the acquisition and consumption of resources – money, labour, materials, equipment, buildings, land, administration and management (Porter 1985). Simply put, there is a purpose in creating value through the transformation of material and non-material inputs into demanded goods and services through chain structures. Its individual stages are also involved in the supply chain analysis. This approach is mirrored in global commodity chains (GCC's), (Gereffi 1994) and in global value chains (GVC's) (Gereffi, Humphrey and Kaplinsky 2002; Gereffi, Humphrey, Sturgeon 2005; Bair 2008; Gibbon and Ponte 2008). Some authors (Henderson et al. 2002; Smith et al. 2002 In Coe et al. 2008) realized that focus on the linear/vertical dimension could be problematic, as a production chain is embedded in a set of non-linear/horizontal relationships, so a concept of global production networks (GPN's) arose; the idea was put forward by (Lazzarini et al. 2000) as a concept of a chain net. Even though these acronyms might look confusing, there is clearly a common concern with understanding the organizationally fragmented and spatially dispersed production networks of the global economy (Coe 2015). In this paper the term global value chains (GVC's) is used.

The value chain approach, which emphasizes "economic upgrading", is often used to describe the way in which firms cope with a change of their position as a consequence of stronger international competition and trade. It refers to making better (higher value) products, making them more efficiently, or moving into more skilled activities – repositioning within the value chain (e.g. Barientos, Gereffi, Rossi 2011; Humphrey and Schmitz 2002).

The value chain view of global economic integration highlights the fact that for many industries, access to international markets is not achieved merely through designing, producing and marketing new products. Instead, it involves gaining entry into the international design, production and marketing networks consisting of many different firms. Understanding how these value chains operate is very important for developing a country's firms and policy makers, because the way chains are structured has implications for newcomers (Gereffi, Humphrey, Kaplinsky and Sturgeon 2001: 1).

The economic literature has been making progress in the measurement and mapping of the GVC phenomenon (Amador, Cappariello and Stehrer 2015).

The importance of global value chains (GVC's) has been steadily increasing over the past few decades and, as reported in UNCTAD's World Investment Report, 2013, about 60% of global trade consists of trade in intermediate goods and services, which are then incorporated at different stages of production. The prevalence of GVC's in the world economy has a great impact on trade and labour markets, but also on issues such as inequality, poverty and the environment (Amador and di Mauro 2015).

The paper is focused on one selected industry in Slovakia which has a long tradition (the clothing industry). It is based on the long-term research of the global value chain and production networks in the clothing industry, which was carried out in Slovakia and Bulgaria (Smith, Pickles, Buček, Pástor and Begg 2003–2014), as well on the research carried out in the Slovak fashion design sector (Pástor 2013–2014). This industry is a traditional type of industry which formerly employed large numbers of people, and which after the period of transition and upgrading, engaged in mainly export oriented production, with higher value added.

The aim of the paper is the analysis of firm upgrading in the clothing industry in Slovakia. The second aim is focused on the analysis of fashion design in the Bratislava region and its value chain actors, linkages as well as support environment.

The examples of such export oriented Slovak clothing firms are located in the traditional Slovak clothing industry centres; e.g. Prešov (the firm O, the firm Y), Michalovce (the firm Z) and Turzovka (the firm X). The value chain of Slovak fashion design is presented in the case study of the Bratislava region, where the main actors and linkages among them are identified together with other relevant parts of the value chain.

The paper is organized as follows. The first section highlights the apparel global value chain, the second section describes the methodology of the paper. It is followed by the overview and upgrading of the Slovak clothing industry. The fourth part of the paper's analysis of the value chain of Slovak fashion design in the Bratislava region. In the final section, policy implications and paper conclusions are presented.

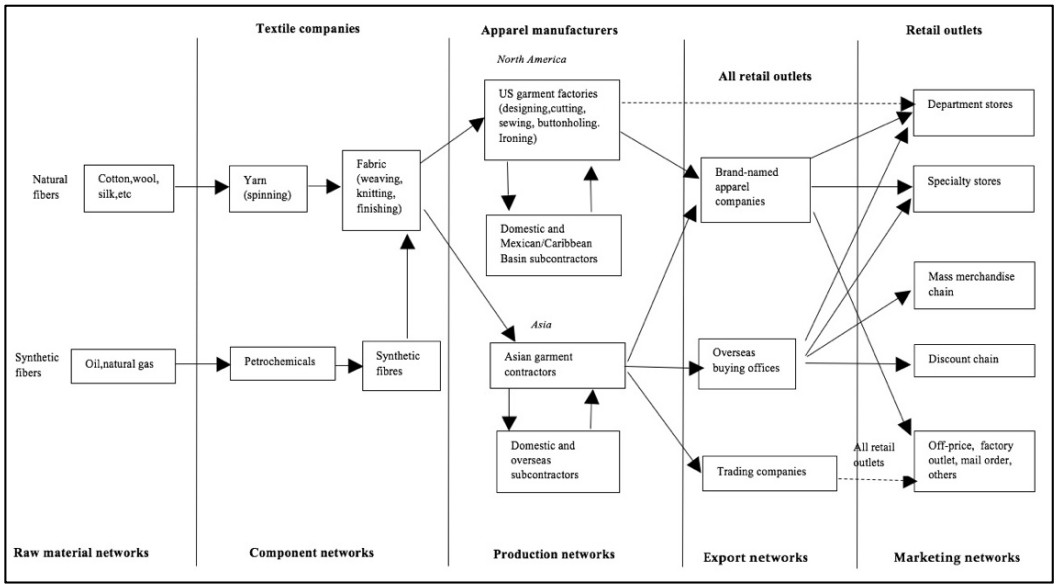
1. Literature Review and The Apparel Global Value Chain

The apparel industry has been characterized by global production and trade networks since at least the middle of the twentieth century, and the expansion and growing capabilities of its global supply-base have permitted it to move rapidly from captive to more complex relational value chains over the span of just a few decades (Gereffi, Humphreyy and Sturgeon 2005: 91).

There are 2 types of GVC's (Gereffi and Memedovic 2003: 2–5): a) producer driven and b) buyer driven. Apparel has been the classic "buyer-driven" value chain. Unlike producer-driven chains, where profits come from scale, volume and technological advances, in the buyer-driven global apparel value chain, profits come from a combination of high-value research, design, sales, marketing, and financial services that allow the retailers, designers and marketers to act as strategic brokers in linking overseas factories and traders with the product niches in their main consumer markets.

To have a closer look, the apparel GVC is organized around 5 main segments (Appelbaum and Gereffi 1994: 11) (Figure 1): (1) raw material supply, including: natural and synthetic fibers; (2) provision of components, such as the yarns and fabrics manufactured by textile companies; (3) production networks made up of garment factories, including their domestic and overseas subcontractors; (4) export channels established by trade intermediaries; and (5) marketing networks at retail level.

Figure 13: The Apparel Value Chain



Source: Appelbaum and Gereffi 1994

An alternate view of the value chains in the clothing industry, that is closer to Porter's stand on GVC's, is representing by the following activities (Flecker and Holtgrewe 2008: 11–12):

(1) planning and development of a collection; (2) design and prototyping of models; (3) production design, planning, monitoring; (4) manufacture and assembly of garments; (5) marketing; (6) distribution, logistics; (7) Point of sale (POS) marketing; (8) sales. These activities can be carried out by one company in one or several regions or countries (vertical integration). The value chain may be fragmented so that the various functions are carried out by separate companies, often in different regions and countries (vertical dis-integration). Individual clothing or fashion firms may cover different steps of the value chain, and they may hold different strategic positions within it. Competition among firms is cost-driven.

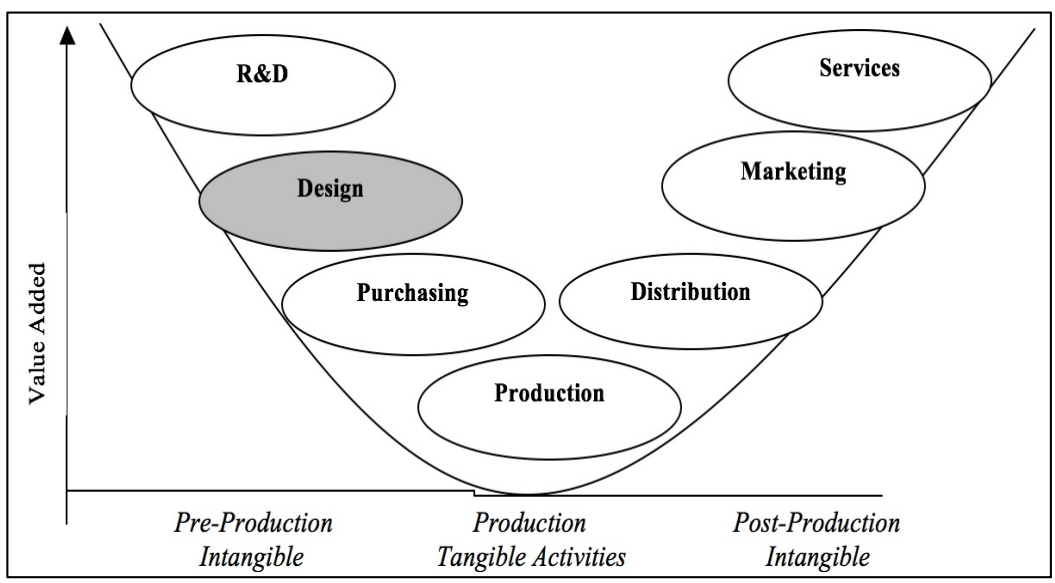
While the global expansion of the apparel industry, historically, has been driven by trade policy; by 2005, the Agreement on Textiles and Clothing (ATC) from the World Trade Organization (WTO) had phased out many of the quotas that had previously regulated the industry. This caused a huge flux in the global geography of apparel production and trade, as well as a restructuring of the strategies of firms seeking to realign their production and sourcing networks to accommodate new economic and political realities (Gereffi and Frederick

2010: 2–3). This tremendous shift in the former communist countries of Central and Eastern Europe has been strengthened by the change in their political and economic regimes after 1989. This change has brought other key factors in the countries' competitiveness to the forefront, including labour costs, productivity, and competences.

As Gereffi and Frederick (2010) state, this pressure to be competitive forces smaller countries to upgrade into higher-value segments, such as branding and design, which rely on high-quality human capital. As a result, workforce skills will become increasingly important elements for developing economies to maintain and upgrade their positions in the global apparel value chain.

To understand how this division of work occurs, and how the workforce may affect the role which developing countries play in the global value chain, six distinct value adding activities can be identified: (1) research and new product development (R&D), (2) design, (3) production, (4) logistics (purchasing and distribution), (5) marketing and branding, and (6) services (see Figure 2). The most important value-adding stages are intangible services that occur before and after the apparel production process (Fernandez-Stark, Frederick and Gereffi 2011: 12).

Figure 14: Curve of Value − Added Stages in the Apparel Global Value Chain



Source: Frederick et al. 2011

R&D: Includes companies that engage in R&D, as well as activities related to improving the physical product, or process and market and consumer research.

Design: Includes the people and companies that offer aesthetic design services for products and components throughout the value chain. Design and style activities are used to attract attention, improve product performance, cut production costs, and give the product a strong competitive advantage in the target market.

Purchasing/Sourcing (Inbound): Refers to the inbound processes involved in purchasing and transporting textile products, such as physically transporting products, as well as managing or providing technology and equipment for coordination of the supply chain.

Production/Assembly/Cut, Make, Trim (CMT): The cut-and-sew classification includes a diverse range of establishments making full lines of ready-to-wear and custom apparel. Apparel manufacturers can be contractors, performing cutting or sewing operations on materials owned by others, or jobbers and tailors who manufacture custom garments for individual clients. Firms can purchase textiles from another establishment, or make the textile components in-house.

Distribution (Outbound): Includes a network of wholesalers, agents, logistics firms, and other companies responsible for value-adding activities which take place outside of production.

Marketing and Sales: Includes pricing, selling, and distributing a product, including activities such as branding and/or advertising. These companies frequently do not make any physical alterations to the product. Apparel is marketed and sold to consumers (via retail channels), institutions, or to the government.

Services: Includes any type of activity a firm or industry provides to its suppliers, buyers, or employees, typically as a way to distinguish itself from competitors in the market (e.g., offering consulting services concerning the international apparel business, or fashion trends).

The opportunities for upgrading are shaped by the buyer-driven governance structure of the apparel industry. In general, there are four types of industrial upgrading: (1) *functional* (moving to higher-value functions); (2) *product* (producing higher-value products); (3) *process* (incorporation of more sophisticated technologies into production); and (4) *intersectoral* (leveraging expertise gained in one industrial sector to enter a new sector) (Fernandez-Stark, Frederick and Gereffi 2011: 12–13).

However, empirical findings about upgrading are not always positive regarding the broader assessment of risk and rewards (e.g. Ponte and Ewert in Coe 2012).

Pickles et al. (2006) point to the fact, that the upgrading possibilities for apparel producers in CEE countries has to be understood within the local institutional context with its opportunities and constraints. Recent research on upgrading has distinguished between economic upgrading and social upgrading; taking into consideration the worker's wages, benefits, as well as their rights (freedom of association, etc.). See: Barrientos, Gereffi, Rossi 2011; Coe et al. 2011.

Recent literature on global value chains and production networks examines the re-articulation between states and markets after the crisis of 2008 (Sellar 2015).

Governance is playing an important role in upgrading, while by governance, Coe (2011) means the coordination of economic activities through non-market relations, while Frederick and Gereffi 2009, stress the relationship or linkages among stakeholders in the chain and the dynamic features of GVC governance. Within inter-firm governance, a powerful firm sets the parameters of the purchasing power of other firms, who must comply with what is known as the lead firm in the chain. The apparel industry contains three types of lead firms: retailers, marketers and branded manufacturers (Gereffi and Memedovic 2003).

With the globalization of apparel production, competition between the leading firms in the industry has intensified as each type of lead firm has developed extensive global sourcing capabilities. While "de-verticalizing" the production processes, these firms are fortifying their activities in the high value-added design and marketing segments of the apparel chain, leading to a blurring of the boundaries between them, as well as a realignment of interests within the chain. Profits in this type of value chain come from combinations of high-value research, design, sales, marketing, and financial services which allow the retailers, designers and marketers to act as strategic brokers in linking overseas factories and traders with product niches in their main consumer markets (Gereffi and Memedovic 2003).

Fashion design is characterized by cyclical (seasonal) processes of continuous innovation, avoiding the standardization of its products, as well as by the importance of the knowledge, expertise, skills and talents of individuals. The structure of the industry is characterized by a large number of small firms, which are mainly concentrated in fashion capitals (Wenting 2008).

Fashion design originates in the cities where 80–85 % of the designers' work. Each city has its own "design identity", or characteristics. All suitably sized companies have showrooms in the major cities, and within each city there are one or two specific fashion and garment districts (Jones 2011).

The recent situation in the fashion design sector has changed. Global distribution and branding have grown; manufacturing has changed rapidly, with more companies sourcing their suppliers where labor is cheaper. Value for money and credibility are major considerations for any designer today, and the fashion-buying customer is better informed than at any other time in history (Jones and Rushton 2010: 28)

In the high-quality fashion market, the industry is characterized by modern technology, relatively well-paid workers and designers, as well as a high degree of flexibility. The competitive advantage of firms in this market segment is related to the ability to produce designs that capture tastes and preferences, and even better – influence such tastes and preferences – in addition to cost effectiveness. The core functions of firms servicing this market segment are largely located in developed countries, and often in limited geographical areas or clusters within these countries (Kyvik Nordås 2004).

2. Data and methodology

There are four basic dimensions that GVC methodology explores: (1) an input-output structure, which describes the process of transforming raw materials into final products; (2) geographical considerations; (3) a governance structure, which explains how the value chain is controlled; and (4) an institutional context in which the industry value chain is embedded. We use these four fundamental dimensions which describe the dynamic movement within the value chain to examine how producers shift between different stages of the chain. Early use of GVC methodology focused principally on economic and competitiveness issues, while recently, social and environmental dimensions have been incorporated. GVC research is now exploring new topics such as labor regulation issues, workforce development, the greening of value chains, and gender (Gereffi and Fernandez-Stark 2011).

Not only do value chains differ (both within and between sectors), but so, too, do national and local contexts. So, there is no mechanical way of applying value chain methodology. Each chain will have particular characteristics, whose distinctiveness and wider relevance can only be effectively captured and analysed though an understanding of the broader issues which are involved. The methodology outlined in following sections will address the following

issues: mapping value chains and upgrading in value chains (Kaplinsky and Morris 2003).

Pickles (2014) suggests this methodology in GVC analysis: to identify the industry; to set up limits of the chain; to map the main actors/components of the chain, institutions, regulators; to look at relations between supplier-producers.

New research now shows that GVC's can and do benefit the domestic economy if a set of prerequisites is fulfilled. Using a new unique set of inter-country inputs-outputs with extensive country coverage provided by the OECD, there was found a positive and robust relationship between global value chains participation and domestic value-added. This finding holds true for indicators based on both backward linkages (i.e. foreign value-added in domestic exports) and forward linkages (i.e. domestic value-added in foreign exports) reflecting different stages of the value chain (Kumritz 2015).

To achieve the objectives of the paper we have used two main approaches – qualitative and quantitative research. As Coe (2011) presents, qualitative methods predominated in GVC research. Also a lot of empirical research using the methodology of the studies figures prominently.

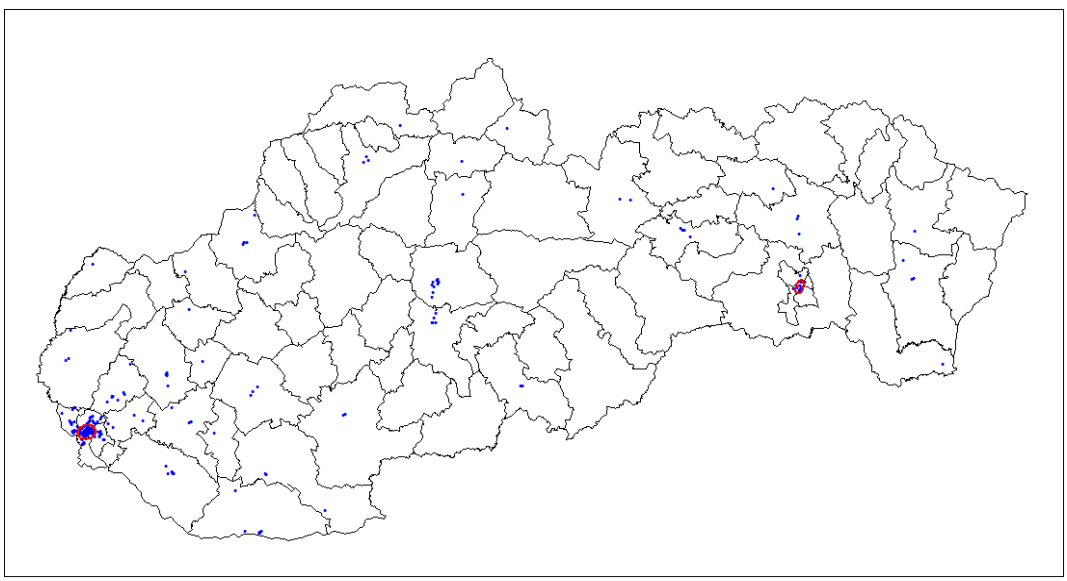
Some authors (Derudder and Witlox in Coe 2011) have observed a need to find a methodological ground between top – down quantitative research prevailing in the world city network analysis and bottom – up firm, region and sector case studies offered by the GVC methodology.

Our paper included primary and secondary research: (1) Primary research – the analysis of upgrading of the clothing industry in Slovakia was collected through 4 interviews with Slovak clothing firms – the firm O (Prešov), the firm X (Turzovka), the firm Y (Prešov) and the firm Z (Michalovce). The way of selection of clothing firms for interviews was based on the long-term tradition in the clothing production of these firms before 1989 (the firm O was established from OZKN), as well as on their innovations to upgrade their product portfolio (the firm X, the firm O). The qualitative aspects of the Slovak fashion design were collected via semi-structured interviews with 11 key Slovak fashion designers in Bratislava, 2 representatives of additional, related industries (modeling agencies in Bratislava – Elite Model Management and Mix Model Management), 1 representative from sales (shop of fashion design products) and 1 university representative (the Academy of Fine Arts and Design in Bratislava). The way of selection of respondents for interviews in Slovak fashion design was based on the following criteria: we have focused on Slovak fashion designers with long-term experience in fashion design, as well as young talented fashion designers. We have used the output from 16 interviews, while the information obtained

was supplemented by various presentations organized by the Slovak Fashion Council in Bratislava, as well as information from Slovak TV media (TA3, RTVS, Fashion TV, etc.). (2) Secondary research – analysis of existing data obtained from the Regional Statistical Office Database and Institute of Informatics and Statistics (Infostat). Other sources used for sector analysis are from Slovak economic journals and economic daily news, TV news, etc.

The selection of the Bratislava region for our paper is based on the identification of the cluster of creative industries in this region (Blahovec, Hudec 2011 and Rehák, Chovanec 2012). The main location of Slovak fashion design is Bratislava (Map 1). According to a famous Slovak fashion designer, *"fashion design is innovative, perspective and highly concentrated in Bratislava"*.[44]

Map 1: Clusters of creative industries in Slovakia – fashion design



Source: Rehák and Chovanec 2012

From point of view of the classification of economic activities NACE2 rev. (2008)[45], fashion design belongs to the group – *specialized design activities*. This group includes fashion design of textiles, clothing, shoes, jewelry, furniture, and other household ware, industrial design, the activities of graphic designers and interior decorators. In our research we have focused on clothing and jewelry design. The clothing industry includes – the manufacture of textile and manufacture of wearing apparel.

[44] SIEA, Bratislava, 28. 3. 2013

[45] Eurostat (2008)

3. The overview and upgrading of the Slovak clothing industry

3.1 Overview of the Slovak clothing industry

The Central and Eastern European clothing industry has experienced a number of competitive pressures over the past 20 years since the collapse of state socialism which have altered its position in global markets and transformed the livelihoods of its workers (Smith, Pickles, Buček, Pástor and Begg 2014:1028).

Before 1989 the Slovak clothing and textile industry belonged to one of the most important industries within the national economy, in terms of employment as well as volume of production.

During Slovakia's industrialisation, this sector acquired massive development capacities and had a significant social function. Later, during the 1980's, the output of the textile and clothing industry as a share of overall industrial output stabilised at 4.7% (textiles 3.2%, clothing 1.5%). Employment in these sectors as a share of overall employment fluctuated between 9.3% and 9.8% (The Ministry of Economy of the SR 2004).

After 1989, and later during the economic transformation period, we have observed a systematic decline in the Slovak clothing sector, resulting from its reorientation to exports to the EU market.

The most critical stage in the development of Slovakia's textile and clothing industry came between 1989 and 1993. The volume of textile and clothing production for 1993 was only 46.5% of the level for 1989. Production of cotton yarn, for example, fell by 50.2%, that of woolen fabrics by 45.2%, knitted tops by 57.6% and clothing from fabrics by 30.5%. Textile and clothing output grew from 1994 until 2002. In 2003, it registered a fall of 3.1% year-on-year. Regarding the employment situation between 1989 and 1993, the number of people employed in the textile and clothing industry fell by 16,500, and between 1994 and 2003 by almost 11,000. The textile industry is all the more problematic in terms of employment development. Between 1989 and 2003, it lost 31,300 employees, while the number of people employed in the clothing industry rose by 4,200 (at companies employing more than 20 people) (The Ministry of Economy of the SR 2004).

The total number of companies operating in the sector increased by about 10%, but due to a loss of competitiveness several prestigious national companies were significantly restructured or even closed. Company restructuring also resulted in changes in the structure of companies active in the textile and

clothing sector. While in 2001 about 60% of companies were active in the manufacture of clothing, their share increased to almost 75% in 2011. Though the total number of companies in the sector increased, the aggregate employment decreased significantly, by almost 58% – from about 73,000 to about 31,000. The total number of employees working in companies in the sector decreased even more – by almost 60%. Changes in employment have diminished the sector's share of the economy. The share of sectorial employment in the economy fell from 3.5% in 2001 to 1.3% in 2011. Similar trends concerned the number of employees. Employment in the sector is very female-dominated, with women accounting for about 85%–86% of total employment in textiles and clothing. This proportion did not change during the decade 2000 to 2011.[46]

In Slovakia, the clothing industry accounted for around 6% of total industrial employment (30,000 employees in 1995), at a time when the post-socialist economy was going through major recession. Since the mid-2000's there has been sustained job loss in the industry as competitive pressures increased (16,000 jobs between 2002 and 2011), and industrial value added has declined, although this has stabilised in recent years. Overall, Slovakia's share of the EU-15 clothing market has fallen from 1% in 1995 to 0.49% in 2011, although there are certain product niches which have proved very resistant to these wider changes (Smith, Pickles, Buček, Pástor, and Begg 2014: 1029).

The proportion of added value in the textile and clothing industry has been falling since 2001. For 2003, it stood at 36.0% in textiles and 51.7% in clothing. The values are significantly higher compared to the overall situation in Slovak industry. Weak points in the textile and clothing industry include the level of average wages, the share of foreign direct investment, and the high share of OTP production in the clothing industry (The Ministry of Economy of the SR 2004).

At a national level, the Slovak clothing industry has seen a steady loss of employment since 2000. The largest decline in district-level clothing employment occurred in about six key centres located in Western and Central Slovakia, where wage costs have tended to be highest and increasing, although the employment decline has also been occurring more recently in some lower cost regions of Eastern Slovakia. These districts in Western and Central Slovakia have seen an almost complete collapse of employment in the sector. For example, Trenčín, which used to be known as the 'fashion capital' of Slovakia, dropped from the second most important employer of clothing workers in 1997, to 24th position in 2007 (district Trenčín), as 92% of employment in the sector was lost. This was associated with significant downsizing of production and

[46] European Observatory of Working Life (2013)

employment in the Ozeta Neo enterprise, which, like other large former state-owned enterprises, had an extensive branch plant structure in surrounding districts. Ozeta Neo was purchased in 2003 by the private equity investment firm, Penta Investments. In February 2007, the main factory in Trenčín was closed. The significance of the decline in the Ozeta Neo enterprise also affected other districts around Slovakia, given the branch plant structure of the firm, so typical of former state-owned enterprises. Similarly, high levels of employment loss have been experienced in Banská Bystrica (–92%) in Central Slovakia with the collapse of the former state-owned Slovenka enterprise, which meant that the district dropped from 8th to 41st between 1997 and 2007, and Trnava in Western Slovakia saw an employment loss of –91% over this period (Smith, Pickles, Buček, Pástor, and Begg 2014: 1035).

3.2 The upgrading of Slovak Clothing Industry

The textile industry is also undergoing a major reorientation towards the non-clothing applications of textiles, known as technical textiles, which represent the fastest-growing segment of total textile applications. Technical textiles are often defined as textile materials and products manufactured primarily for their technical and performance properties rather than for their aesthetic or decorative characteristics. It is estimated that technical textiles are growing at roughly twice the rate of textiles for clothing applications and now account for more than half of total textile production. The processes involved in producing technical textiles require relatively expensive equipment and skilled workers and are, for the moment, concentrated in developed countries (OECD 2004).

The outward-processing trade (OPT) in the European clothing sector is the practice by which companies export fabrics, or parts of garments, to be further processed in a third country and then re-import them as finished garments in an EU country (Gereffi 2002).

One example of this process upgrading we can find in designs that are provided to the firms electronically for them to complete the garment utilising cut-make-trim (CMT) production. As a result, only limited design activity or other higher value added activities have emerged within these firms, imposing real limits on firm upgrading. Some firm-level upgrading away from simple CM and CMT production has occurred, but the ability to break into own brand and own design manufacturing has been limited. Forms of process upgrading have also been introduced in some of these firms to increase production flexibility in order to meet the increasing demands of quick response supply, and fast fashion

from buyers, even in segments such as tailored suits. In order to deal with reduced stock inventory among retailers, joint venture firms have been able to adopt quick response approaches to supply orders within two to three weeks. Higher value production has provided producers with some flexibility to manage the increasing cost and competitive pressures that all firms have been experiencing. Some greater functional downshifting of tasks to suppliers has occurred (especially washing, packaging, labeling, quality control), but other key functions such as design and fabric sourcing remain to a large extent the responsibility of the buyer. Designs are provided to the firms electronically for them to complete the garment utilizing cut-make-trim (CMT) production. As a result, only limited design activity or other higher value added activities have emerged within these firms, imposing real limits on firm upgrading. Some firm-level upgrading away from simple CM and CMT production has occurred, but the ability to break into own brand and own design manufacturing has been limited. The Slovak branches of these foreign firms have been able to exploit their close proximity to Italian and German buyers (who are often direct owners or co-owners), and their particular product niche (high quality men's trousers, suits and shirts; and women's pantyhose), in order to ensure some stability in orders and exports, during a period of dramatic tightening of competitive pressure (Smith, Pickles, Buček, Pástor and Begg 2014: 1041).

Forms of process upgrading have also been introduced in some Slovak clothing firms to increase production flexibility in order to meet the increasing demands of quick response supply and fast fashion from buyers, even in segments such as tailored suits (Smith, Pickles, Buček, Pástor and Begg 2014).

In addition to clothing firms based on outward processing transactions (OTP), there are also clothing firms focused on more complex ranges (technical textiles, luxury clothing) and thus remain a step ahead in clothing production. Through modernisation, they are reducing production costs, improving output quality, speeding up deliveries, and phasing in processes of globalisation and inter-sectoral cooperation (e.g. with the automotive sector). They also rely on their real comparative advantages (workforce skills, research, innovation, sales), and exploit a wide base of modern production in machinery and chemicals (The Ministry of Economy of the SR 2004).

The Slovak clothing firms have also reacted to the trend of upgrading, mainly via product and process upgrading.

The leading Slovak clothing firms have recently become fully export oriented firms as regards their production (the firm O, Makyta), and these firms produce for the lucrative world clothing brands (e.g. Prada, Armani, Versace

and Valentino). The products for these brands (jackets, costumes, suits and shirts) are produced in small series with the stress on high quality.[47]

The upgrading of the Slovak clothing industry is represented in the cases of the firms which were examined in our survey. In the case of the firm O (Table 1), it produces suits, jackets and trousers. The production volume as well as production value has increased. This firm supplies the European market and has started to supply the US market. Employment has stabilized, with a moderate increase in 2008. The product upgrading is significant, e.g. this firm produces a smaller series, and the production is more demanding. The firm has a long-term contract with an Italian partner, so continuity in the production is secured for the future.[48]

Table 8: Production and production processes – the firm O

	2004	*2008*	*2012*
Production volume (in units)	90,000	110,000	100,000
Production value (euro)	4,000,000	4,600,000	4,700,000
Employment	300	330	330

Source: The firm O, 24. 2. 2014

The next firm X (Table 2), is a typical example of product upgrading. The firm concentrates on knitted products. Around 90 % of its production are pullovers, knitted ladies suits and winter clothes (caps, scarves, gloves). 25 % of this is OPT, but the problem with OPT is that it pays only the wages; does not give a profit. During the crisis, the OPT grew to 50–60 % of production, but by 2012 it was back at 25 %, mainly for German, Austrian and French buyers (Lacoste). The firm has three types of production: (1) Circle knit thermal underwear produced on Monarch (US) Machines; and (2) New flat-bed Japanese machines. The computer technology to run the machines is contracted to Bratislava; (3) Japanese Shimishake fully automatic machines produce clothing. The firm X has a really ambitious strategy, as every year the firm develops a new product, and tries to set up markets in a new territory. With the decrease of production volume in outerwear and gloves, the firm has specialized in extreme weather clothing, particularly functional thermal underwear. This product has been sold to Russian Railways since 2008. In the case of production process

[47] TREND TOP v priemysle, September 2014

[48] Interview, 24. 2. 2014

upgrading, the firm has added extremely modern circular knitting machines that have increased quality and productivity, while reducing labour needs significantly. Despite that, the future of orders is always uncertain, the firm's strategy is to maintain competitiveness by its commitment to innovation. Trade success is based on innovation policy, with several cornerstones on which the firm focuses; specifically; quality, prompt delivery, and the price of products. The production volume of functional thermal underwear has radically increased from 6,077 in 2008, to 42,056 in 2012. The firm's entire production is exported to the EU, Russian, Kazakh, and Eurasian/Afghan markets. Employment in the firm has gradually decreased from 483 in 1997 to 412 in 2000 and 151 in 2012.[49]

Table 9: Production and production processes – the firm X

	2004	*2008*	*2012*
Production volume			
Outerwear (in units)	199,665	116,151	53,082
Gloves (pairs)	65,941	669,724	28,774
Functional thermal underwear		6,077	42,056
Production value (euro)	3,072,296	1,721,768	1,824,304
Employment	224	170	151

Source: The firm X, 25. 10. 2013

The functions and capacities of the firm Y (Table 3) in Prešov have changed since 2004. The production volume of firm has moderately decreased, but production value has increased from 1,7 million to 2,7 million euros. The firm produces men's and women's trousers and it supplies the Western and Central European markets. Employment in the firm has stabilized with a moderate increase in 2012. Process upgrading is achieved by means of technology upgrading. The firm is worried by the competition from Asia and the growth of wages.[50]

[49] Interview, 25. 10. 2013

[50] Interview, 25. 3. 2014

Table 10: Production and production processes – the firm Y

	2004	*2008*	*2012*
Production volume (in units)	432,132	421,055	412,602
Production value (euro)	1,728,532	2,315,803	2,681,913
Employment	197	200	224

Source: The firm Y, 25. 3. 2014

The negative development in the firms, which were interviewed, was observed in the firm Z (Table 4). This development is interconnected with slow industrial firm upgrading. The production volume, as well as production value, has radically decreased and it is directly in relation to the decrease in the level of employment from 947 employees in 2004, to 195 in 2012. From the longer-term perspective, the prospects of the firm in the future are unclear in relation to the legislative process, as well as the small attractiveness of the clothing industry in general.[51]

Table 11: Production and production processes – the firm Z

	2004	*2008*	*2012*
Production volume (in units)	1,759,252	585,385	131,901
Production value (euro)	15,953,000	6,830,000	3,189,000
Employment	947	593	195

Source: The firm Z, 20. 3. 2014

Another example of the clothing industry upgrading is Maximilian Mucska Tailors. The traditional tailoring salon is situated in the center of Bratislava. The salon is led by the second generation of the Mucska family, which ensures the highest quality garments "Bespoke Tailoring". The upgrading lies in the exceptional treatment of the garment. This means from the choice of fabric, creating the original pattern based on the customer´s measurements and requirements, to the final version. The process includes also 3 fittings and one garment is created in 4 to 6 weeks.[52]

[51] Interview, 20. 3. 2014

[52] http://mucska.sk/en, 1. 10. 2015

With the increase in the economic level in the Slovak regions, we also presume that there is increased interest in original Slovak fashion design production.

The Slovak clothing industry is forced more to upgrade into higher-value segments, such as branding and design, which rely on high quality human capital to maintain their competitiveness. This section has confirmed the firm´s upgrading of the Slovak clothing industry and the move to higher stages in the apparel value chain. The surveyed firms (with the exception of one) have moved continuously from OPT to more specific clothing production.

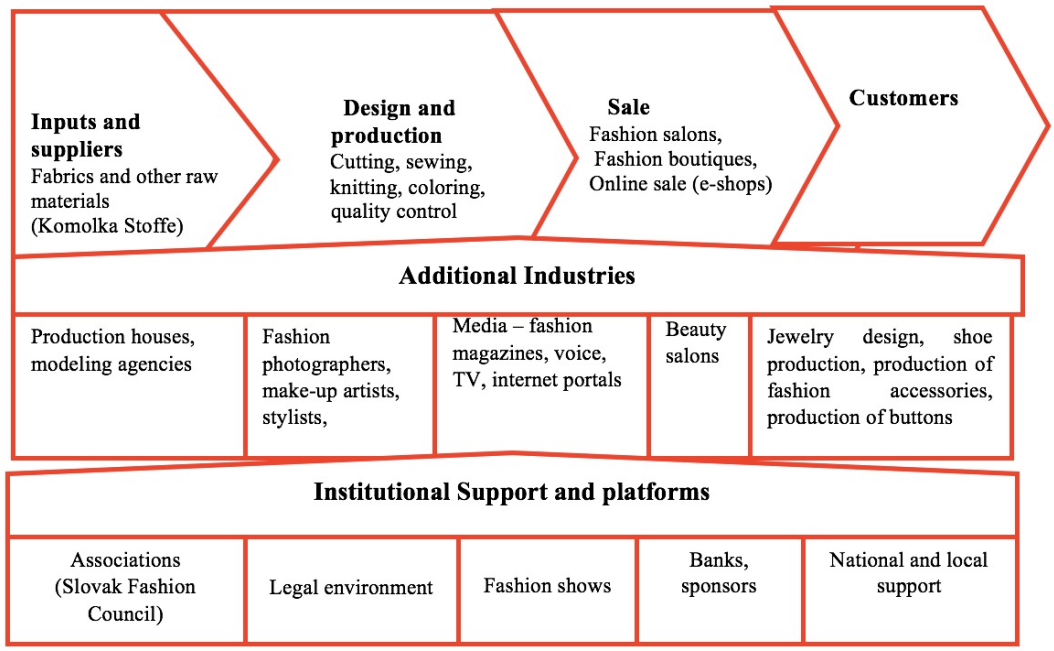
4. Value chain of Slovak fashion design in the Bratislava region

Some observers distinguish between the fashion industry (which makes "high fashion") and the apparel industry (which makes ordinary clothes or "mass fashion"), but by the 1970's the boundaries between them had blurred. Key sectors of the fashion industry are: (1) textile design and production; (2) fashion design and manufacturing; (3) fashion retailing and merchandising; (4) fashion shows; (5) media and marketing.[53]

Fashion design represents the higher stage of the value chain in the clothing industry. Among the main components of the Slovak fashion design value chain in the Bratislava region we can find (Figure 3): (1) suppliers of fabrics and raw material; (2) producers – fashion designers; (3) distributors and sale of fashion design products; (4) customers; (5) additional industries; (6) institutional environment and platforms for the presentation of fashion designers' work (fashion shows).

[53] Encyclopaedia Britannica 2015

Figure 15: Value chain of Slovak fashion design in the Bratislava region



Source: Own elaboration based on interviews

The results of the empirical analysis in the fashion design in Bratislava region are as follows:

(1) Suppliers: the main Slovak suppliers of raw material for fashion designers in Bratislava are Boritex and Koloria in Bratislava (sale of clothing fabrics). Koloria has been on the Slovak market since 1992, and supplies fabric to the fashion designers. Boritex has been on the Slovak market since 2004 and is specialized in the wholesale and retail of fabrics with a high level of quality.[54] With foreign suppliers, an important factor is the geographical proximity of locations such as Vienna and Prague, e.g. Komolka Stoffe (Vienna) and Aped (Prague), etc. The import of other materials was influenced by the fact that some materials are not produced in Slovakia after 1989 anymore, e.g. yarn, which is mostly imported from Italy. The main criterion for the selection of input materials from suppliers is the quality of the input materials.[55] In the case of the other Slovak fashion designers; with the exception of the traditional European

[54] http://www.boritex.sk, 15. 2. 2013

[55] Interview, Bratislava, 15. 1. 2013, 21. 2. 2013

suppliers (Italy, France, Spain)' they have suppliers also in Asia (India, UAE – Dubai).[56]

(2) Production: the whole production process of Slovak fashion designers is usually managed by fashion designers. According to the popular Slovak fashion designer, *"own original collection for fashion show is created at least during 2 months (20–30 models).*[57] The production process in fashion design is based on handwork, e.g. the sewing of the clothing. In the case of innovations among Slovak fashion designers, we have recorded new printing methods, or smart tailoring processes.[58] The lack of product innovation is influenced by the fact, that there is a lot of handwork in the process of fashion creation (e.g. sewing etc.) and it can be only partially substituted. From other product innovations, in the meantime, we have recorded moves in the direction of using more qualitative materials, as well as new fabrics, also more naturalness of components used in the production process. The Slovak fashion designers are mostly focused on women´s collections; the production of men´s collection is more unique.[59]

(3) Sale: the main distribution channels of Slovak fashion designers are fashion salons, fashion boutiques and internet shops. Online shops belong among the innovative tools in fashion design sale and direct marketing, and are used by accessing new fashion customers.[60] An example of an online shopping portal is "Fashion Days". This internet portal is the conduit for the sale of fashion collections and products for women and men.[61] The sale of fashion garments from Slovak fashion designers is usually provided directly through fashion salons and showrooms in Bratislava. Slovak fashion designers prefer personal contact with their customers, especially by fitting. The sale of a designer's own original collection through other fashion boutiques in the city center of Bratislava is also possible (e.g. M.ONA Fashion Store,[62] Ivica). The new young generation of Slovak fashion designers also use the internet as a distribution channel, with its offer of greater possibilities to reach new customers. *"The internet presentation and sale of fashion collection on the internet represents a gap on the Slovak fashion market."*[63] Despite the fact that the internet

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56 Interview, Bratislava, 20. 2. 2013

57 Interview, Bratislava, 7. 3. 2013

58 Interview, Bratislava, 17. 7. 2013

59 Interview, Bratislava, 15. 1. 2013, 21. 2. 2013

60 Interview, Bratislava, 20. 2. 2013

61 Fashion Days, www.fashiondays.sk, 15. 2. 2013

62 This concept store offers to customers a fashion collection from Czech and Slovak fashion designers, http://monafashion.sk, 8. 3. 2013

63 Interview, Bratislava, 20. 2. 2013

may make shopping easier, generally Slovak fashion designers do not prefer the internet as a distribution channel, especially for the sale of fashion garments, e.g. evening dresses or wedding dresses, as more fitting and personal contact with customer is required. In the case of fashion accessories, Slovak fashion designers are more inclined to use internet selling (e.g. for jewelry, sunglasses, handbags, shoes).[64]

(4) Customers: customers play an important role in fashion design. The typical customer of Slovak fashion designers is mostly a woman with above average salary, mainly coming from Bratislava. The main customer demand comes from the business district of Bratislava region, from "celebrities", government representatives and politicians, etc. During the past few years we have also observed a growing number of men customers. The dynamic of the fashion market in the Bratislava region is growing. The customers are usually more interested in fashion, and they want to wear original fashion collections made by Slovak fashion designers. Some of the young Slovak fashion designers have customers also from abroad (e.g. from Germany, Sri Lanka, whom they have reached especially through direct marketing channels).[65]

(5) Additional industries: Slovak fashion designers use the various services of additional industries (e.g. production and modeling agencies, make-up artists, fashion stylists, fashion photographers and other firms from different industries), and there is also close cooperation with them. The best known production agencies in Bratislava are Star production and the production house Forza. Star production is main organizer of "Bratislava Fashion Days". The production house Forza, since its establishment in 1994, has become one of the largest and most prestigious production companies in Slovakia. Among its other activities, Forza has also organized fashion shows in cooperation with some Slovak fashion designers. In addition, Forza is a co-organizer of Miss Slovakia, the main beauty competition in Slovakia. Modeling agencies also represent an important part of the fashion industry, especially by their visual presentation of fashion collection through the use of fashion models. The most important fashion agencies in Bratislava are Elite Model Management (office in Bratislava opened in 2002) and Exit Model Management (established in Bratislava in 1999). There are also smaller modeling agencies in Bratislava, e.g. Mix Model Management (established by a former Slovak model in 2010) and Heriett Models, etc. Mix Model Management has recently contracted with 85 fashion models; 95 % of these fashion models are working abroad.[66] According to the

[64] Interview, Bratislava, 7. 3. 2013

[65] Interview, Bratislava, 20. 2. 2013

[66] Interview, Bratislava, 18. 6. 2013

head representative of Elite Model Management in Bratislava, the main localization factor in establishing a subsidiary of an international modeling agency in Bratislava were the low costs involved. Elite Model Management in Bratislava has recently started representing 120 models, and is oriented mostly on the foreign market, e.g. New York, Paris, Tokyo.[67]

The other additional industry is represented by photographers. According to the opinion of the modeling agency representative, the most important role in the "fashion business" recently, is being played by fashion photographers and fashion stylists, as they, together with fashion editors decide on the final visual presentation of the fashion collection.[68]

One of the most important roles in the presentation of fashion are played by the media, especially the printed media (e.g. fashion magazines). Recently, a more and more critical role is being played by the new media channels, especially (e.g. internet portals, social networks etc.). Of the Slovak fashion magazines, the best known are Móda Revue, La Femme, Top Fashion and others. Fashion is presented regularly on Slovak TV (e.g. Fashion TV – established in Slovakia in 2009, TA3 TV-Showbiz, RTVS and others).

Beauty salons represent an important additional industry of fashion design, in the case of the Bratislava region especially during recent years. Another type of additional fashion industry (production of fashion accessories), is also in the production portfolio of Slovak fashion designers. A typical additional industry, too, is the shoe and leather production industry, with its long tradition in Slovakia.

(6) Institutional environment and fashion platforms: the support environment of fashion design in the Bratislava region is represented by the Slovak Fashion Council, and it sponsors the various fashion platforms for the presentation of fashion design production (e.g. fashion shows, jewelry exhibitions as well as other design sale exhibitions, etc.). The Slovak Fashion Council (SFC) was established in Bratislava in 2011, with the aim of supporting Slovak professional fashion and textile designers, and firms, when they enter local, and especially, foreign markets. Despite its short history, and just the individual initiative of one fashion designer, it was an important step in the case of the presentation of Slovak fashion abroad more often than before. According to the Slovak fashion designer and founder of the initiative "SFC", *"The institution wants to connect fashion designers, manufacturers in Slovakia and sales. In addition to this initiative, there was an interactive internet portal developed, which will*

[67] Interview, Bratislava, 24. 1. 2014

[68] Interview, Bratislava, 24. 1. 2014

provide all practical information and guidance, and should also be a gateway for foreign investors who are interested in Slovak fashion design and designers".[69]

The Bratislava region has also various other fashion platforms for the presentation of Slovak fashion designers' work at fashion shows in Bratislava, as well as abroad, e.g. "Bratislava Fashion Days", "Bratislava Fashion Weekend", "Fashion LIVE!", "Bratislava Design Week", as well as other commercial fashion events, e.g. "Orange Fashion Show", etc.

With "Bratislava Fashion Days (BFD)", Bratislava has already an 8 years established platform for the presentation of original fashion collections from Slovak fashion designers. Bratislava has established itself on the European fashion scene, as here are organized fashion shows at least twice per year – Spring/Summer collection in April and Fall/Winter collection in October. Since 2013 Bratislava belongs to the network of world fashion weeks. In addition to the presentation of Slovak fashion designers on the Slovak scene, there is also opportunity for young Slovak fashion designers to present their collections abroad, e.g. on "Slovak Fashion Night" in New York.[70]

Another recent initiative for the presentation of Slovak fashion design is Fashion LIVE! This new initiative is an example of the cooperation between Slovak fashion designers, fashion brand Impéria, La Femme and the Slovak Fashion Council. This initiative would like to present local Slovak Fashion and local fashion brands to a wider audience, as the 1st, 2nd and 3rd Fashion LIVE! have been successfully organized in Bratislava in 2013, 2014 and 2015 with free access to the public.[71]

5. Policy implications

The capacity of firms to meet the requirements of GVCs is affected by the institutional context in which they operate. Here governments play a key role, as they may implement policies that either promote or reduce the capacities of their firms to enhance their competitiveness, attract investment, and insert themselves into GVC's. Good governance in general is important, as it signals to prospective investors and traders that a country is a good place to invest their capital (OECD 2014).

The emergence of GVC's challenges conventional wisdom on how we look at economic globalisation and in particular, the policies that we develop around

[69] Interview, Bratislava, 28. 2. 2013, http://www.kleinert.sk, 1. 3. 2013

[70] TA3, 19. 10. 2013, http://www.agentura-promotion.sk, 10. 2. 2013

[71] TASR, 15. 10. 2013

it. The whole process of producing goods, from raw materials to finished products, is increasingly carried out wherever the necessary skills and materials are available at competitive cost and quality. Similarly, trade in service is essential for the efficient functioning of GVC's, not only because services link activities across countries, but also because they help companies to increase the value of their products. This fragmentation highlights the importance of an ambitious complementary policy agenda to leverage engagement in GVC's into more inclusive growth and employment (OECD 2015).

There is an urgent need for policymakers to fully acknowledge the extent to which conventional indicators related to gross trade are severely flawed as policy benchmarks. This is because they fail to take into account the existence of GVC's and their increasing role in shaping the global economy (Amador and di Mauro 2015).

The identification and measurement of production linkages is a key issue for policy assessment, especially for highly integrated economies such as those in the Eurozone. In recent decades the Eurozone has become more integrated into GVC's. After the introduction and strengthening of the euro, and the opening up of the Chinese economy to world trade, the Eurozone´s participation in the global production has increased substantially (Amador and di Mauro 2015: 26).

The policy support of the Slovak clothing and textile industry after 1989 was interconnected with sector development. After 1989 and the loss of the strategic position of the clothing industry and textile industry in the Slovak economy, we have observed the loss of strong institutional support for the clothing and textile industry. There is no specific tripartite or bipartite body dealing with sector-specific public policy issues in Slovakia in particular. Nevertheless, the clothing sector is consulted in sector-specific issues via IOZ (Integrated Trade Union Association) representing the KOZ SR (Confederation of Trade Unions of Slovak Republic) in the national level tripartite body HSR[72]. Until recently, there was also no relevant employer association in the clothing sector. Before 2008, the Textile, Clothing and Leather Trade Union Association (OZ TOK), and the Association of Textile, Clothing and Leather Industry (ATOP) operated as social partners in the sector. In 2008, the OZ TOK merged with the Construction Union and the new Integrated Trade Union Association (IOZ) was established. The IOZ has a sector-specific Textile, Clothing and Leather Section. In 2008–2009, this section bargained collectively with ATOP for the conclusion of multi-employer collective agreements in the sector. In 2010, the ATOP presidency decided to

[72] HSR - Deals with regulation of entrepreneurship, employment conditions and social policy at the national level and partly at the sectorial level – including the textiles and clothing sector.

abolish the organization. The abolition of ATOP is attributed partly to the impact of the economic crisis on companies in the sector, and partly to the unwillingness of employers to bargain for multi-employer collective agreements, which usually regulate wage-setting in the sector. Since then, only single-employer collective bargaining has taken place there.[73]

An important policy issue in the Slovak clothing industry development is wage regulation. National legislation increased the minimum wage level in Slovakia, which increased wage levels for the lowest paid segment of industrial workers, among whom clothing workers were a significant group. In October 2006 the national minimum wage was increased by 10.2 % to 220 euro, and by a further 4.1 % to 308 euro in January 2010. This reflected not only the changing national political priorities but also a political settlement following the 2006 election which brought a stronger role for the national trade unions, as well as greater positional power for organized labour (Smith, Pickles, Buček, Pástor and Begg 2014: 1031).

The minimum wage was further increased to 338 euro in 2013 and to 380 euro in 2015 and finally by 6.6 % in January 2016 to 405 euro.[74] This minimum wage increase is the second part of the Social Package adopted by the Slovak government.

As the minimum wage increased, nationally jobs were lost. According to a manager of a Slovak clothing firm, "the minimum wage policies fail because they occur despite the quality of the work performed".[75]

On the other hand, the Slovak fashion design sector has developed since the early 1990's without any institutional support. Based on interviews[76], part of the Slovak fashion designers use support from the SFC (Slovak Fashion Council), especially young fashion designers. The SFC is not accepted by all Slovak fashion designers (e.g. by leaders on the Slovak fashion scene). Some of leading Slovak fashion designers are members of the Entrepreneurs Association of Slovakia.

In the case of policy implications for Slovak fashion design, we haven´t identified an important influence of national or regional policy on the fashion design sector development in Slovakia.[77] The Slovak fashion design sector has

[73] European Observatory of Working Life, 24 July 2013

[74] Hospodárske noviny, 9 October 2015

[75] Interview, the firm X, November 2013

[76] Interviews, Bratislava, January − March 2013

[77] Interviews, Bratislava, January − March 2013

grown continuously and naturally. The community of Slovak fashion designers haven´t experienced any policy support at all. From direct support initiatives and measures, Slovak fashion designers have mostly used bank loans to start their business. The situation regarding access to loans for Slovak entrepreneurs has improved, especially after the transformation of the Slovak banking sector since 2000.

Conclusion

From the sectorial point of view, the clothing industry is heavily engaged in global value chains. The Slovak clothing industry was an important catalyst for national development before 1989. Despite negative developments since the 1990's (radical decrease of production and employment), the clothing industry has integrated into global value chains. The clothing industry in Slovakia is characterised by highly fragmented value chains and cost-driven competition.

The product upgrading was influenced by pressure from customers to produce higher quality clothes, as well clothes for leisure and sport activities (change of lifestyle). The demand in Slovak clothing and textile industry is already influenced by the automotive sector, and Slovak clothing firms have changed their production portfolio in the direction of the automotive sector production. There is further potential for growth of more innovative production from technical textiles as well as in the original Slovak fashion design production (luxury). The evolution of process upgrading is connected with the use of new, highly qualitative materials and naturalness of materials. The functional upgrading has increased with the increase of the knowledge-intensity of existing functions provided by Slovak clothing firms. We have observed increased ICT applications, e. g. in design processes. New, modern, machines which have been introduced in Slovak clothing firms have increased quality and productivity, while reducing labour needs significantly.

To summarize, the future of the Slovak clothing industry's upgrading is in further specialization, either with the focus on production of technical textiles (leisure and sports clothes), as well as in the production of the higher luxury segment (men's suits, women´s accessories, etc.). The space for further upgrading is in the production of women´s accessories (e.g. original leather bags and shoes, original jewellery etc.).

Slovak fashion design is linked with the development, and state of, the Slovak textile and clothing industry. The value chain of Slovak fashion design is even much more differentiated, in the cases of suppliers, producers, distributors and customers.

We have observed a shift and upgrading of additional industries, especially in the case of modeling agencies and fashion photographers, as they play important role in the final presentation of fashion design production. Original collections by Slovak fashion designers are regularly presented mostly at fashion shows in Bratislava, but also in other regional centers (Košice). In the meantime, the level of presentation of Slovak fashion designers at the fashion shows has reached standards of other European "fashion cities".

In the case of production, the whole production process is usually managed by Slovak fashion designers. With the exception of handwork quality, we have observed an upgrading of production processes into more innovative production (e.g. new printing methods, tailoring etc.). The evolution of process upgrading is in new quality and natural materials. There is an emphasis by fashion designers on sensitive high-tech material selection. Slovak fashion designers prefer materials from abroad, especially because of good price/quality ratio. The Slovak fashion designers use foreign suppliers, especially. The market of suppliers has changed in the meantime, from local Slovak suppliers or nearby locations (e.g. Vienna and Prague), to other parts of the world (e.g. Asia etc.).

The sale of fashion products is usually provided directly through fashion salons located mostly in Bratislava, with their individual approaches to customer´s needs. Upgrading of sale processes is represented by an increase in the internet sale of original fashion design products, especially in case of fashion accessories (e.g. jewelry). The production of Slovak commercial fashion designers is oriented mostly on the local or national market.

Generally, we have recorded an increase in the awareness of original fashion design among the Slovak population, as well as an increase in the level of customer informedness (e.g. through media, internet and social networks). The future of Slovak fashion design is in the possible expansion of Slovak fashion design abroad. The limiting factor being that Slovak fashion designers are not so well known. From this point of view, there is a possibility of further cooperation with neighboring countries (Czech Republic, Hungary and Austria) through "Bratislava Fashion Week", as well as through the initiatives of the "Slovak Fashion Council", to present Slovak fashion design more worldwide; e.g. in countries with the representation of Slovak communities abroad (USA, Canada, Great Britain).

To move into the higher segments of the value chain, it is necessary to have a strong commitment to the industry's growth by both the public and private sectors to support original Slovak fashion design.

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