ETLA Working Papers

No. 36

11 March 2016

Tobias Ylömäki

# Global Value Chain Upgrading

Suggested citation: Ylömäki, Tobias (11.3.2016). "Global Value Chain Upgrading". ETLA Working Papers No 36. http://pub.etla.fi/ETLA-Working-Papers-36.pdf

ETLA ELINKEINOELÄMÄN TUTKIMUSLAITOS
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY

ISSN-L 2323–2420
ISSN 2323–2420 (print)
ISSN 2323–2439 (online)

# *Global Value Chain Upgrading*

Tobias Ylömäki

## Abstract

Global value chain (GVC) upgrading is a key factor in country-level economic performance. Therefore it is important to study its fundamental, firm-level origins. What are the main attributes that drive firms toward GVC upgrading? How do upgrading trajectories differ? The previous literature has largely concentrated on developing countries and firms producing low value-added goods and services. Are there any fundamental differences between these and firms in a highly developed country that mainly operate in sectors other than pure manufacturing? I answer these questions by analyzing a 2015 survey that consists of thousands of Finnish firms from a variety of industries and size cohorts. From the survey, it is possible to determine firms' ex ante propensity for GVC upgrading. I found that innovativeness, the young age of the firm and outsourcing positively affect upgrading. I also found that firms do not plan their upgrading via any specific trajectory.

Keywords: global value chain upgrading, firm-level survey analysis, innovativeness, outsourcing

I wish to thank Professor Martin Kenney as well as my supervisor Petri Rouvinen for their constructive criticism and helpful comments. All errors remain my own.

# 1 Introduction

One of the most prominent effects of globalization has been the rise of global value chains (GVC). Technological innovations have reduced transportation and communication costs and made it possible to disaggregate different production stages to ever-finer levels (Baldwin, 2006). Furthermore, these stages can be offshored or outsourced, hence shifting the international trade in goods to trade in tasks (Grossman & Rossi-Hansberg, 2008). A good can be designed in one location, manufactured in another, and sold in a third. The added value, however, is not spread evenly along the value chain. For example, manufacturing adds a minor share of value compared to other, more skill-intensive production stages such as research and marketing (Ali-Yrkkö & Rouvinen, 2015). Therefore, it would be expected that firms would tend to upgrade their position in the hope of having a bigger slice of the value added. This is referred to as GVC upgrading, a phenomenon that has practically defined the rise of many Asian countries from poverty to prosperity.

Even though GVC upgrading is initially a firm-level phenomenon, in a major share of GVC studies, firms are still mostly treated as "black boxes," which are in either a lead or a supplier position in the chain (Holste, 2015; Coe et al., 2008). By studying individual firms, it is possible to explain inter-firm differences that eventually lead some firms to upgrade their position in the value chain.

In this paper, I examine the readiness of Finnish firms for global value chain upgrading, based on a survey conducted in early 2015. In the survey, firms were asked, among other things, whether *they believed that their value chain position would upgrade during the next three years*. This survey data is combined with secondary firm-level data, which allows control for firm-specific variables.

Readiness for GVC upgrading is explicitly linked to a firm's long-term growth, product renewal, innovation, knowledge capital, and flexible organizational structure (Pietrobelli & Rabellotti, 2011). More ambiguous yet interesting factors could be, for example, offshoring and outsourcing of certain functions, especially R&D.

Firms naturally face constraints in GVC upgrading. Small and medium-sized firms especially have more limited access to employee training, financing, new markets, and to both horizontal and vertical linkages (Fernandez-Stark et al., 2012). This paper, however, studies only the readiness or propensity of firms to upgrade. The main goal, therefore, is not to identify the firms that are most likely to upgrade their position in their GVC, but rather to identify what determinants drive firms toward upgrading.

## 2 GVC upgrading framework

A value chain is defined as the sequence of activities that are performed in order to "bring a product from its conception to end use and beyond" (Gereffi & Fernandez-Stark, 2011). These activities or tasks can be divided between different firms in different locations worldwide. As mentioned before, the value added varies greatly among these activities, thus creating pressure on firms to pursue higher value added by upgrading their chain position.

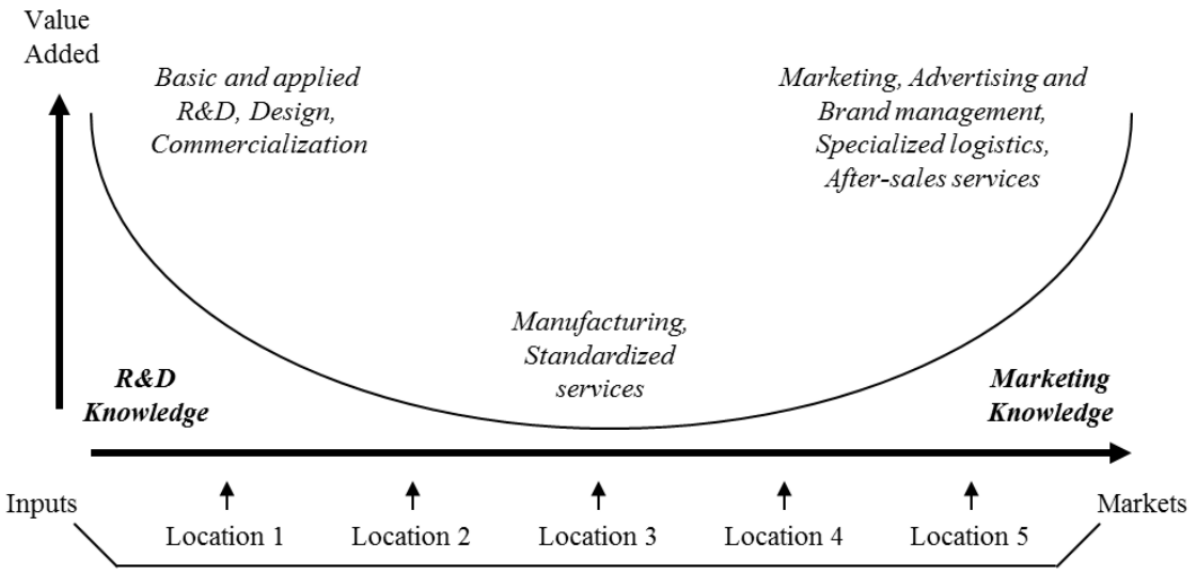


**Figure 1: The smile curve, from Mudambi (2008), according to Everatt (1999).**

Global value chain upgrading and its relation to value added are commonly represented by a "smiling curve," proposed by Stan Shih, the founder of the Taiwanese company Acer. It illustrates how the value added is distributed along the value chain. In the middle are the low value-added activities, where the barriers to entry are low and competition is based mainly on price (Pietrobelli & Rabellotti, 2011). Firms at the middle of the curve should therefore have an incentive to upgrade their position either upstream or downstream, where the barriers to entry are higher and the competition less fierce (Mudambi, 2008).

GVC upgrading is usually divided into four or five types or "trajectories [that] firms can adopt in pursuing the objective of upgrading" (Kaplinsky & Morris, 2001).

- *Process upgrading* means that a firm improves its productivity by increasing production process efficiency. This usually requires knowledge capital and also tangible investments.
- *Product upgrading* means introducing improved products that have a higher value added.
- *Functional upgrading* happens when firms enter into a new GVC segment. A manufacturing firm may establish research and development, or a vendor may acquire production plants.
- *Chain* (or *intersectoral*) *upgrading* is achieved when firms participate in new value chains, e.g., to manufacturing new products.

An additional fifth type of GVC upgrade is *end-market* upgrading, which means entering into new market segments, both location- and industry-wise (Fernandez-Stark et al., 2012).

Innovation, learning, and global linkages are generally accepted to be the main spurs to GVC upgrading at both firm and nation level (Morrison et al., 2008). Upgrading itself is usually defined as "innovating to increase value" (Giuliani et al., 2005). Innovation alone does not suffice if the firm is unable to capture the value added (Dedrick et al., 2009). A firm's attitude toward, say, its customers should be equally important.

## 2.1 GVC governance

Upgrading prospects are greatly affected by value chain governance in global value chains: Who decides how each link in the chain is to participate in production? Gereffi (1999) distinguishes producer- and buyer-driven chains. In a producer-driven chain, a usually high-tech producer coordinates a production network that involves as many as thousands of firms as subcontractors; examples of this are usually found in the auto industry. Buyer-driven chains are seen mostly in markets dominated by large retailers. A vivid example is the textile industry, where global brand owners have an extensive manufacturing network in developing countries. From the supplier's point of view, the governance types can be further divided into following sub-categories (Gereffi et al., 2005).

- Markets (arm's length): a pure market-based firm relationship. Characterized by low switching costs for both producer and buyer.
- Modular: products are made according to client's specifications but the degree of the client's participation in the process is usually low.
- Relational: stable and mutually dependent relationship where the (often highly skilled) supplier usually has a high degree of involvement in defining the final product.
- Captive: a buyer-driven chain where small suppliers are dependent on large buyers. This forms a captive customer relationship, where the supplier would face high costs if it wanted to switch to another client. Lead firms have a significant role in product specification.
- Hierarchy: the supplier is a subsidiary of the leading company, thus being in direct managerial control of the lead firm.

The choice of governance is determined by three factors (Gereffi et al., 2005): the complexity of transactions, the codifiability of information, and the capability of suppliers. Governance structures have an important role with regard to a firm's upgrading prospects: for example, if a firm is a supplier in a captive value chain, upgrading prospects can be very limited, if the lead firm is unwilling or obstructive. Relational value chains are considered to offer the ideal upgrading conditions, thanks to mutual learning and the high competency of suppliers (Humphrey & Schmitz, 2002).

### 2.2 Hypotheses

The framework presented here helps us to form certain hypotheses concerning GVC upgrading that can be tested with our current dataset. The first thing to ask is **whether the different types of GVC upgrading trajectories are distinguishable from one another** and whether firms intentionally choose different upgrading trajectories in pursuit of upgrading. Differentiating the types of upgrading has gained widespread popularity in GVC literature, but how reasonable and useful is the distinction in an empirical framework? This hypothesis can be approached by factor analysis.

Another hypothesis is that a **firm's endogenous properties affect its overall attitude to upgrading**. Internationalization, innovativeness, and the firm's age and size are variables of particular interest, along with the **firm's current participation in GVCs** and their **governance**. In the questionnaire, no direct questions about current GVC participation were asked, but a firm can be considered to be somehow involved in a *global* value chain if it has either exported or imported products in the previous fiscal year. The governance issue was handled by the firm's main supply chain position and ownership status (depending on whether the firm a subsidiary or an independent company).

## 3 Previous empirical literature

Previous empirical literature on GVC upgrading has mainly concentrated on country- or industry-level case studies. However, Brancati et al. (2015) present micro-level results on GVC participation and upgrading in Italian firms. They have an extensive panel dataset based on both survey and financial data. In order to identify GVC participation, they document inter-firm transactions and use these data to determine impact on, for example, firm innovativeness, investment, and R&D. As their panel dataset is rather more detailed than our cross-sectional dataset, their approach is not directly replicable for us. They draw the conclusion that GVC upgrading is more likely for firms that are more innovative but that the results depend on GVC governance.

Holste (2015) interviews several Taiwanese technology firms and comes to the conclusion that GVC upgrading is not a response to exogenous factors but a result of endogenous, firm-level characteristics, with an emphasis on the company CEO's willingness to upgrade.

Pietrobelli and Saliola (2008) study Thai firms and their GVC governance. They use econometric methods to link together GVC governance and firm total factor productivity, finding that high buyer involvement leads to higher supplier productivity.

Firm-level studies on related matters include those of Nieto and Rodríguez (2011), who study R&D offshoring with Spanish panel data, and Altomonte et al. (2013), who study innovation and internationalization with cross-country data based on the EFIGE[1] survey. Their results generally favor internationalization and offshoring as significant factors for innovativeness. This could furthermore boost GVC upgrading.

[1] A European cross-country firm-level survey: http://www.bruegel.org/datasets/efigedataset/

# 4 Data and descriptive statistics

The main source of data is a survey conducted in early 2015 for Finland-based companies. The survey dataset is further combined with relevant balance sheet data acquired from Statistics Finland. The questionnaire was sent to total 33 390 companies, of which 6 268 (18.8 %) responded at least partially and 4 673 (14.0 %) completed the survey.[2]

**Table 1: Survey coverage**

| STAFF SIZE | Companies completing the survey | | Companies responding at least partially | | Total of companies | |
|---|---|---|---|---|---|---|
| | # of obs. | Percentage of total | # of obs. | Percentage of total | # of obs. | Percentage of total |
| Unknown | 9 | 0.2 % | 13 | 0.2 % | 71 | 0.2 % |
| 1-4 employees | 2298 | 49.2 % | 3161 | 50.4 % | 18715 | 56.0 % |
| 5-9 employees | 773 | 16.5 % | 1070 | 17.1 % | 5452 | 16.3 % |
| 10–19 employees | 607 | 13.0 % | 790 | 12.6 % | 4051 | 12.1 % |
| 20–49 employees | 548 | 11.7 % | 672 | 10.7 % | 2994 | 9.0 % |
| 50-99 employees | 181 | 3.9 % | 238 | 3.8 % | 1035 | 3.1 % |
| 100-249 employees | 143 | 3.1 % | 178 | 2.8 % | 619 | 1.9 % |
| 250-499 employees | 57 | 1.2 % | 69 | 1.1 % | 227 | 0.7 % |
| 500-999 employees | 28 | 0.6 % | 38 | 0.6 % | 122 | 0.4 % |
| 1000 or more employees | 29 | 0.6 % | 39 | 0.6 % | 104 | 0.3 % |
| TOTAL | 4673 | 100.0 % | 6268 | 100.0 % | 33390 | 100.0 % |

As can be seen from the table, companies with 1-4 employees are a little underrepresented in the survey responses, having a lower response rate than other size groups. 97.2 % of survey respondents were either company CEOs or sole proprietors, the remaining respondents being other firm executives.

## 4.1 Variable construction

Firms' foreseeable GVC upgrading prospects were explored in a section in which the following umbrella question was posed: *To what extent do you believe that your company will change over the next three years (subject to the following claims* [in Table 2]*)?* Questions were designed such that the responses, which were on a four-point Likert scale (1= not at all, 4 = very much), could be linked to certain types of GVC upgrading. The responses were summed according to the assumed type of GVC upgrade and scaled to an interval between [0,1]. The most favored upgrade type would be process upgrading (45 % intensity) and the least favored is end-market upgrading, with 32 % intensity. It should be noted that the process upgrading index is constructed from only one question, whereas other indices were constructed from two or more questions. The question-level response statistics can be seen in Table 2.

[2] It should be noted that the survey also concerned firms that had ceased their operations, in which case only a few questions were asked.

### *4.1.1 Total upgrading index*

The variables constituting the different GVC upgrade types seem to be highly correlated. The variable bundle has a Cronbach's alpha of 0.884, which suggests that aggregating these variables into one general GVC upgrading index variable would make sense: it generally tends to be the case that firms' upgrading prospects are rather holistic. The similarity of distributions of the upgrading types can be seen in Figure 2: Histograms of the GVC upgrading indices. Factor analysis is performed in the chapter 5.1.

A total GVC upgrading index was constructed using both principal component analysis (PCA) and plain unweighted summation. The results were quite consistent with both approaches, as can be seen in Figure 2.

**Table 2: Questions regarding GVC upgrading prospects (emphases from the questionnaire), response statistics scaled to interval between [0,1]**

| Claim | GVC upgrading type | N | Mean | SD |
|---|---|---|---|---|
| We will bring to market **products/services** that distinguish us from our competitors. | Product | 4588 | 0.47 | 0.27 |
| We will develop the **production process** of our products/services. | Process | 4524 | 0.45 | 0.27 |
| We will improve our position in the **supply chain** of our products/services. | Chain | 4540 | 0.46 | 0.27 |
| We have found new or significantly better ways to do our **sales**. | Functional | 4530 | 0.40 | 0.26 |
| Our **business model** will change. | Functional | 4543 | 0.39 | 0.25 |
| We will invest in operations that can lead to patents, trademarks, or other **intangible rights**. | Product | 4532 | 0.22 | 0.27 |
| We will offer new **after sales services** to our customers. | End-market | 4535 | 0.34 | 0.27 |
| We will extend our **collaborative networks** to new industries. | Chain | 4531 | 0.34 | 0.27 |
| We will acquire **customers from new industries**. | End-market | 4534 | 0.40 | 0.27 |
| We will sell our products/services to **countries** we haven't sold to before. | End-market | 4527 | 0.24 | 0.3 |

**Table 3: Correlations between upgrading variables. All correlations statistically significant at 99 % level**

| | Product | Process | Functional | Chain | End-market |
|---|---|---|---|---|---|
| Product | 1.0000 | | | | |
| Process | 0.8609 | 1.0000 | | | |
| Functional | 0.6000 | 0.5280 | 1.0000 | | |
| Chain | 0.5968 | 0.4898 | 0.6140 | 1.0000 | |
| End-market | 0.6085 | 0.5427 | 0.5571 | 0.6428 | 1.0000 |

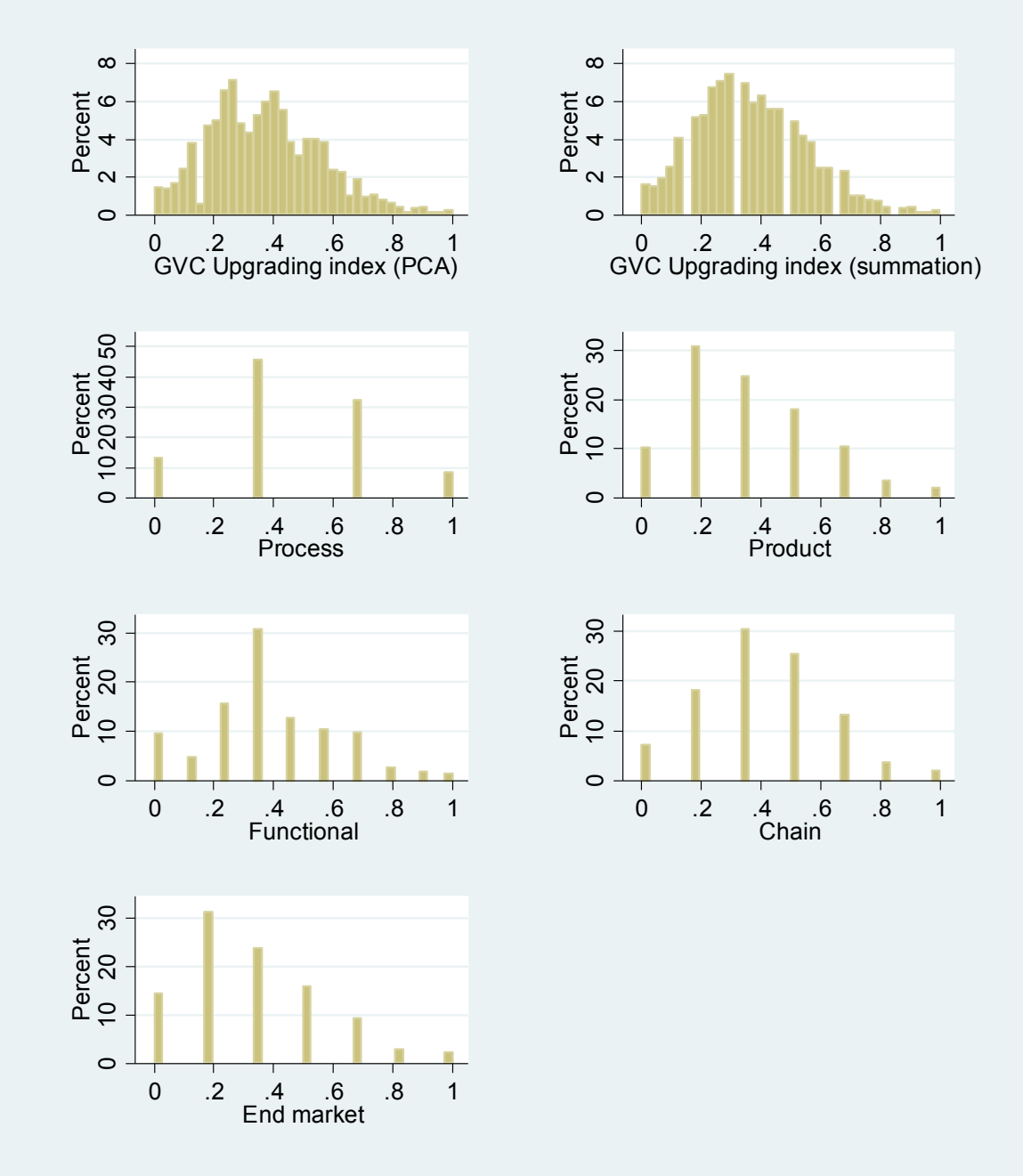


**Figure 2: Histograms of the GVC upgrading indices.**

## 4.2 Regression variables

The dependent variable is the GVC upgrading index constructed in the previous section. Control variables are firm region, industry, age, size, and group. Other variables concern the firm's current situation in terms of current outsourcing, supply chain position, and past innovation occurrence. An indicator of the firm's current participation in GVCs is produced by variables relating to current exporting and importing. The firm's reported supply chain position can reveal something about the type of governance in the value chain: being a main supplier indicates that the firm is in a leading position. A systems supplier is in a position where there is no large power asymmetry (relational, modular, or market-based governance) between the supplier and the lead firm. Subcontractors usually have a lesser degree of freedom in product development and are usually in a captive or hierarchical relationship with the leading firm.

It would be feasible to include variables concerning the firm's solvency and performance (such as equity ratio and return on investment), but in our cross-sectional dataset, one year's value for the respective variables would be subject to random year-to-year variation.

The questionnaire also included questions about the firm's investment plans and financing constraints. *Has the firm planned to make investments? If so, have there been financing constraints? If the firm received a sum of money equivalent to 10 % of their annual turnover, how would they spend it?*[3] From the former question, I was able to distinguish (with respect to both equity and debt constraints) willingness to invest from ability to invest.

**Table 4: Potential responses to the investment questions**

| | | Would prefer making investments given the extra cash. | |
|---|---|---|---|
| | | Yes | No |
| Had investment plans during the past 12 months, but could not proceed owing to lack of equity/debt financing resources. | Yes | Willing to invest but not (financially) able. | Was willing to invest, but not anymore. |
| | No | No financial constraints. | No investment plans. |

[3] The firm was considered to be willing to invest if it reported that they would spend more than 50 % of that "extra" money on investments (rather than distributing it to owners or paying off debt).

**Table 5: Variable descriptions**

| Source[4] | Variable | Explanation | Values |
|---|---|---|---|
| S | GVC: Index | Global value chain upgrade plans/goals (aggregate) | [0,1] |
| S | Firm: Innovated | Did the firm innovate in 2012-2014 | {0,1} |
| D | Firm: Age | Firm age calculated from year founded[5] | {0,1} |
| D | Region | 5 categories: Helsinki, South, North, West (NUTS 2) | {0,1} |
| D | Industry | 8 categories[6] | {0,1} |
| S | Firm: Group member | Is the firm member of a group/concern? | {0,1} |
| S | Firm: Offshore | Does the firm currently have own functions[7] outside Finland? | {0,1} |
| S | Supply Chain | Firm's position in supply chain[8] | {0,1} |
| D | Size | Personnel count, divided into three cohorts[9] | {0,1} |
| S | Financing: Debt | Has the availability of debt restricted firm's investments? | {0,1} |
| S | Financing: Equity | Has the availability of equity restricted firm's investments? | {0,1} |
| S | Investment | Would the firm invest given the extra cash? | {0,1} |
| D | Exported | Has the firm exported during the recent fiscal year? | {0,1} |
| D | Imported | Has the firm imported during the recent fiscal year? | {0,1} |

4 S=survey, D=database (Statistics Finland or Asiakastieto Oyj (detailed financial data on fiscal year 2013)).

5 Divided into three cohorts: 0-9 years old, 10-20 years old, and 21 plus years old.

6 Primary factors, engineering, other manufacturing, construction, trade, restaurants and hotels, transportation, and communications.

7 Production, sales/marketing, distribution, R&D.

8 Main supplier, systems supplier, subcontractor, retailer.

9 Micro-sized (1-9 persons), small (10-50), medium and large (51- ).

**Table 6: Descriptive statistics (all variables except GVC indices are dummies)**

| Variable | N | Mean | SD |
|---|---|---|---|
| **GVC Upgrading index (summation)** | 4554 | 0.37 | 0.19 |
| GVC: Process upgrading | 4524 | 0.45 | 0.27 |
| GVC: Product upgrading | 4525 | 0.34 | 0.23 |
| GVC: Functional upgrading | 4519 | 0.37 | 0.22 |
| GVC: Chain upgrading | 4499 | 0.40 | 0.22 |
| GVC: End-market upgrading | 4508 | 0.32 | 0.24 |
| Firm: Main supplier | 4760 | 0.48 | 0.50 |
| Firm: Systems supplier | 4760 | 0.12 | 0.32 |
| Firm: Subcontractor | 4760 | 0.21 | 0.40 |
| Firm: Retailer | 4760 | 0.18 | 0.38 |
| Firm: Debt financing constraints | 5252 | 0.18 | 0.39 |
| Firm: Equity financing constraints | 5241 | 0.19 | 0.39 |
| Firm: Exported | 6268 | 0.15 | 0.36 |
| Firm: Imported | 6268 | 0.29 | 0.45 |
| Firm: Innovated | 5084 | 0.52 | 0.50 |
| Outsource: Production | 5261 | 0.42 | 0.49 |
| Outsource: Sales/marketing | 5261 | 0.39 | 0.49 |
| Outsource: Distribution | 5261 | 0.25 | 0.43 |
| Outsource: R&D | 5261 | 0.18 | 0.38 |
| Firm age: 21 plus years | 6268 | 0.40 | 0.49 |
| Firm age: 11-20 years | 6268 | 0.29 | 0.46 |
| Firm age: 0-10 years | 6268 | 0.31 | 0.46 |
| Region: Helsinki | 6268 | 0.39 | 0.49 |
| Region: West | 6268 | 0.22 | 0.42 |
| Region: South excl. Helsinki | 6268 | 0.19 | 0.40 |
| Region: North & East | 6268 | 0.19 | 0.39 |
| Size: Small | 6268 | 0.68 | 0.47 |
| Size: Medium | 6268 | 0.23 | 0.42 |
| Size: Large | 6268 | 0.07 | 0.25 |

# 5 Methods and results

## 5.1 Factor analysis on GVC upgrading types

Do separate GVC upgrading types really exist? This question can be answered by applying factor analysis to the battery of questions regarding upgrading prospects (Table 2). If we are not able to find more than one underlying factor in responses to the battery of questions, it would indicate a possibility that the upgrading phenomenon does not separate into the proposed upgrading trajectories. By using exploratory factor analysis (EFA), we are able to see that there is only one factor behind the question battery. Only the first factor has an eigenvalue over 1 (4.36). Also the factor loads are higher than 0.5 for only the first factor.

By confirmatory factor analysis (CFA), we can also test the hypothesis that certain questions relate to certain upgrading types, as in Table 2. I found strong evidence against the hypothesis.

The evidence suggests that firms do not plan to upgrade their GVC position in any particular way. It appears that their initial upgrading plan is to "try everything." This does not, however, indicate that the outcome would resemble the plans in any way. It could be that eventually the upgrading follows a certain trajectory that has turned out to be the best strategy for the firm.

## 5.2 Regression

The dependent variable for the GVC aggregate index is bounded between [0,1]. A fractional probit model is implemented, although a standard linear model with robust standard errors can also be applied (see appendix), with highly consistent results. Endogeneity issues are possible, even though the dependent variable concerns future prospects, whereas explanatory variables concern the firm's current or past situation.

**Table 7: Fractional probit**

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Firm: Willingness to invest | | | | 0.0731*** |
| | | | | (0.0148) |
| Firm: Debt financing constraints | | | | 0.151*** |
| | | | | (0.0214) |
| Firm: Equity financing constraints | | | | 0.112*** |
| | | | | (0.0209) |
| Firm: Main supplier | | | 0.109*** | 0.105*** |
| | | | (0.0199) | (0.0203) |
| Firm: Systems supplier | | | 0.165*** | 0.162*** |
| | | | (0.0262) | (0.0263) |
| Firm: Subcontractor | | | 0.0652*** | 0.0647*** |
| | | | (0.0223) | (0.0228) |
| Outsource: Production | | 0.0722*** | 0.0642*** | 0.0330** |
| | | (0.0136) | (0.0136) | (0.0137) |
| Outsource: Sales/marketing | | 0.0882*** | 0.0916*** | 0.0637*** |
| | | (0.0136) | (0.0137) | (0.0138) |
| Outsource: Distribution | | 0.104*** | 0.107*** | 0.0991*** |
| | | (0.0159) | (0.0159) | (0.0161) |
| Outsource: R&D | | 0.159*** | 0.149*** | 0.144*** |
| | | (0.0184) | (0.0184) | (0.0184) |
| Firm: Innovated | 0.425*** | 0.362*** | 0.346*** | 0.304*** |
| | (0.0140) | (0.0142) | (0.0143) | (0.0147) |
| Firm: Exported | 0.0714*** | 0.0454** | 0.0397* | 0.0425** |
| | (0.0216) | (0.0214) | (0.0212) | (0.0212) |
| Firm: Imported | 0.117*** | 0.0968*** | 0.108*** | 0.0861*** |
| | (0.0184) | (0.0183) | (0.0185) | (0.0185) |
| Firm age: 0-10 years | 0.101*** | 0.0925*** | 0.0910*** | 0.0738*** |
| | (0.0174) | (0.0170) | (0.0169) | (0.0172) |
| Firm age: 21 plus years | -0.0313* | -0.0387** | -0.0402** | -0.0350** |
| | (0.0164) | (0.0161) | (0.0160) | (0.0162) |
| Firm: Group member | -0.0310 | -0.0292 | -0.0285 | -0.0141 |
| | (0.0253) | (0.0251) | (0.0251) | (0.0254) |

| | | | | |
|---|---|---|---|---|
| Regions | Included | Included | Included | Included |
| Industries | Included | Included | Included | Included |
| Size | Included | Included | Included | Included |
| | | | | |
| Observations | 4554 | 4554 | 4554 | 4154 |
| Wald test (industry) | 100.7 | 100.5 | 86.32 | 82.96 |
| Wald test (region) | 23.79 | 24.54 | 23.81 | 25.47 |
| Wald test (size) | 3.327 | 8.423 | 7.571 | 2.503 |
| Wald test | 1548 | 1867 | 1922 | 1925 |
| Pseudo R-squared | 0.0301 | 0.0351 | 0.0360 | 0.0368 |
| Log-pseudolikelihood | -2903 | -2888 | -2886 | -2657 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The supply chain position also contributes significantly to GVC upgrade. Retailer position is omitted: it is the only supply chain category contributing negatively to GVC upgrading.

## 5.3 Main results

The main things that can be inferred from factor analysis and probit regression are:

1. Firms do not plan their upgrading specifically, i.e., there are no multiple factors behind the upgrading questions.
2. Firms that have **outsourced** their functions, especially R&D, have higher upgrading propensity. Outsourcing generally is favorable for GVC upgrading, as it allows firms to specialize and upgrade their core competencies (Mudambi, 2008).
3. Firms that have **innovated recently** have a higher tendency for GVC upgrading. This can be either because the innovation has directly led to upgrading or because innovativeness and GVC upgrading have some other common factor.
4. **Younger firms** have a generally **higher upgrading propensity**. Yet belonging to the "old" cohort is not statistically significant. This would indicate that firm age alone is not a very important factor.
5. **Supply chain position matters**: being in retailer position (the reference variable) decreases the upgrading tendency, as the effect in other positions is positive. Systems suppliers have the highest upgrading propensity, which is in line with the literature: they are often in a relational value chain, which offers the best upgrading conditions. **Subcontractors**, which should, according to the literature, also have a high upgrading propensity, have the **lowest positive propensity** in this case. This is probably because the literature has mainly concentrated on developing countries, where subcontractors are operating in low value-added production stages such as manufacturing. Firms identifying themselves as subcontractors in this dataset are mostly specialized in software engineering, management consulting, and other high value-added activities.
6. **Belonging to a group/concern** is not statistically significant in terms of upgrading. This could indicate that hierarchical governance does not have effect on upgrading.

7. **Firms that have faced financing constraints when planning an investment have higher upgrading propensity.** The question regarding this actually comprised two distinct questions[10]: *Has the firm planned to make investments?* And, if so, *Have there been financing constraints?* The former is the particularly interesting question in this context, as GVC upgrading usually requires investments. This is tackled in the section 4.2: an additional variable representing "willingness to invest" was introduced, which also contributes positively to GVC upgrading.

# 6 Discussion and conclusions

## 6.1 Summary and discussion

As suggested by the literature, GVC upgrading is highly dependent on endogenous, firm-level factors. Upgrading is mainly linked to factors that are signs of good overall firm performance, such as innovativeness and a propensity to outsource. Also, young firm age and having investment plans positively affect upgrading plans. The attempt to find different forms of value chain governance from a firm's self-identified supply chain position led to interesting yet reasonable results: the highest upgrading propensity appears to be with the system suppliers, who are often involved in a relational value chain. In a relational value chain, spillover effects and mutual learning can occur, without constraining the supplier too much.

Different upgrading types were whole indistinguishable from one another in this study. Firms do not seem to favor any special upgrade type over another, but rather plan to upgrade their position comprehensively. Even though the division of upgrading types may be applicable in conceptualizing the phenomenon, it does not seem to have much significance in an empirical framework.

## 6.2 Limitations and further research

This study was strictly limited to surveying firms' general views on global value chain upgrading. There can be a long way to go between planning to upgrade and actually upgrading. Many firms may also upgrade their position without any specific plan. Therefore, future research might attempt to find a link between actual GVC upgrading and upgrading plans.

Many of the responses may be subject to a self-reporting bias: it is not uncommon for an optimistic entrepreneur to overestimate the firm's upgrading plans (Hyytinen et al., 2015).

[10] Literal question: "Have you had an investment undertaking that wasn't put into action because of poor availability of debt/equity financing during the preceding 12-month period (yes/no)?"

## References


Ali-Yrkkö, J., Rouvinen, P., 2015. Slicing up global value chains: A micro view. Journal of Industry, Competition and Trade 15, 69–85. doi:10.1007/s10842-014-0192-2

Altomonte, C., Aquilante, T., Békés, G., Ottaviano, G.I., 2013. Internationalization and innovation of firms: evidence and policy. Economic Policy 28, 663–700.

Baldwin, R., 2006. Globalisation: The great unbundling (s). Economic Council of Finland 20, 5–47.

Brancati, E., Brancati, R., Maresca, A., 2015. Global value chains, innovation and performance: Firm-level evidence from Italy. doi:10.2139/ssrn.2512641

Coe, N.M., Dicken, P., Hess, M., 2008. Global production networks: Realizing the potential. Journal of Economic Geography 8, 271–295. doi:10.1093/jeg/lbn002

Dedrick, J., Kraemer, K.L., Linden, G., 2009. Who profits from innovation in global value chains?: A study of the iPod and notebook PCs. Industrial and Corporate Change dtp032.

Everatt, D., 1999. The Acer Group's China Manufacturing Decision. London, Ontario, Canada: Ivey Publishing.

Fernandez-Stark, K., Bamber, P., Gereffi, G., 2012. Upgrading in global value chains: Addressing the skills challenge in developing countries. Document de référence de l'OCDE, www. cggc. duke. edu/pdfs/2012-09-26_Duke_CGGC_OECD_background_paper_Skills_Upgrading_inGVCs. pdf.

Gereffi, G., 1999. International trade and industrial upgrading in the apparel commodity chain. Journal of International Economics 48, 37–70.

Gereffi, G., Fernandez-Stark, K., 2011. Global value chain analysis: A primer. Center on Globalization, Governance & Competitiveness (CGGC), Duke University, North Carolina, USA.

Gereffi, G., Humphrey, J., Sturgeon, T., 2005. The governance of global value chains. Review of International Political Economy 12, 78–104. doi:10.1080/09692290500049805

Giuliani, E., Pietrobelli, C., Rabellotti, R., 2005. Upgrading in global value chains: Lessons from Latin American clusters. World Development 33, 549–573. doi:10.1016/j.worlddev.2005.01.002

Grossman, G.M., Rossi-Hansberg, E., 2008. Trading tasks: A simple theory of offshoring. American Economic Review 98, 1978–1997. doi:10.1257/aer.98.5.1978

Holste, J.H., 2015. Local Firm Upgrading in Global Value Chains. Wiesbaden: Springer Fachmedien Wiesbaden.

Humphrey, J., Schmitz, H., 2002. How does insertion in global value chains affect upgrading in industrial clusters? Regional Studies 36, 1017–1027. doi:10.1080/0034340022000022198

Hyytinen, A., Pajarinen, M., Rouvinen, P., 2015. Does innovativeness reduce startup survival rates? Journal of Business Venturing 30, 564–581. doi:10.1016/j.jbusvent.2014.10.001

Kaplinsky, R., Morris, M., 2001. A Handbook for Value Chain Research. Ottawa, Canada: IDRC.

Morrison, A., Pietrobelli, C., Rabellotti, R., 2008. Global value chains and technological capabilities: A framework to study learning and innovation in developing countries. Oxford Development Studies 36, 39–58.

Mudambi, R., 2008. Location, control and innovation in knowledge-intensive industries. Journal of Economic Geography 8, 699–725. doi:10.1093/jeg/lbn024

Nieto, M.J., Rodríguez, A., 2011. Offshoring of R&D: Looking abroad to improve innovation performance. Journal of International Business Studies 42, 345–361. doi:10.1057/jibs.2010.59

Pietrobelli, C., Rabellotti, R., 2011. Global value chains meet innovation systems: Are there learning opportunities for developing countries? World Development 39, 1261–1269. doi:10.1016/j.worlddev.2010.05.013

Pietrobelli, C., Saliola, F., 2008. Power relationships along the value chain: Multinational firms, global buyers and performance of local suppliers. Cambridge Journal of Economics 32, 947–962. doi:10.1093/cje/ben016

# Appendix

*Linear regression*

**Table 8: OLS regression**

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Firm: Willingess to invest | | | | 0.0266*** |
| | | | | (0.00535) |
| Firm: Debt financing constraints | | | | 0.0573*** |
| | | | | (0.00821) |
| Firm: Equity financing constraints | | | | 0.0426*** |
| | | | | (0.00798) |
| Firm: Main supplier | | | 0.0388*** | 0.0379*** |
| | | | (0.00699) | (0.00727) |
| Firm: Systems supplier | | | 0.0608*** | 0.0602*** |
| | | | (0.00960) | (0.00969) |
| Firm: Subcontractor | | | 0.0225*** | 0.0228*** |
| | | | (0.00781) | (0.00809) |
| Outsource: Production | | 0.0263*** | 0.0234*** | 0.0120** |
| | | (0.00502) | (0.00502) | (0.00509) |
| Outsource: Sales/marketing | | 0.0326*** | 0.0338*** | 0.0237*** |
| | | (0.00502) | (0.00504) | (0.00514) |
| Outsource: Distribution | | 0.0389*** | 0.0399*** | 0.0367*** |
| | | (0.00596) | (0.00595) | (0.00607) |
| Outsource: R&D | | 0.0619*** | 0.0582*** | 0.0559*** |
| | | (0.00713) | (0.00714) | (0.00714) |
| Firm: Innovated | 0.156*** | 0.132*** | 0.126*** | 0.112*** |
| | (0.00512) | (0.00520) | (0.00525) | (0.00541) |
| Firm: Exported | 0.0269*** | 0.0172** | 0.0151* | 0.0162** |
| | (0.00812) | (0.00800) | (0.00794) | (0.00797) |
| Firm: Imported | 0.0424*** | 0.0346*** | 0.0385*** | 0.0309*** |
| | (0.00678) | (0.00673) | (0.00679) | (0.00681) |
| Firm age: 0-10 years | 0.0371*** | 0.0341*** | 0.0335*** | 0.0273*** |
| | (0.00642) | (0.00624) | (0.00621) | (0.00637) |
| Firm age: 21 plus years | -0.0114* | -0.0139** | -0.0144** | -0.0128** |
| | (0.00595) | (0.00580) | (0.00578) | (0.00591) |
| Firm: Group member | -0.0120 | -0.0113 | -0.0109 | -0.00561 |
| | (0.00943) | (0.00932) | (0.00931) | (0.00947) |
| Regions | Included | Included | Included | Included |
| Industries | Included | Included | Included | Included |
| Firm: Size | Included | Included | Included | Included |
| Observations | 4,554 | 4,554 | 4,554 | 4,154 |
| R-squared | 0.253 | 0.295 | 0.303 | 0.325 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

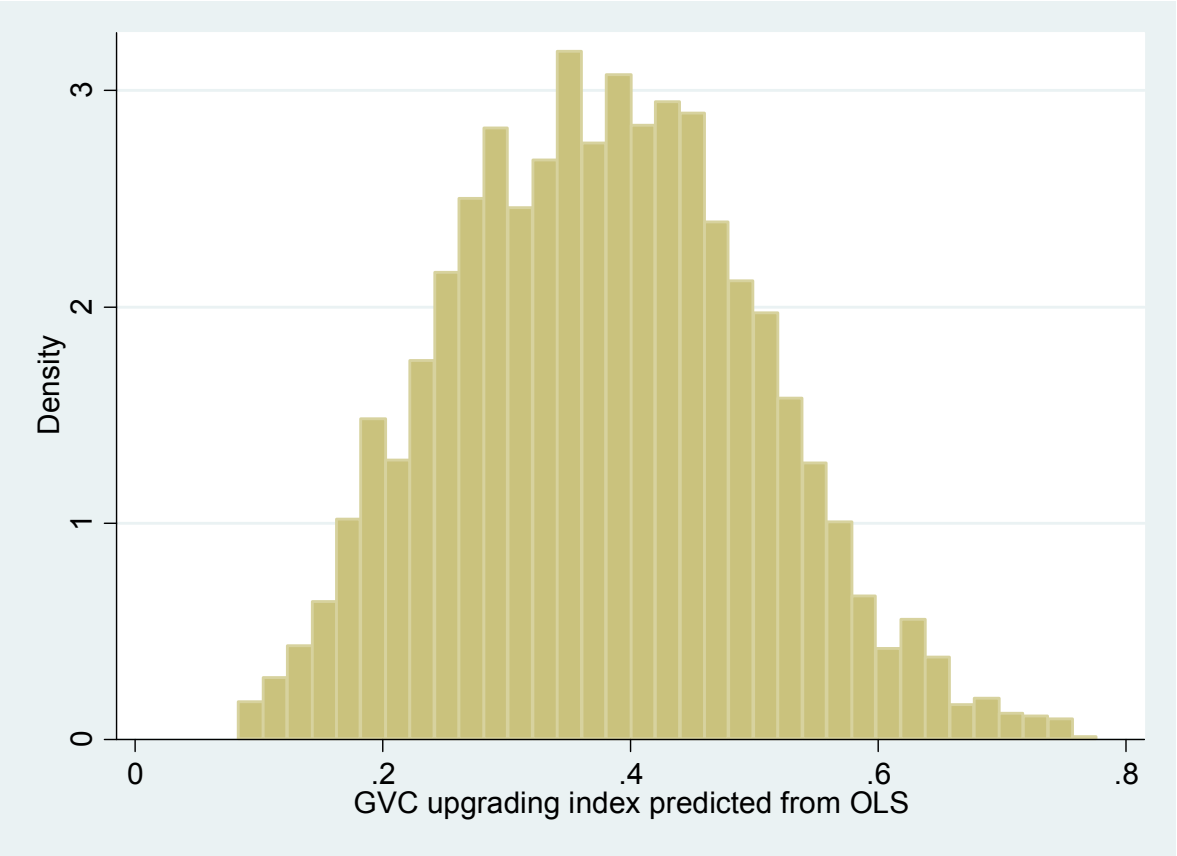


**Figure 3: OLS prediction (model 4).**