Who Captures Value in Global Supply Chains? Case Nokia N95 *

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OECD, Paris, France
Thursday, 19th may, 2011

* This research is a part of the ongoing collaboration of BRIE, the Berkeley Roundtable on the International Economy at the University of California at Berkeley, and ETLA. The inclusion of the EU-27 analysis as well as a few other extensions relate to Framework Service Contract B2/ENTR/05/091–FC.

Global supply chains operate at ever-finer resolutions in terms of where & when individual tasks are carried out

*From the 1st to the **2nd unbundling***
(Richard Baldwin, 2006)

*From trading goods to **trading tasks***
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***Empirics**:*

Is China taking over Europe?

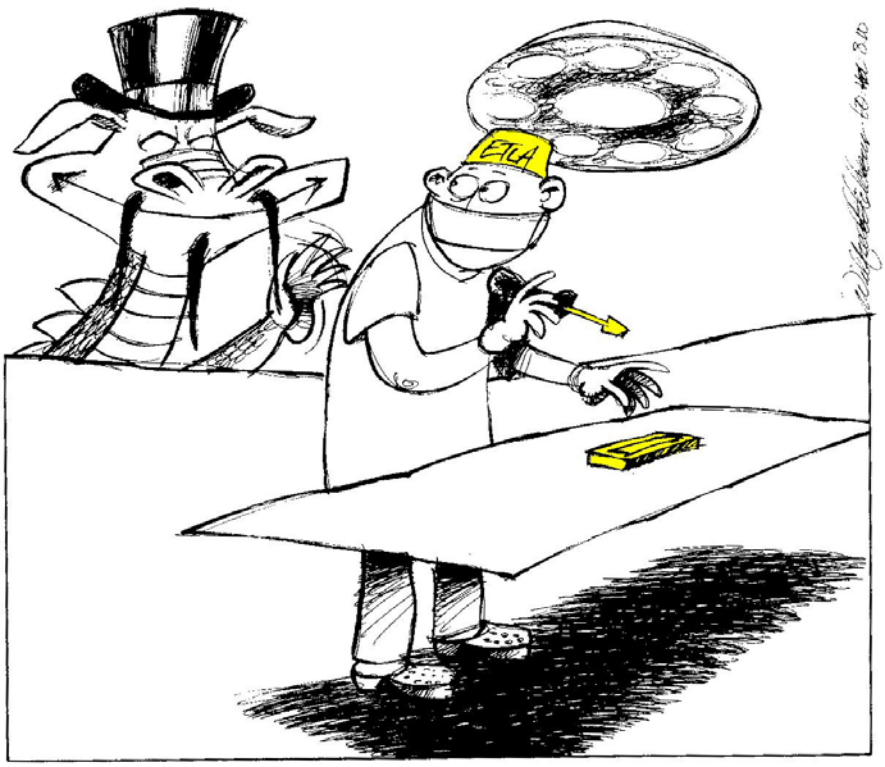
What does the new geography of global value added look like?

Problem: ***Value capture*** *in global supply chains is* ***complex*** *& not reflected in available statistics*

Solution:

Screwdriver economics!

Grass roots detective work in a specific case



Drawing: *Hufvudstadsbladet*, 8 October 2010, p. 14

Task

Value added by actors (firms/individuals), functions (R&D…) & geographies (locations/countries) in a case of one good

Mapping out the whole global supply chain from raw materials / idea generation to a consumer's final purchase of a N95 at a retail store

– All direct & indirect hard & soft inputs
– 1–8 stages before the final assembly & 2–4 after it
– For each, the loc. of innovation, direct labor & support (cap.)

E.g., N95's main processor by *Texas Instruments*

– Hardware design: Dallas (US) & Nice (France)
– Software design & integration to hardware: India
– Manufacturing: Dallas (US) & Japan
– Headquarters etc.

Approach

Our own examination of N95 with electrical engineers

Public (Internet etc.) & private (industry contacts) sources to study value added of 600+ parts & software

Teardown report by Portelligent (and iSuppli)

In-depth interviews with industry actors/experts

Company reporting, industry press/services

Previous literature (by Linden & others)

A few researcher-years of work …

Breakdown of the phone's €546 (+tax) retail price circa 2007

Refers to unbundled & unsubsidized official **retail price** w/o taxes. Excluding discounts & other possibly purchased products/services.

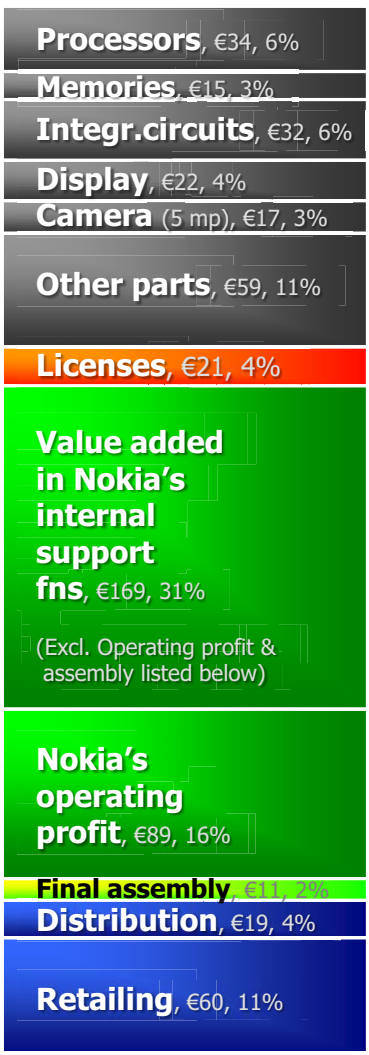
Licenses include protocols, the operating system, pre-installed software etc. Nokia is a major IPR holder in this domain & it does not pay fees to itself; thus value of its own IP is not included here. Furthermore, non-monetary payments (e.g., cross-licensing) is not included here. For a firm without own its IP, licensing fees could have be manifold.

As compared to some other studies, the cost of **final assembly** may seem high. Some other estimates, however, only include direct labor costs and refer to simpler goods.

Nokia's value added covers its innovation, advertising, design, marketing, financial, legal & management costs and depreciation & investment. It also includes some aspects of **outsourcing**, which we are unable to separate from Nokia's internal functions: purchases of "billable hours", some R&D and software sub-contracting, outbound logistics, and certain external warranty & other services.

Nokia's **profit** is assigned to Finland.

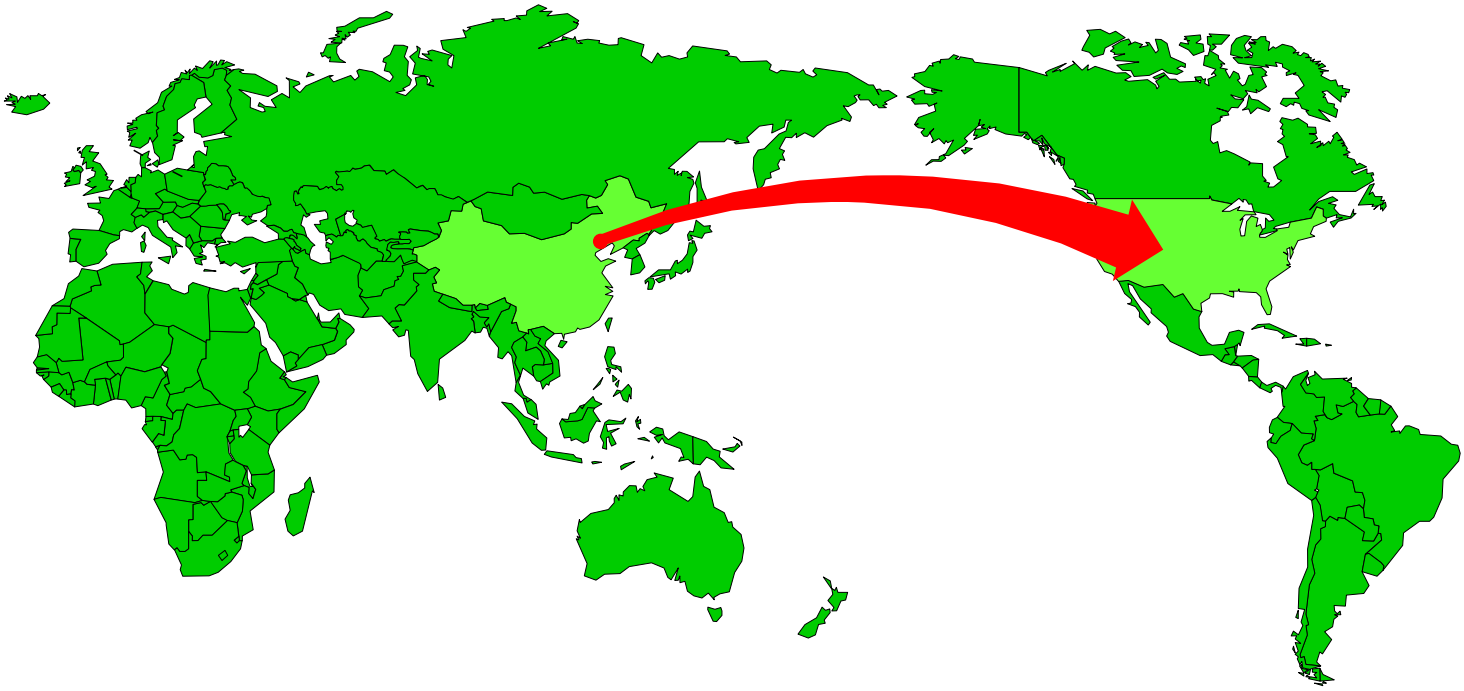
Based on publicly available information.



The geography of N95's value added depends on both the locations of the final assembly (Beijing/Salo) & sale

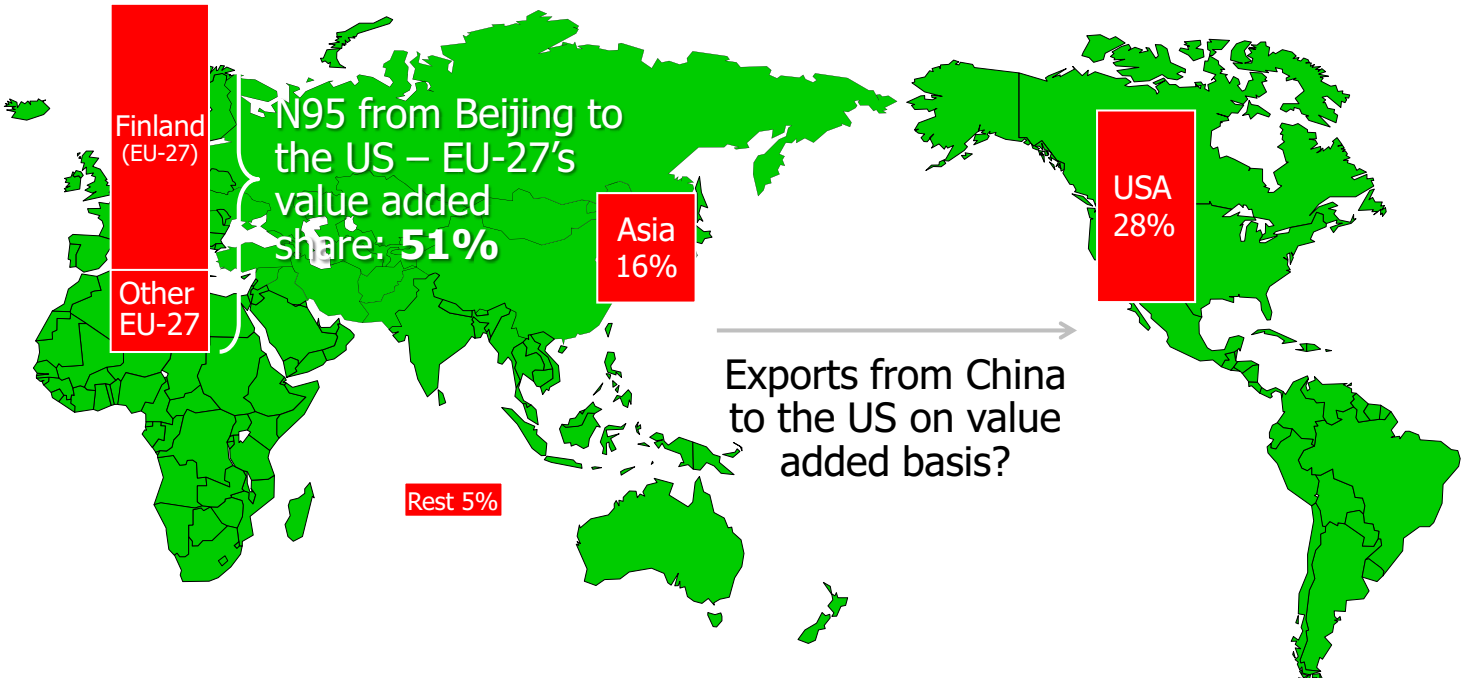
Consider for Europe the <u>least favorable</u> case: a N95 Made in China for consumption in the United States

China scores a €467 hi-tech export (on the basis of Nokia Beijing's factory price)



Europe had little role in the physical goods flows but, even in the <u>least favorable</u> case, EU-27 captured **51%** of the value added (over the life cycle EU-27 captured 55%)

Europe dominated **intangible** aspects of the supply chain



goods/commodity trade statistics ...

... surely the cross-border service flows are reflected in international service trade statistics?

Not too well ...

*One company w.r.t. one phone: Services Fi–China**

Nokia's internal service exports from Finland to China in 2007 w.r.t. N95

~ € 0.8 billion

* N95 was less than **1.5%** of Nokia's handset volume & less than **7.5%** of sales euros

On the basis of Nokia Beijing's assembly volume & services provided for it from Finland

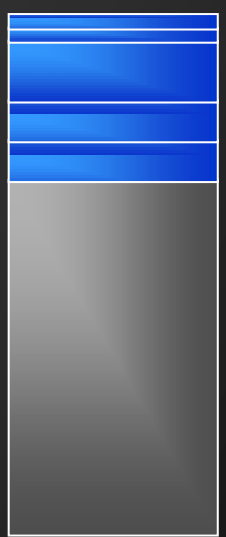
All companies all services: Fi–China

Total service exports from Finland to China, 2007 (Stat Fin 10/10)

~ € 0.6 billion

Finland's total service exports to all countries according to *Statistics Finland* in 2007 (Statistics Finland 10/10)

~ € 12 billion



Trade statistics aside,
The above is reflected in
cross-border financial flows, right?

Mostly not, at least in this case ...

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*Concerning national balance of payments, dividents **ok**, purchases of own shares **not***

*In 2003–8, Nokia's purchases **€18.6 bn***

*At peak in 2005, **2.3% of the GDP***

Source: Savolainen & Forsman (2010)

Observations #1/3

Value capture detached from the physical flows – also in manufactures (internal) services & intangibles dominate

Assembly has moved offshore, but developed countries capture most of the value added generated globally

China is not as dominant as a casual glance of trade statistics would seem to suggest – Europe is ok for now

Observations #2/3

Gross-value based goods trade statistics misleading

International service trade statistics largely “non-existent”

Balance of payments biased (at least in certain cases)

GDP may ”technically” be **ok**, but misleads (cf. crisis in 2009)

GNP/GNI upwardly biased in the Finnish case

Trade *– particularly in intangibles (IPR & services) – remains a* ***core aspect*** *of the global economy. It is, however, unclear what available stats tell about it.*

Trade policy issues: Rules of origin, bilateral foreign trade agreements ...
The ultimate goal should be value-added based trade statistics!

Observations #3/3

China determined not to remain a *2% country* (cf. assembly’s share)

China entering a territory where command & control does not work & where cheap labor is not the core advantage

Even if trade & deepening specialization is clearly not a zero-sum game, previously overly privileged regions such as Europe are indeed being challenged

Who Captures Value in Global Supply Chains? The Case of Three Basic Mobile Phones*

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* This research is a part of the ongoing research project SUGAR (2010-2012) funded by the Finnish Funding Agency for Technology and Innovation, and ETLA.

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***Empirics**:*

How has the geography of global value add changed over time?

How has the geography of global value added tasks changed over time?

We extend N95 case in three major ways:

- 1st - instead of single point in time, our data enables us to analyse how the value creation has changed when technology inside products has commoditized
- 2nd - we also analyse which tasks has been offshored to emerging market economies and which have stayed in advanced economies
- 3rd - we describe in detail how knowledge has systematically been transferred from advanced economics to emerging economies during the last fifteen years

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Task

Value added by actors (firms/individuals), functions (R&D…) & geographies (locations/countries) in a case of one good

Mapping out the whole global supply chain from raw materials / idea generation to a consumer's final purchase of a 3310, 1100 and 1200 at a retail store

– All direct & indirect hard & soft inputs
– 1–8 stages before the final assembly & 2–4 after it
– For each, the loc. of innovation, direct labor & support (cap.)

Mapping out the geographical location of value added tasks

– All direct & indirect work inputs

Approach

Our own examination of 3310, 1100 and 1200 with electrical engineers

Public (Internet etc.) & private (industry contacts) sources to study value added of 600+ parts & software

Teardown report by Portelligent (and iSuppli)

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Preliminary observations #1/2

Knowledge transfer to emerging economies…

The relocation of different types of tasks has required competence transfer from advanced economies to emerging economies and particularly to China.

Instead of sudden change, this process has spread over several years.

Preliminary Observations #2/2

Trade statistics…Imports and exports of goods are measured in gross-value terms.

Our case study data show that if we take services flows into account and use value added based information we come up with strikingly different conclusions on global trade flows than by using gross values of flows of goods.

This implicates that the estimates based on trade in goods statistics and national accounts tend to give a somewhat biased and inadequate picture of how value added spreads geographically.

Who Captures Value in Global Supply Chains? The Case of Other Industries*

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Ongoing Research in other Industries

#1/2:

- Food Manufacturing Industry
  - Two firms
    - Preliminary results available
- Textile Industry
  - Three firms
    - Ongoing
- Paper industry
  - One firm (tbd)
- Chemicals Industry
  - One firm
    - To be started Q3/2011

Ongoing Research in other Industries

#2/2:

- Metal (Machinary) Industry
  - Three firms
    - Ongoing
  - Three firms (tbd)
- Electronics Industry
  - Two firms
    - Ongoing
- Software Industry
  - One firm
    - Preliminary results available

Thank You!

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The method to divide value added to different regions

(1) $Y = \sum_{c=1}^{N} Y_c$

Y = Product's consumer price (pre-tax) which is the total value added of the product.
Y_c= The value added of value chain's part (component or process) *c.*

The value added of each part Y_c can be created globally in different regions (D, E, N, A, O):

(2) $Y_c = Y_{c,D} + Y_{c,E} + Y_{c,N} + Y_{c,A} + Y_{c,O}$, *where*

D= Domestic (Finland)
E= Europe (Other EU-15)
0= Others
N= North-America
A= Asia

To approximate the value of added of part c created in each region *R,* we use the following equation:

(3) $$Y_{c,R} = \left(\frac{C_R}{C}\hat{\alpha} + \frac{L_R}{L}\hat{\beta} + \frac{K_R}{K}\gamma \right) Y_c$$

C_R = firm's physical capital stock in region R,
C = the sum of firm's physical capital stock in all regions,
L_R = firm's employment in region R,
L = firm's employment in all regions,
K_R = firm's knowledge capital (R&D) in region R,
K = firm's knowledge capital (R&D) in all regions,

$\hat{\alpha}$ = Output elasticity of capital
$\hat{\beta}$ = Output elasticity of labour
$\hat{\gamma}$ = Output elasticity of R&D

To take into account the regional productivity differences, we calculate the productivity corrected value added of part c created in region *R* as follows

(4) $$\hat{Y}_{c,R} = \frac{MFP_R \left(\frac{C_R}{C}\hat{\alpha} + \frac{L_R}{L}\hat{\beta} + \frac{K_R}{K}\gamma \right)}{\sum MFP_R \left(\frac{C_R}{C}\hat{\alpha} + \frac{L_R}{L}\hat{\beta} + \frac{K_R}{K}\gamma \right)} Y_c$$

, where MFP_c = multifactor productivity in region *R.*