



OVERSEAS FACTORIES, WORKER RE-ALLOCATION AND TECHNOLOGICAL HOLLOWING-OUT

-A CASE STUDY OF S' CO'S MOBILE BUSINESS -

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Background : de-industrialization

- **High income country** → transition from manufacturing to services = “de-industrialization” ; a general phenomenon (Baumol, et al 1989)
 - However, Still, manufacturing Important: existing concerns about the loss of domestic jobs
- **Literature: Other advanced countries**
(Hijzen, A. and P. Swaim 2007; 2010; Besson et al 2011, Becker, et al 2008; Harrison and McMillan (2011))
 - Employment effects vary by the nature of overseas investment; less un-skilled jobs locally, maybe more high-paid jobs;
- **Recent attention : beyond No of jobs**
 - Which jobs, where
 - Labor Share increase or decrease (Besson et al 2011)
 - Technological hollowing-out and disconnection
- **High expectation on the nature of jobs by locals;**
 - then need to import foreign workers?

Objectives and Method

Internationalization of Production and Job Reallocation

purpose

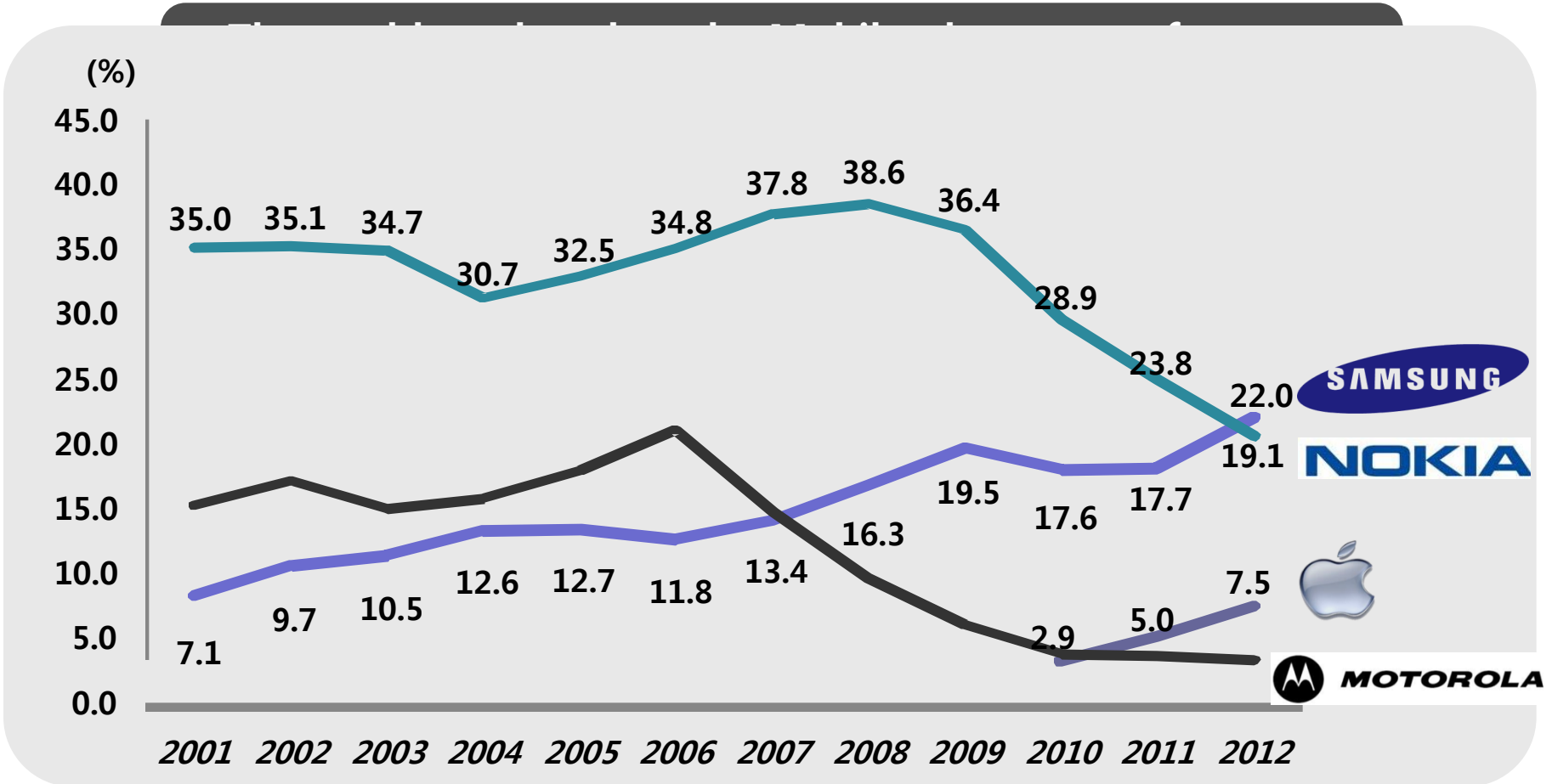
1. Why abroad? Its motives and expected effects
2. Impact 1: domestic employment: high / low-end jobs
Impact 2: Technological hollowingout and disconnection
Impact 3: What effects on distribution and tax revenues?

how

- Research method :
case study of S Electronics (Wireless Division)
 - Statistical analysis together with other company is difficult because of outlier nature of S company
 - Advantageous in terms of depth and dynamic changes
 - Also possible to analyze sub-contracting firms

Samsung's mobile phone business: vs. Nokia

- Market Share : big change : 2012: Samsung > Nokia
- Samsung : 7.1%(2001) → 13.4%(2007) → 22%(2012)



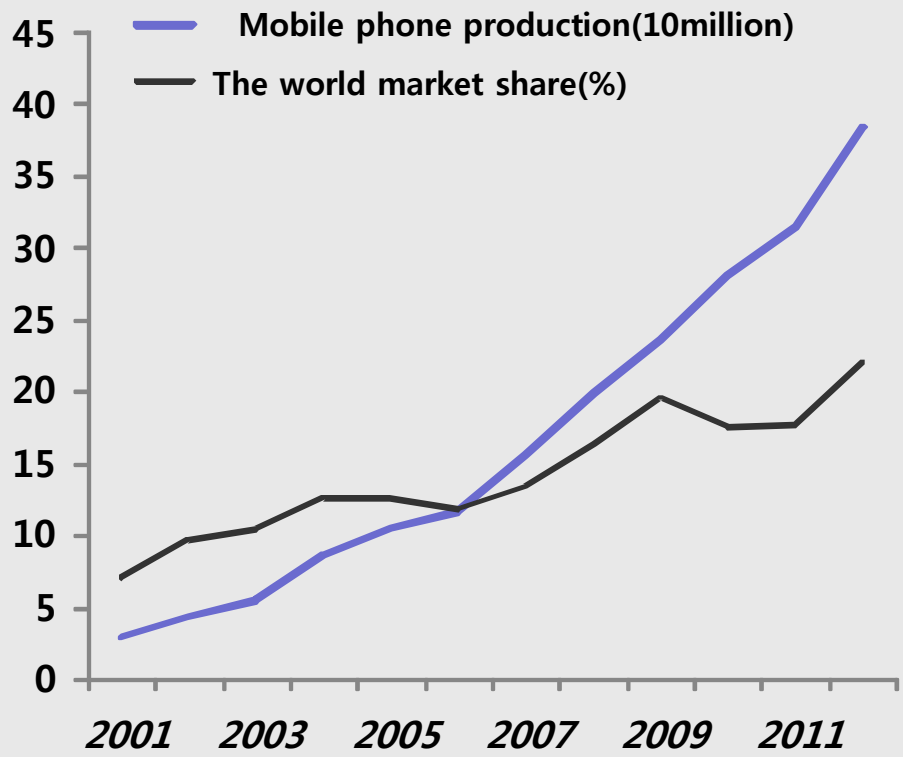
Source: Gartner presentation

Production volume and sales growth

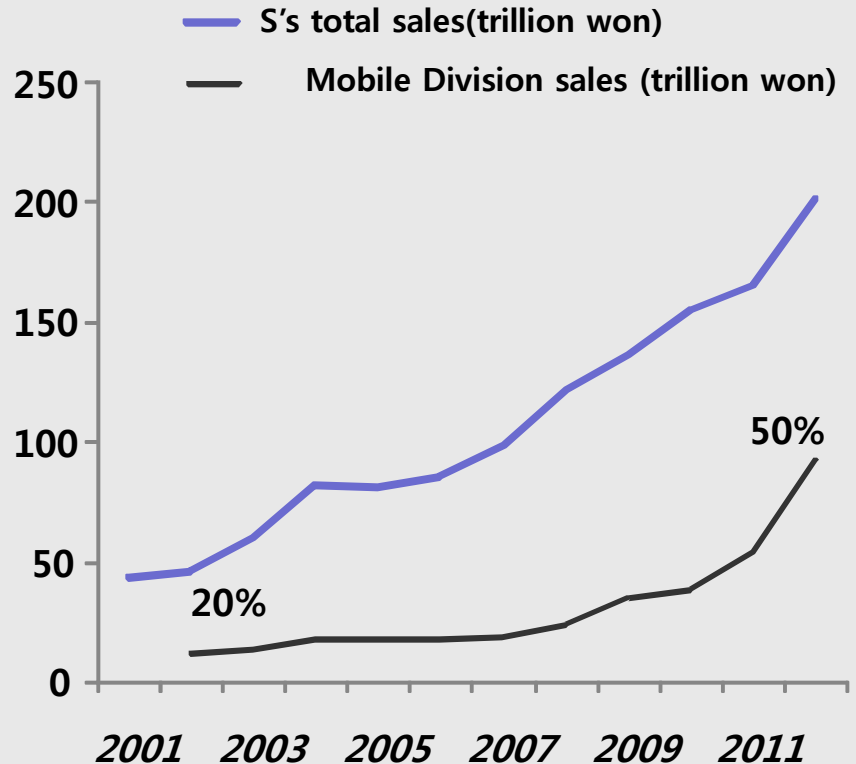
- Sharp increase in the production and sales since 2008

S' mobile phone production and sales trends

a. S' mobile phone production and the world market share



b. S' total sales and Wireless Division sales trend



Source: Gartner presentation, the Financial Supervisory Service's public announcement

S ' mobile phones internationalization of production

▪ 88% of mobile phone sales in 2012 from overseas

Overseas production factories have accelerated to meet the demand of the rapidly growing demand of overseas since 2000s

- Share by overseas sales of mobile phones : 72%(2002) → 88%(2012)

S ' global mobile phone factories (February 2013)

	Founded Year	Production volume (million, 2012)	No. of employees (thousand, 2012)
Gu-mi(Korea)	1988	38	3.5
Hui-zhou(China)	1992	125	8.7
Manaus(Brazil)	1995	8	2.5
Chen-jin(China)	2001	82	8.0
Shenzhen(China)	2002	6	0.6
Kambinas(Brazil)	2007	13	2.3
Noida(India)	2007	32	2.9
Parkninsung(Vietnam)	2008	119	25.9
Sum		420	54.4

Production Internationalization at S Co.

- TV '88 (Mexico), Camera '94 (China),
Printer '96 (China), Fridge '97 (Thailand),
Mobile Phone first time in '01 (China)
- Share of Domestic Production:
11- 50%: Fridge, Washing machines, Aircond
0 % : cooking ranges, oven, notebook; camera
- Domestic production share = less than 20%
by the mid 2000s; Samsung Group as a whole;

Why going abroad ? Case of mobile phones

- **A key factor in Vietnam: cost advantage due to low labor costs :**
difference in processing cost per unit is \$ 5.7
(80% of this difference coming from difference in labor costs)

Cost Comparison of Vietnam and Gu-mi, Korea

Items	Korea	Vietnam	Gap (Korea - Vietnam)
Production volume (ten million)	3.9	11.9	-8
share of labor costs in total value-added (%)	41.7%	6.8%	34.8%
share of labor costs in factory-level sales revenue (%)	4.6%	0.76%	3.9%

- **Cost savings due to a factory in Vietnam is \$ 680 million**

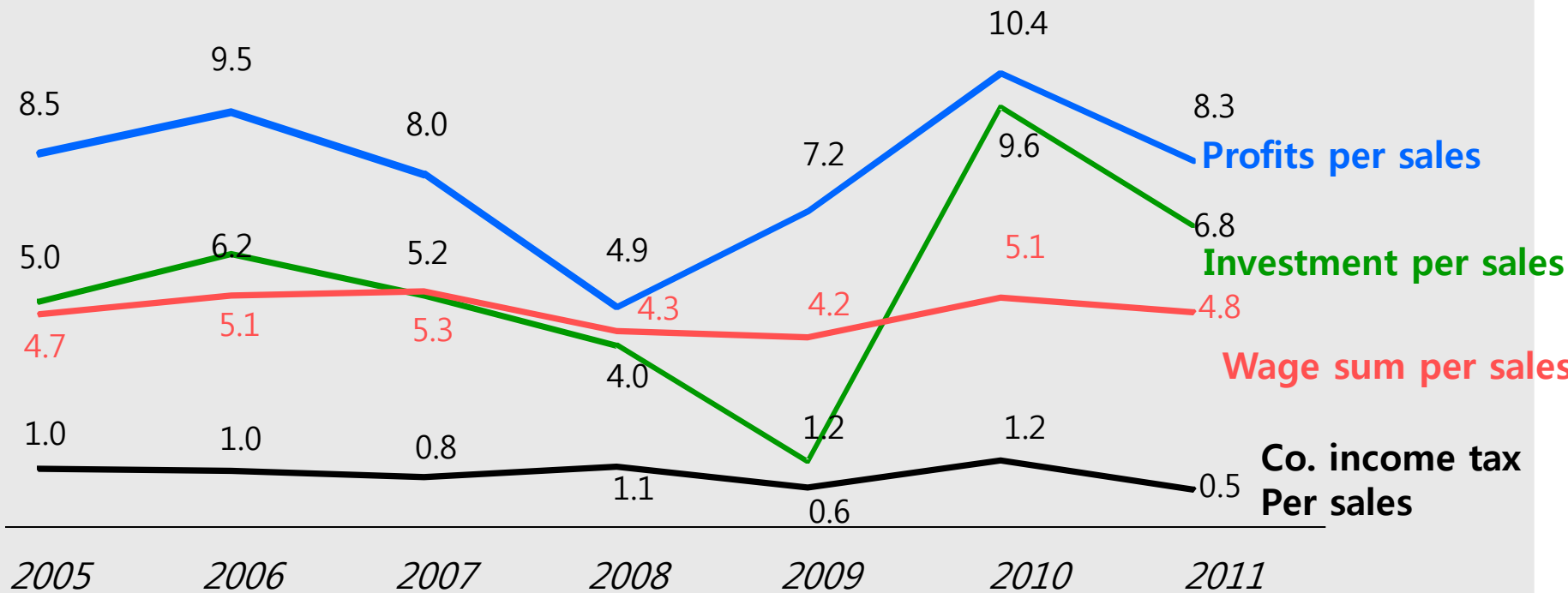
→ Still about 10% of S's annual fixed investment

Wage sum, Fix. investment, & net profit per sales of 100 won (s' electronics as a whole, not only mobile business)

5% range of wage sum per sale is not small;

: equal to fix investment per sale; half of profits per sale

Profits, investment, wages, and corporate tax per sales of 100 won



Korea (Gu-mi) vs Vietnam: comparision of productivity

- Productivity in Vietnam is close to 86% level compared to Gumi.

Produced units per monthly comparable labor (Gu-mi vs Vietnam)

Years	Gu-mi	Vietnam	Vietnam/ Gu-mi
2011	98.2	72.1	84%
2012	104.1	89.4	86%
Change rate compared to 2011	6% ↑	24% ↑	-

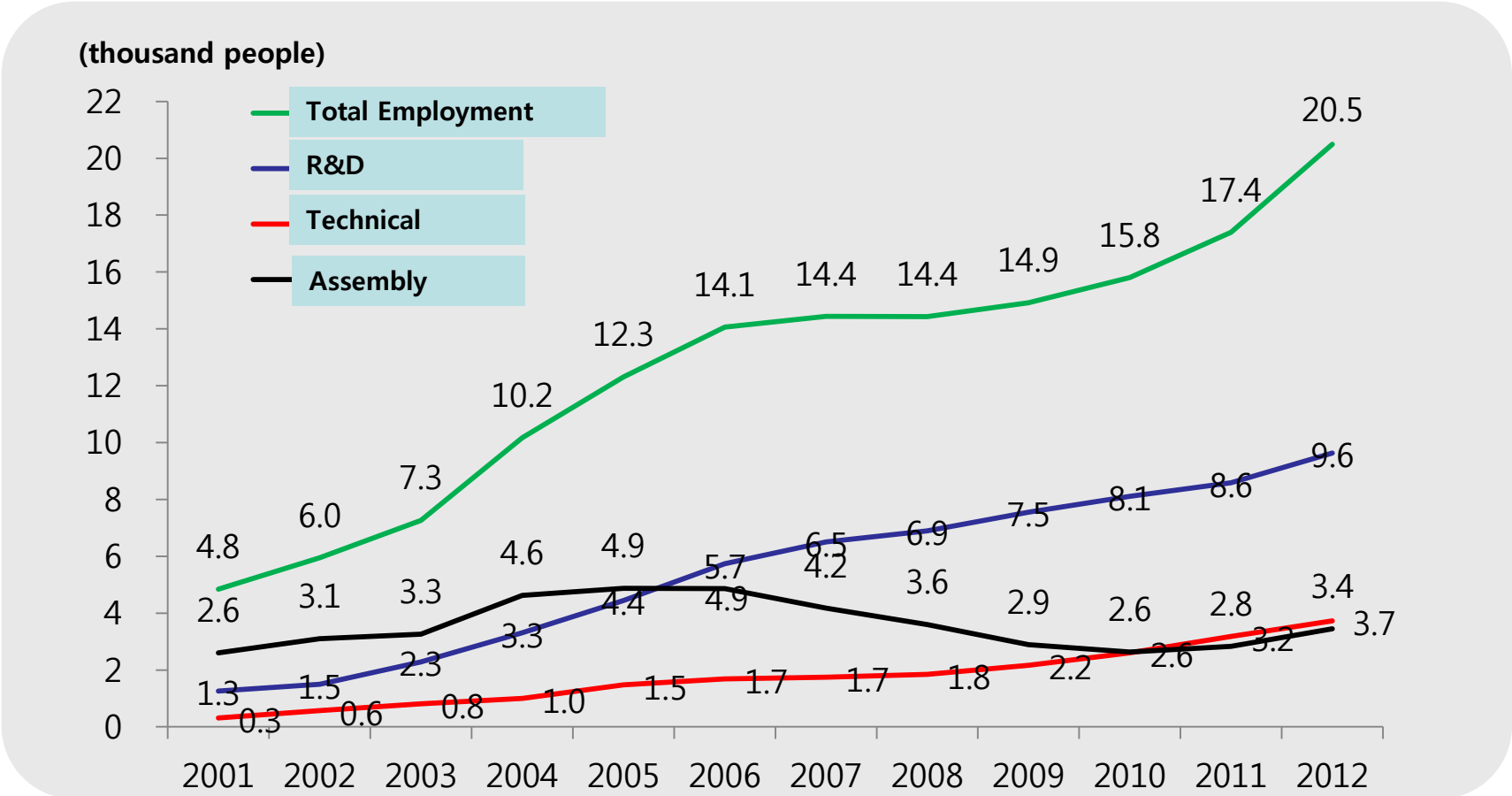
Defect (failure) rate (Gu-mi vs Vietnam)

Failure rate	2010년			2012년		
	Gu-mi	Vietnam	Vietnam/ Gu-mi	Gu-mi	Vietnam	Vietnam/ Gu-mi
Indicator I (ppm)	6,066	12,032	1.98	5,629	10,174	1.81
Indicator II (ppm)	256	798	3.12	385	360	0.94
Indicator III (ppm)	8,598	6,600	0.77	9,145	8,099	0.89

Impacts on Employment ?

- **Total employment at Wireless Division in Korea kept to increase.**
14,400 person(2008) → 20,500person (2012: net increase of 6,100)
- 5,960 person(2002) → 20,500person (2012, 3.4 times increase)

S's wireless division workforce trends by job category in Korea



Employment change trend by occupational group(index: in 2002 = 100)

- High-end jobs (R&D & design) have increased sharply.

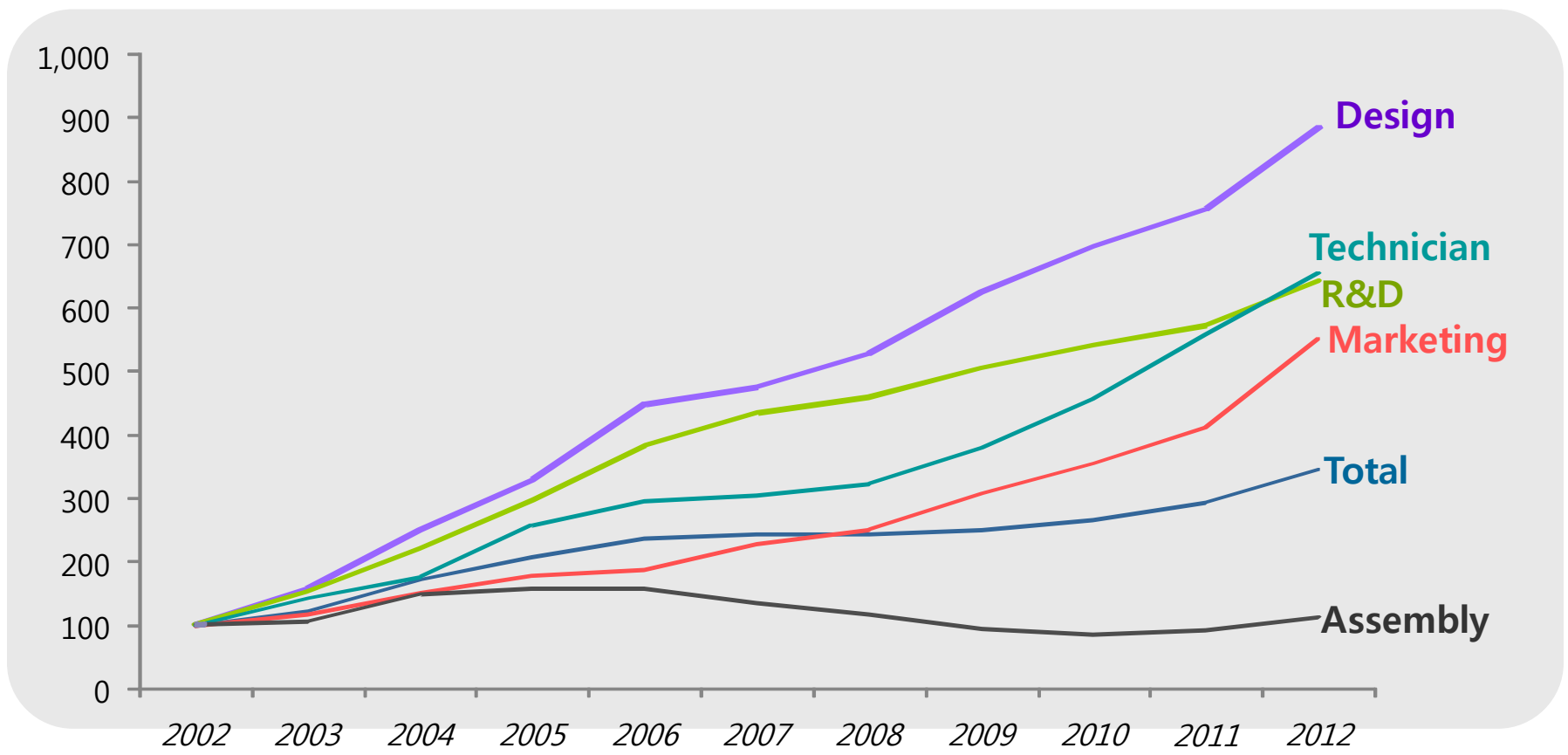
Compared to 2002

Which jobs rise/decline?

Design 8.8times

R&D 6.4times

Technician 6.5times



Some Difference before and after 2008 (Vietnam)

- Design and R&D faster increase before 2008
- Technical and Marketing faster increase after 2008

S company mobile communication division's domestic and foreign workforce progress by occupational group

Division		2002	2004	2008 (%change)		2012		% change	
					Increase from 2002		Increase from 2002	Increase from 2008	
Sales (trillion won,%)	Total	11	18	24	108	93	715	293	
	Domestic	3				11	221		
	Overseas	8				83	934		
Domestic Employment (Person,%)	Total	5,950	10,165	14,435	143	20,491	244	42	
	Supporting etc.	492	728	1,197	143	1,879	282	57	
	marketing	234	357	586	150	1,289	451	120	
	Design	59	147	311	427	522	785	68	
	R&D	1,497	3,309	6,895	361	9,627	543	40	
	Technician	570	1,004	1,845	224	3,730	554	102	
	<i>non-assembly total</i>	<i>2,852</i>	<i>5,545</i>	<i>10,834</i>	<i>280</i>	<i>17,047</i>	<i>498</i>	<i>57</i>	
	Asseby	3,098	4,620	3,601	16	3,444	11	-4	
Overseas Employment (Person,%)	Total	983	3,010	13,831	1,307	50,704	5,058	267	
	Vietnam			237		26,115			
	Non-Vietnam	983	3,010	13,594	1,283	24,589	2,401	81	

Since 2008, the ratio of technicians and marketing staff to volumes of production kept steady

No. of workers required per 10million units of phones (S' wireless division, Korea)

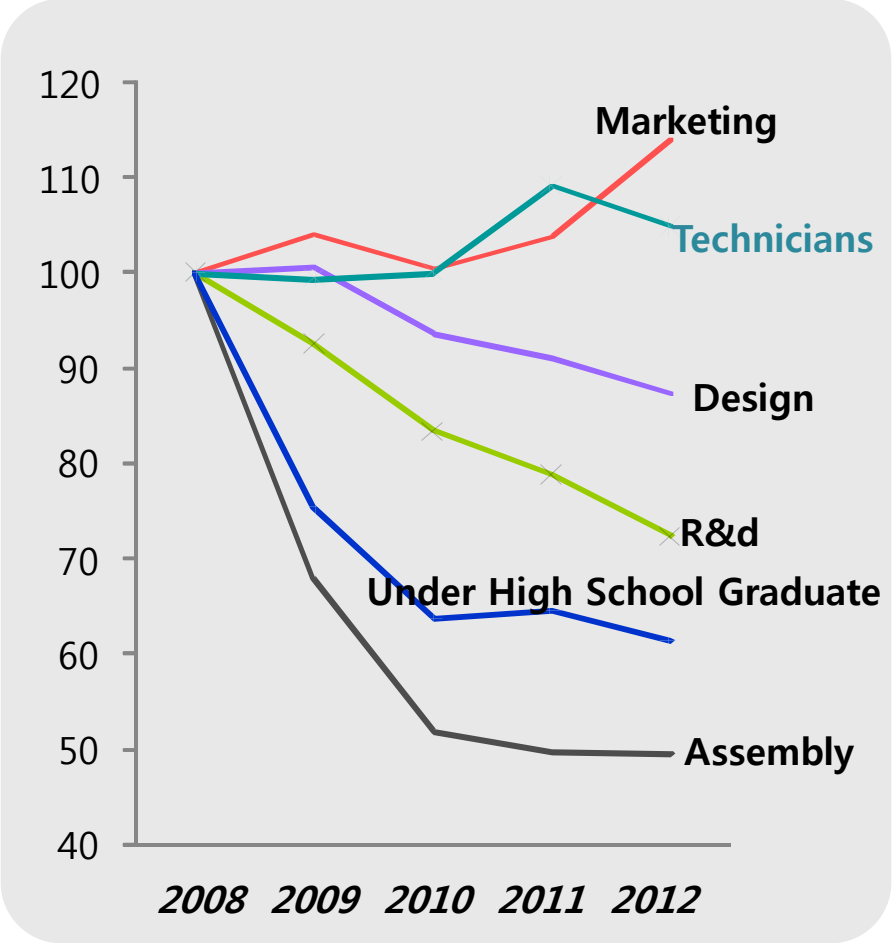
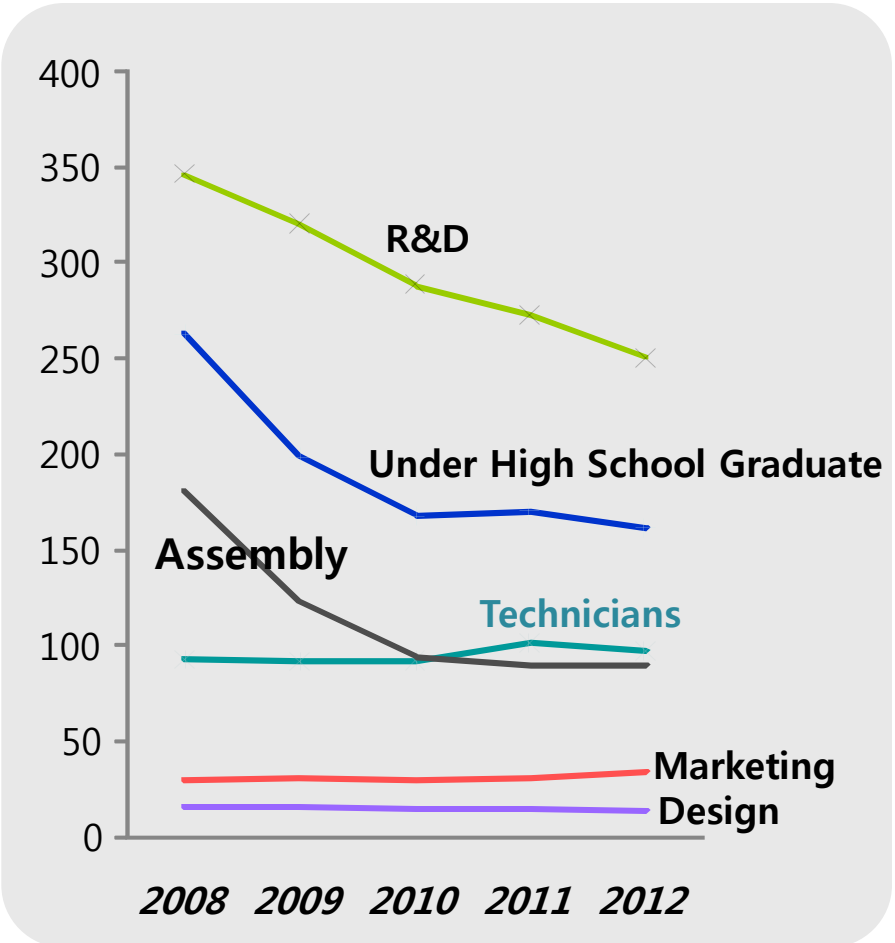
Year	Production volume (10,000)	Total	Supporting	Marketing	Design	R&D	Technician	Assembly
2008	19,932	724.2	60.1	29.4	15.6	345.9	92.6	180.7
2009	23,577	632.6	51.5	30.6	15.7	320.1	92	122.8
2010	28,107	562.5	43.7	29.5	14.6	288.4	92.5	93.7
2011	31,505	552.1	44	30.5	14.2	272.4	101	90
2012	38,463	532.7	48.9	33.5	13.6	250.3	97	89.5

No. of workers per one technician (S' wireless division, Korea)

Year	Total	Supporting	Marketing	Design	R&D	Technician	Assembly
2008	7.8	0.6	0.3	0.2	3.7	1	2
2009	6.9	0.6	0.3	0.2	3.5	1	1.3
2010	6.1	0.5	0.3	0.2	3.1	1	1
2011	5.5	0.4	0.3	0.1	2.7	1	0.9
2012	5.5	0.5	0.3	0.1	2.6	1	0.9

Technicians kept proportionally to prod. volumes

No. of jobs per 10 million units of phones (S's Wireless division, in Korea)



Why technicians?: to cope with technological hollowing-out and disconnection

Definition:

- **Technological hollowing-out** = Specific technologies or persons embodying that technologies are not available locally
- **Technological disconnection** = **Discontinuity due to no successor of specific technologies**

▪ Established MTC (Manufacturing Technology Center) in Su-Won (2006)

- Whenever factory relocation to overseas, kept core technicians in MTC
- Ever increased since then (= > this is what Apple does not have but S has)

Years	2006	2007	2008	2009	2010	2011
No. of workers in MTC	82	202	172	325	847	1,103

They are always dispatched to overseas factories.

No. of staff on business Trip	Total	Overseas Business Trip					Domestic Trip
		Total	China	Southeast asia	EU/CIS	Americas	
No. of workers (% of total)	256 (45)	147 (25.8)	32 (5.6)	46 (8.1)	30 (5.3)	39 (6.8)	109 (19.1)

MTC & Gu-Mi Factory → Source of S's Manufacturing Competitiveness

▪ Gu-Mi Factory= Serves as a 'Mother Factory' for overseas

Global Manuf. Center in Gu-Mi:

Technicians: about 350;
Technicians and R&D in depart. Product Technology about 2,700



- Source of innovation: diffused overseas
- Prototype testing,
- stabilization of production lines;
- introduction of automation

- Possible to produce multiple models (cf: large-scale production of a limited no of models by Apple)

▪ They are dispatched to Vietnam

- Formally Locally Resident Koreans in VT : 37
- 150 employees are stationed daily in Vietnam on a business trip status

- Rapid development & change of new models
 - In-house fabrication of moulds for phone cases (and then given to sub-contracting firms)
 - cf) Apple is outsourcing to Foxconn;
 - Cell assembly method (cf; conveyor belt) : (Advantageous for a Multi-model assembly : Easy to adjust the volumes by model types)

Employment change in sub-contracting firms

- **also increased domestic jobs despite going overseas following S'**
 - A company: 900 persons (2009) → 1,450 persons (2012, 61% increase)
 - B co.: 291 persons (2009) → 427 persons (2012, 47% increase)

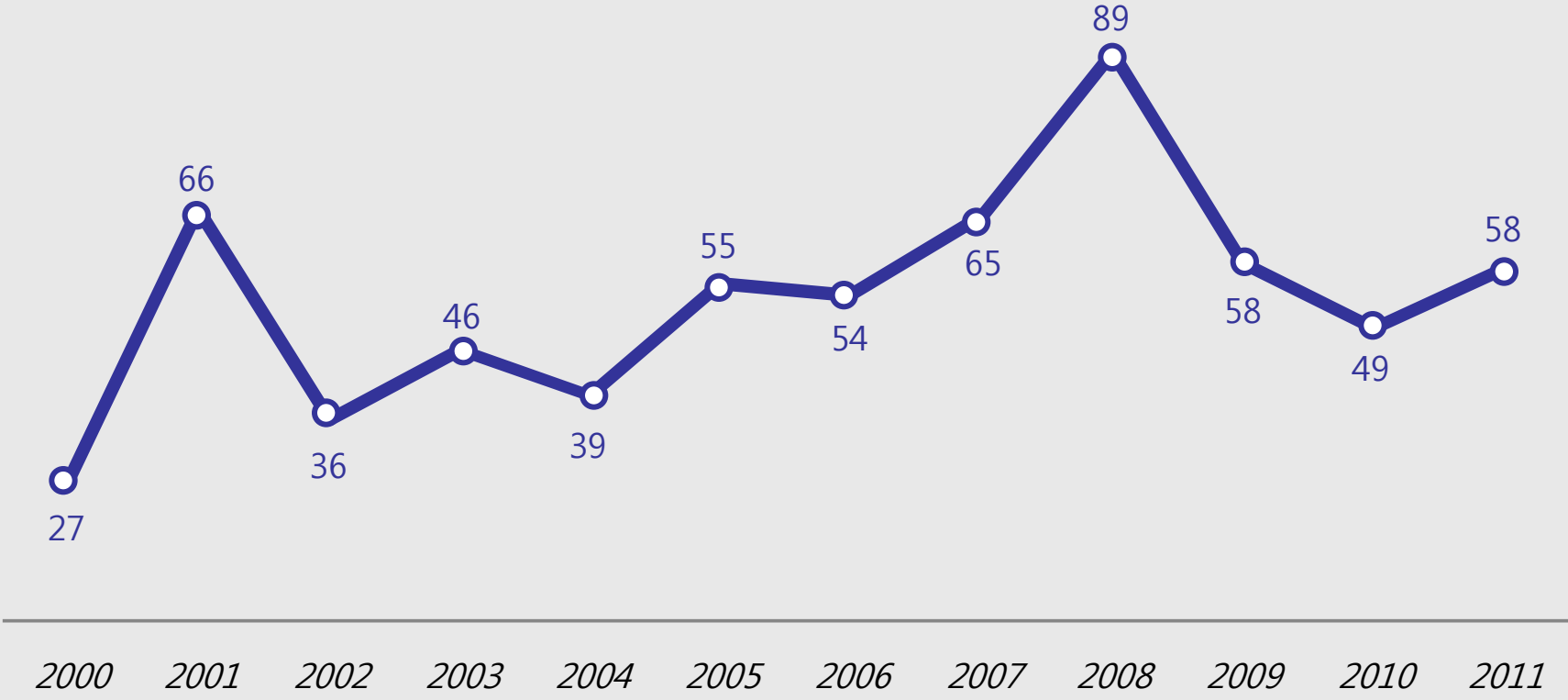
Sub-contracting firms: sales and employment after going overseas following S company

		2009	2012	change	growth
A company	Sales(100million)	3,570	9,181	5,611	157%
	The number of domestic people(person)	900	1,450	550	61%
	The number of overseas people(person)	1,170	3,860	2,690	230%
B company	Sales(100million)	1,921	7,900	5,979	311%
	The number of domestic people(person)	291	427	136	47%
	The number of overseas people(person)	1,230	4,324	3,094	252%
C company	Sales(100million)	173	640	467	270%
	The number of domestic people(person)	114	133	19	17%
	The number of overseas people(person)	0	540	540	-

Distributional side : Increase in Labor Share

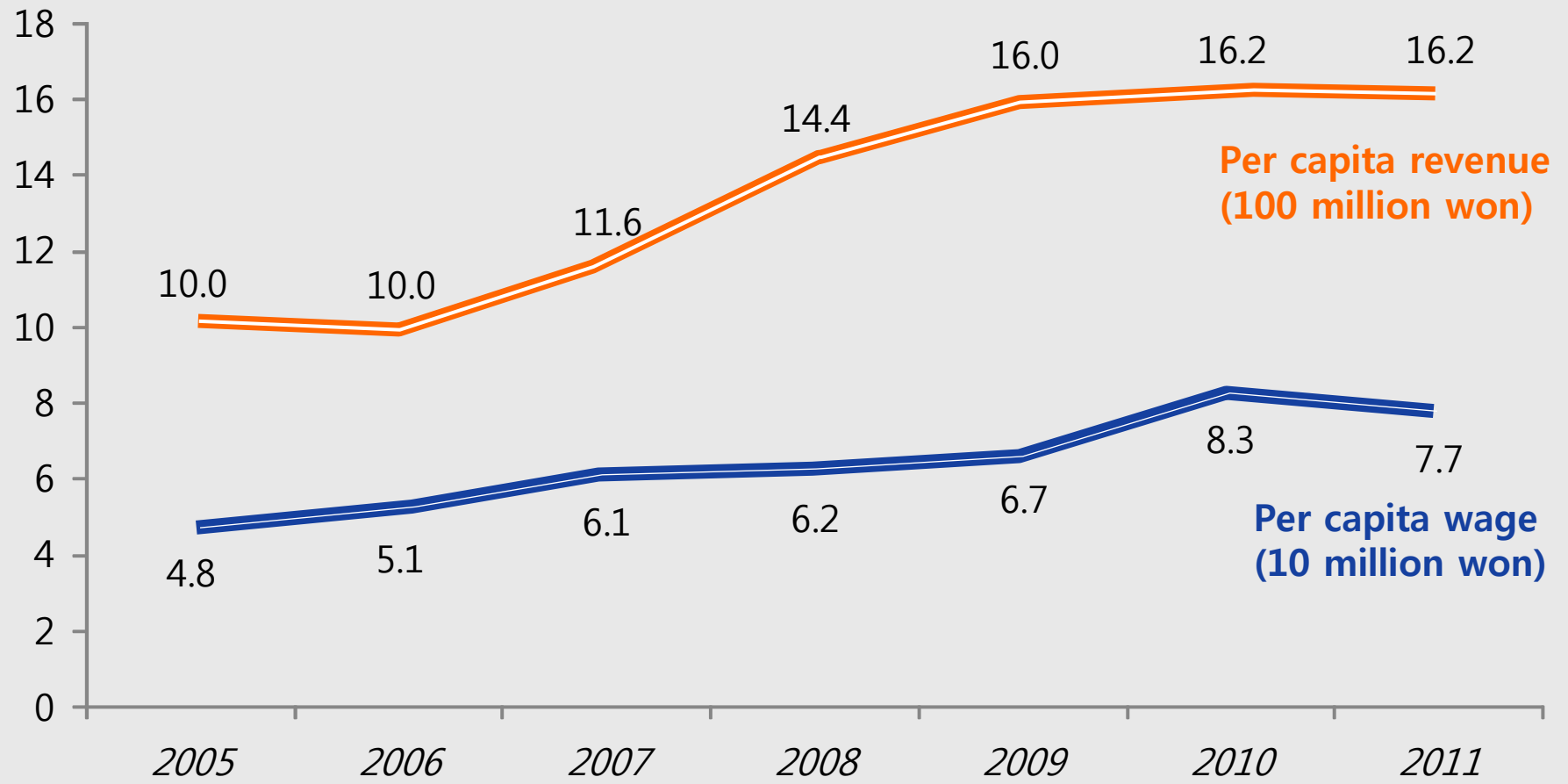
**Total wage sum to net profits (S company total)
: 36% → 58%**

(Unit: %)



Average wage rates increase faster than sales per person

Per capita sales and per capita wage (S' company)



Corporate income tax, fix investment, and profit

- Corporate tax increase faster than others

- Growth of Corporate tax > Investment > Profit > wage sum

Change of the whole of S company's profit, labor costs, corporate investment cost

		Profit	Wage sum	Corporate tax	Fixed Investment
Rate of increase	2001 → 2011	4 times	4 times	25.2 times	5.8 times
	2001 → 2005	2.3	2.0	9.0	2.1
	2005 → 2011	2.0	2.1	2.8	2.8
	2001 → 2008	2.0	2.7	5.1	2.5
	2008 → 2011	2.3	1.5	5.0	2.3

Summary of results

- **S's going abroad: -> higher competitiveness**
- **to increase global sales, to expand MS, and to create employment**

Mobile phone division overseas → Domestic jobs growth

- **Domestic job:**
3.4 times increase;
- 5,950 ('02)
→ 14,400 ('08)
→ 20,500 ('12)
- **Despite going overseas, domestic employment increased**
- **A positive contribution to the national economy**

Scale effect > Substitution effect

- 2005~2012:
assembly jobs (-1,425)
R&D & technicians (+7434)
- domestic unskilled replaced by overseas jobs;
- high value added workforce increases 5 times
- Kept jobs owing to increased competitiveness
- Hijzen, A. and P. Swaim (2007): OECD17 similar results

Technical/ marketing jobs maintained

- per 10 million units ('08~'11):
- **Assembly: 182 -> 82**
- **Marketing: 30**
Technician: 95
- **Need them to check, maintain, control overseas factories**
- **Sources of manufacturing competitiveness**

Overall Interpretations

- **Fundamental determinants of total employment is not whether moving factories overseas but the volume of total production and sales;**
 - There is a constant proportion between types of jobs and productions
 - Expansion of total production maintains demand of labor in different job categories;
 - Similar result with Becker and Muendler (2008); Besson, et al (2011)
- **Offshoring -> more profit -> more timely fixed investment for next models /first mover models -> expansion path possible**
- **Need to differentiate intra-firm (Samsung) vs. inter-firm (Apple) offshoring**
 - **Samsung not outsourcing but offshoring**
 - → different outcome on the job impacts
- **Despite moving overseas; technological hollowing-out checked**
 - By Keeping redundant manufacturing workers special manufacturing technology center:
 - Using this, to implement cost reduction by continuous factory automation, to become innovation sources, and to upgrade productive efficiency.
- **Finally, contributes to more taxes and worker compensation**
 - In 2008~2011, corporate tax has increased five times:
corporate tax > investment > profit > total labor costs
 - A share of wage sum to net profit: 35% → 55% increased

Policy Implications

- **Gov't Policies need to focus on how keep good jobs (R&D/ design / technicians) locally and them to stay in Korea**
- **Need to increase supply of manpower for employment, and to reform labor market institutions and employment regulations**
 - Gu-Mi factories may also expand a little bit but it needs to get help in terms of labor supply and easing of factory location regulations for larger scale expansion
- **Different nature of products resulting in different possibility of maintaining a domestic factory at home**
 - The higher in technical complexity/fusion; the shorter a cycle of product innovation,
 - cf) mobile phones vs. micro-ovens / notebooks
 - > higher importance of continual re-adjustment of production line and model changes
 - Keeping a mother factory in home : possible and necessary

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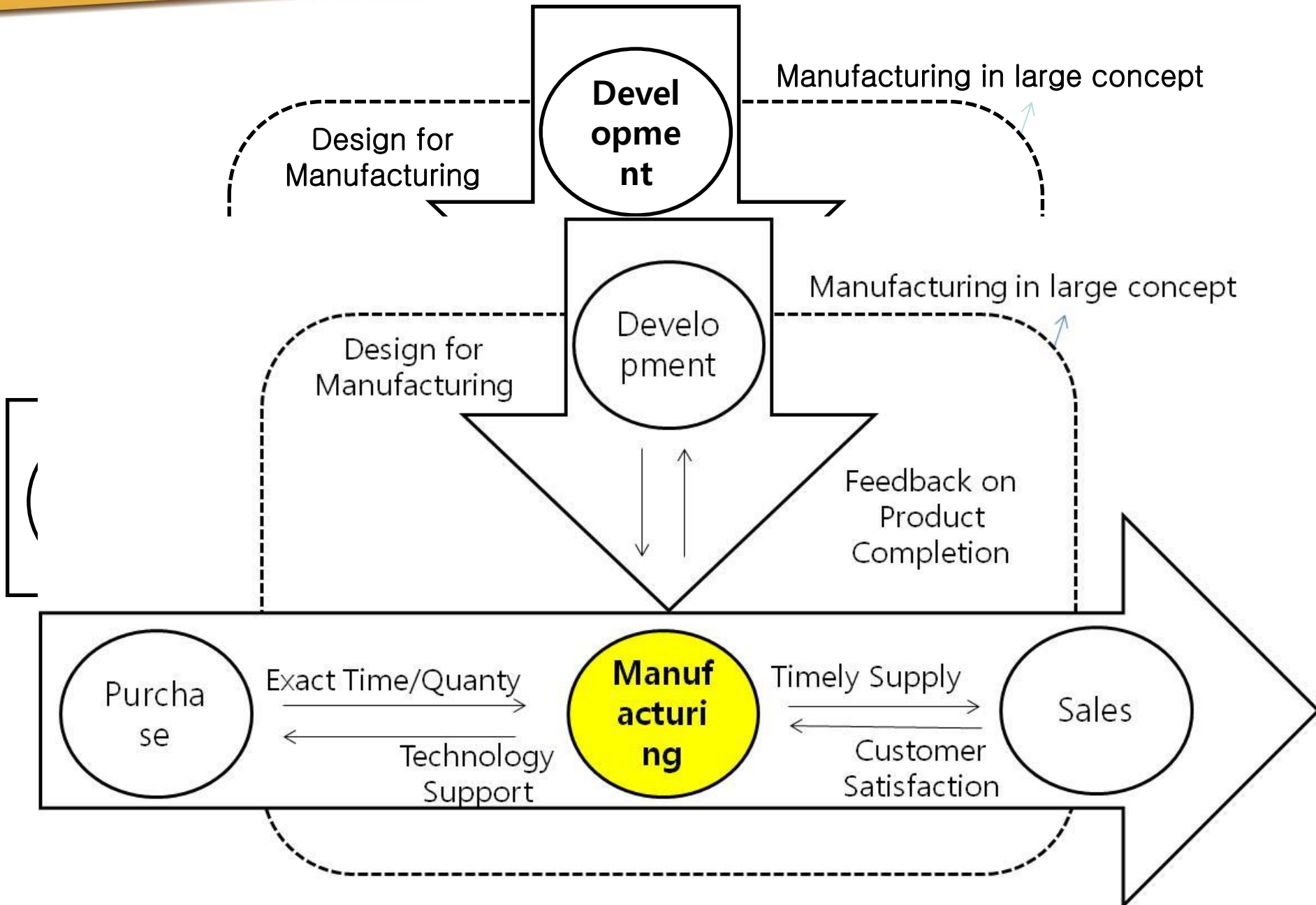
discussion

- **Conceptual**
- **Determinants of going abroad vs. its impacts**
- **Several alternatives/partial substitutes**
 - 1) **domestic temporary workers**
 - 2) **imported foreign workers**
 - 3) **automation**
 - 4) **outsourcing of intermediates**

Terminologies and measurement:

**offshoring vs outsourcing;
offshoring index**

Alternative to Mother factory: apple; HMC (less control)





THANK YOU