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# Part 1: Country Report

## Economy and Construction Industry in Korea

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## **1. Executive summary**

The Korean economy has successfully passed through the global financial and economic crisis, even if it is currently slowing down due to stagnant private consumption. The Korean GDP growth rate in the first half of 2014 showed a slight increase compared with the previous year, due to the improvement of terms-of-trade. In the first half of 2014, the private consumption and investment decreased 0.3% and 0.2% respectively, but the export of goods and service increased 1.7% compared with the previous quarter. Both exports and import are forecasted to rise by 4.9 and 5.5% respectively compared with the last year, because of the growth of cordless telephone and automobile car, the influence of US government shut-down, rise of exchange rate and so forth.

In the construction sector, the value of contracts in the first half of 2014 definitely has increased 26.8% owing to the recovery of residential building construction. The number of contractors in June 2014 is similar to that in last year, and that of employees maintained the same level. For the exports in construction, the Civil sector showed an exceptional shrunk, while the Plant sector keep the steady trend after 2011. The construction investment in 2014 is expected to increase by 1.3%, lower than original expectation in 2013.

All things considered, the Korean GDP growth rate in 2014 is expected to be 3.8% under the influence of the domestic and global economic recovery. The economic outlook for next year is predicted to be more improved, even if it will be affected by domestic demand reduction and uncertainty of the global economy.

## **2. Macro Economic Review and Outlook**

The Korea as well as other countries had been confronted with a serious economy crisis after the Subprime mortgage in U.S.A, 2008. However, the GDP growth rate had greatly been up to 6.5 percent in 2010 from 0.7 percent in 2009, riding on brisk exports and recovering domestic demand. The GDP growth rate, unfortunately, has fallen again from 2.3 percent in 2012 to 3.7 percent in the first half of 2014, which means that the Korean economy has been at a standstill. In the first half of 2014, the population and labour force growth rate slightly increased and the unemployment rate is slightly moving upward, compared with the values in 2013. The interbank and short term loan interest rate decreased during the same period, whereas the long term loan interest rate increased 2.79 to 2.82 percent.

In the first half of 2014, private consumption declines by 0.3% over previous quarter due to the national tragic accident, the sinking of the Sewol, which reduce the expenditure of almost all goods and service. The construction investment increased by 0.4% with a growth of building construction especially in non-residential building, while the investment in civil engineering and road decreased due to shortage of national and local government's budget.

On the production side, the manufacturing sector increased by 5.4% over the same period in the previous year, which was mainly due to the rise of precision instrument such as electronic and semiconductor equipment. The construction sector also increased of 1.7% because of expansion of residential sector, which was extremely sluggish after 2007. In addition, the service sector increased by 3.0% on the strength of finance, insurance, food and lodging industries.

As the rate of Korean economic growth is predicted to be 3.8% in the next half of 2014, it is difficult to say that economic has been completely recovered. However, the major credit rating agencies like Moody's take an optimistic view of Korean economy despite downgrading the most developed countries' rating. In conclusion, the Korean economy is expected to be positive growth but its pace might be slow down.

Table 2.1. Main Economic Indicators

	2006	2007	2008	2009	2010	2011	2012.	2013	2014 2Q
<b>GDP and Components</b>									
GDP at real price (bill. won, base year 2010)	1,087,876	1,147,311	1,179,771	1,188,118	1,265,308	1,311,893	1,341,966	1,381,838	694,762
GDP at current market price (bill. won)	966,055	1,043,258	1,104,492	1,151,708	1,265,308	1,332,681	1,377,457	1,428,295	736,972
GDP growth (%)	5.2	5.5	2.8	0.7	6.5	3.7	2.3	3.0	3.7
GDP growth (%) for agri and fishing sector	1.6	4.1	5.6	3.2	-4.3	-2.0	-0.9	5.8	5.2
GDP growth (%) for manufacturing sector	7.7	8.4	3.7	-0.5	13.7	6.5	2.4	3.3	5.4
GDP growth (%) for services sector	4.6	5.2	3.2	1.5	4.4	3.1	2.8	2.9	3.0
GDP growth (%) for mining sector	7.7	8.3	3.7	-0.5	13.5	6.5	2.4	3.3	1.1
GDP growth (%) for construction sector	1.7	2.5	-2.6	2.3	-3.7	-5.5	-1.8	3.6	1.7
<b>Demographic Indicator</b>									
Population (1000 people)	48,371	48,597	48,948	49,182	49,410	49,779	50,004	50,219	50,423
Population growth rate (%)	0.49	0.47	0.72	0.48	0.46	0.75	0.45	0.43	0.40
Labour force (1000 people)	23,151	23,433	23,577	23,506	23,829	24,244	24,681	25,066	25,790
Labour force growth rate (%)	1.29	1.22	0.61	-0.30	1.36	1.71	1.77	1.54	2.81
Unemployment rate	3.5	3.2	3.2	3.6	3.7	3.4	3.2	3.1	3.7
Inflation rate (CPI)	2.2 (88.1)	2.5 (90.3)	4.7 (94.5)	2.8 (97.1)	3.0 (100.0)	4.0 (104.0)	2.2 (106.3)	1.3 (107.6)	1.4 (109.0)
<b>Financial Indicator</b>									
Interbank interest rate	4.14	4.65	4.77	1.92	2.03	3.01	3.02	2.56	2.47
Short term loan interest rate (Yields on CD(91-day))	4.48	5.16	5.49	2.63	2.67	3.44	3.30	2.72	2.65
Long term loan interest rate (Yields of Treasury Bonds (3-year))	4.83	5.23	5.27	4.04	3.72	3.62	3.13	2.79	2.82
Average change against USD\$	955.08	929.16	1,103.36	1,276.35	1,156.00	1,107.99	1,126.76	1,095.04	1,029.19

### 3. Trading Country

#### 3.1. Value of Import and Export

The balance of trade was recorded a surplus of \$44.0 billion in 2013, due to the sharp increase of export exceeding the increase of import. In the first half of 2014, it already made a surplus of \$20.2 billion, that is, similar with that of last year. The value of import and export in 2014 is expected more than that in 2013 due to recent recover of world economy especially in developed countries. However, the balance of trade can be shrunk to \$43.0 billion.

The export in the first half of 2014 is estimated to have grown 1.7%, which was caused by the growth of cordless telephone, automobile car, general machinery and petrochemicals and by the decline of shipping and wireless mobile products. The import is also estimated to increase about 1.1%, which was caused by rise of consumption abroad.

The value of exports and imports in 2014 are being forecasted to increase about 4.9% and 5.5% respectively by the effects of recent recover of world economy.

Table 3.1. Export and Import

	2006	2007	2008	2009	2010	2011	2012	2013	2014 2Q
Export (increase rate)	325.5 (14.4)	371.5 (14.1)	422.0 (13.6)	363.5 (-13.9)	466.3 (28.3)	555.2 (19.0)	547.8 (-1.3)	559.6 (2.1)	283.3 (2.5)
Import (increase rate)	309.4 (18.4)	356.8 (15.3)	435.3 (22.0)	323.1 (-25.8)	425.2 (31.6)	524.4 (23.3)	519.5 (-0.9)	515.5 (-0.7)	263.1 (2.6)
Balance of trade	16.1	14.6	-13.3	42.6	41.1	30.8	28.3	44.0	20.2

Source: Korea Customs, The Korea International Trade Association.

#### 3.2. Five Major Trading Countries

The three major trading countries of Korea in the first half of 2014 are China, Japan and America. Hong Kong and Singapore are also included in the five major countries of export, and Middle East Asia countries including Saudi Arabia and Qatar are the major countries of import. About 80% of oil import of Korea is from these Middle East countries. While the share of EU Countries in the trading to Korea has decreased, the share of East South and Middle East Asia countries has increased.

Table 3.2. Top 5 Major Trading Countries of Import and Export (2Q, 2014)

Rank	Export		Import	
	Country	Value	Country	Value
1	China	69,441	China	43,833
2	America	33,863	Japan	26,782
3	Japan	16,191	America	22,993
4	Singapore	13,704	Australia	10,628
5	Hong Kong	13,174	Taiwan	7,486

Source: Korea Customs

## 4. Overview of construction industry

### 4.1. The Value of Construction Contracts

Since early 2008, the economic stimulus policy had led the government expenditure to rise rapidly, letting the investment in construction, mainly for infrastructure projects, to rise fast. In 2009, the rate of civil construction contracts increase by 31.2%, but that of total construction contracts conversely decreased by 1.1% with offsetting by a large fall of private projects. In 2010, only non-residential construction contracts recorded positive growth of 18.6%. Fortunately, the residential construction contracts in 2011 increased rapidly into 22.4%, which brought about the positive growth in total construction.

However, construction contracts including civil and privates have been deeply decreased by domestic recession since 2012. The civil and residential construction contracts in 2013 were recorded the extremely negative growth of 16.2% and 14.6% respectively, meanwhile the non-residential construction contract decreased by 1.0% compared with the same period the previous year.

After severe decrease in contract for 2 years, the value of contracts in the first half of 2014 increase sharply due to base effect. The residential building contracts increase by 49.6% but its real value is 37% lower than the peak point in 2007. The non-residential and civil contracts also grow 27.4% and 8.9% respectively. By the results, the total construction contracts showed the positive growth of 26.8%, reaching a value of KRW 49.6 trillion (US\$ 47.4 billion).

The economic prospects for the second half of this year are different from the sectors. It is expected that it will be difficult to keep the recovery pace in the residential construction contracts due to the shortage of housing demand. Government try to induce an end user to buy a house through diverse policy packages but people is reluctant to buy worrying the additional decline of housing price. It is predicted to be the positive growth in the non-residential buildings and infrastructure, however, its amount is dependent in the private sector investment due to insufficient public budget.

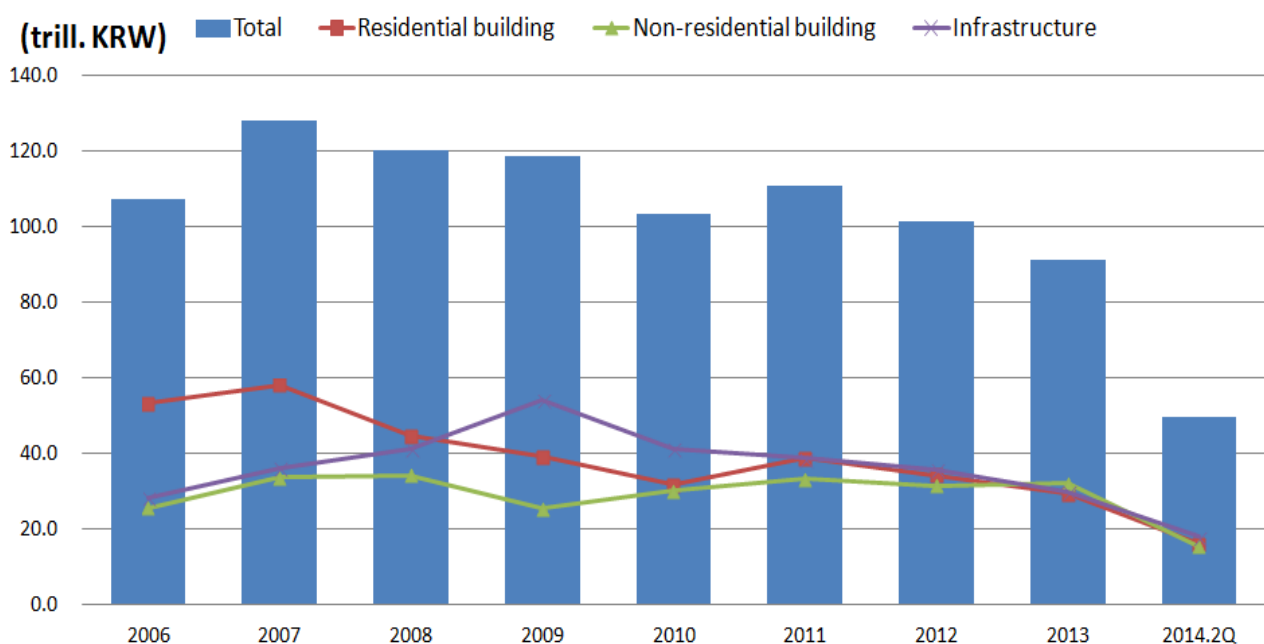


Figure 4.1: The Value of Construction Contracts (2006~2014.2Q)

Table 4.1. The growth rate of construction Contracts

(Unit: %, compared with the same period)

Year	residential	non-residential	civil(Infra)	total
2006	23.9	-1.2	-6.6	8.0
2007	9.1	30.8	27.5	19.2
2008	-23.2	1.8	14.0	-6.1
2009	-12.5	-25.4	31.2	-1.1
2010	-19.1	18.6	-23.5	-13.0
2011	22.4	9.8	-6.2	7.2
2012	-11.4	-5.0	-8.1	-8.3
2013	-14.6	-1.0	-16.2	-10.0
2014.6	49.6	8.9	27.4	26.8

Table 4.2. Breakdown of Construction Contracts

(Unit: bill. won, current price)

Type of Contract	2006	2007	2008	2009	2010	2011	2012	2013	2014. 6
Public Project									
Residential building	5,122	7,570	9,346	7,378	4,738	6,963	6,446	5,058	1,676
Non-residential building	5,755	7,587	9,149	8,327	7,749	7,779	8,730	11,049	5,525
Infrastructure	18,643	21,932	23,354	42,782	25,749	21,882	18,901	20,063	14,495
Sub-Total	29,519	37,089	41,849	58,487	38,236	36,624	34,077	36,170	21,696
Private Project									
Residential building	48,155	50,578	35,311	31,699	26,875	31,742	27,850	24,233	14,511
Non-residential building	19,905	25,984	25,021	17,161	22,486	25,406	22,797	21,063	9,923
Infrastructure	9,740	14,261	17,904	11,366	15,631	16,927	16,781	9,841	3,524
Sub-Total	77,799	90,823	78,236	60,227	64,993	74,076	67,428	55,137	27,958
Total									
Residential building	53,276	58,148	44,657	39,078	31,613	38,705	34,295	29,291	16,187
Non-residential building	25,660	33,571	34,170	25,488	30,235	33,185	31,528	32,112	15,448
Infrastructure	28,383	36,193	41,258	54,149	41,380	38,809	35,683	29,904	18,019
Total	107,318	127,912	120,085	118,714	103,229	110,701	101,506	91,307	49,655

Source: Construction Association of Korea.

## 4.2. Construction Companies

### 4.2.1. The number of Contractors by Type

The number of construction companies had steadily increased since 2006, and dropped back to 54,825 in 2014, where it hardly changed the amount of contractors until August 2013. Although the number of general contractors and specialized and equipment contractors are gradually decreasing year after year, those of equipment contractors is reversely increasing a little.

Most of the contractors are composed with the general and specialized companies, and the shares of them consist of 20.0% and 67.8% respectively in total.

Table 4.2.1. The number of Construction Companies

(Unit: each).

Year Type	2006	2007	2008	2009	2010	2011	2012	2013	2014.6
General Contractors	12,914	12,842	12,590	12,321	11,956	11,545	11,304	10,921	10,962
Specialized contractors	35,040	36,422	37,106	37,914	38,426	38,100	37,605	37,057	37,164
Equipment contractors	5,387	5,478	5,768	5,994	6,151	6,330	6,463	6,599	6,699
Total	53,341	54,742	55,464	56,229	56,533	55,975	55,372	54,577	54,825

Source: Construction Association of Korea.

## 4.3. Construction Employees and Labors

### 4.3.1. The number of construction workers by job type

The number of workers shows an up-and-down pattern in the construction industry. For the year of 2007, more than 1.8 million employees worked in the construction field, 7.9% of total employment. However, the number of workers in 2008 slightly declined with construction business depression. And it sharply fell by 1.7 million workers in 2009, when Korean economy was in the deepest recession affected by global financial crisis. In 2010, the number of employees in construction increased a few owing to the growth in the economically active population. Reflecting this trend, the number of employees in June 2014 is over 1.8 million, 7.1% of total employee, similar with that before financial crisis.

It is hard to analyze the latest trend by job type, because the relevant data was only available until 2010, as showing in the Table 4.3.1b. The number of building construction workers increased amid the buoyant housing and building business from 2006 to early 2007.

Table 4.3.1a. The total number of workers in Construction

(Unit : thousand persons)

Year Number	2006	2007	2008	2009	2010	2011	2012	2013	2014.6
Number of employee in construction	1,833	1,849	1,812	1,720	1,753	1,751	1,773	1,754	1,842

Source: Korea National Statistical Office.



Table 4.3.1b. The number of Construction Workers by Job Type

(Unit: thousand workers)

Type \ Year	2005	2006	2007	2008	2009	2010
General construction	571	579	576	529	491	468
Heavy construction	176	161	162	157	196	166
Building construction	395	417	414	372	294	302
Special trade construction	1,147	1,138	1,151	1,127	1,170	1,157
Engineering and building	475	482	477	469	465	466
Building installation	183	170	165	165	169	177
Electrical & communication works	252	246	265	258	290	280
Building completion	236	239	243	233	246	234
Equipment construction	95	116	121	155	59	128
Total	1,813	1,833	1,849	1,812	1,720	1,753

Source: Construction Association of Korea.

## 4.3.2. The number of foreign construction workers by job type

There are few statistics about the number of foreign workers in Korean construction market, because it is difficult to assemble acute figures for the number of foreign workers. The reason that can't exactly accumulate the number of foreign workers is that there are a lot of illegal foreigner more than 1 million. In 2012, the number of legal foreign construction workers is approximately 85 thousand and soar up continuously.

## 4.4. Productivity

## 4.4.1. The Value added per employee

The index of value added per employee was changed into 100 in 2010, therefore we just suggest the figures since 2008. The table 4.4.1 shows the value added per employee construction dropped from 105.8 in 2009 to 96.1 in 2013. Showing the trends in the past data, the value added per employee in each industry had not been improved since 2010, even though the percentages charged in manufacturing had increased from 2008 to 2012.

Table 4.4.1. The Value Added per Employee

(unit : %)

	2008	2009	2010	2011	2012	2013
Construction	(98.2)	(105.8)	(100)	(94.6)	(91.8)	(96.1)
Manufacturing	(89.9)	(92.4)	(100)	(104.9)	(107)	(108.4)
Service	(96.5)	(96.9)	(100)	(100.7)	(101)	(102)
Primary sector	(94.7)	(99.6)	(100)	(99.9)	(100.1)	(106.5)

Source: Korea National Statistical Office.

#### 4.4.2. Physical measurement of construction productivity

We do not have the adequate data explaining physical measurements of construction productivity, since there is no labor input data classified by construction types.

### 4.5. Construction Cost

#### 4.5.1. Major construction material average price

The official prices of major construction materials are influenced by government guideline but the actual transaction value changes according to the market conditions. The demand and supply of most construction materials can be more or less matched domestically. Shown as table 4.5.1, the price of construction materials has not been much changed since 2005, except Steel bars.

In 2008, the price of Steel bar sharply rose to 888,500 won per ton from the previous year 526,500 won. Because the raw material of Steel bar mainly depended on import, the price was influenced by international market situation such as construction and shipbuilding. The price of steel bar came down to 811,000 won in 2010. But it had been risen up to 995,000 won in 2012 and the price has been stabilized so far.

Table 4.5.1. Average Construction Material Price

	Cement in bulk (won per 40kg)	RMC * kg/cm <sup>3</sup> (won per m <sup>3</sup> )	Steel bars (won per ton)	25mm aggregates (won per m <sup>3</sup> )	Concreting sand (won per m <sup>3</sup> )	Common Bricks (won per thousand pieces)
2006	3,370	49,080	455,667	11,333	13,250	45,000
2007	3,370	49,080	526,500	11,500	13,083	45,000
2008	3,370	51,248	888,500	12,417	12,000	45,000
2009	4,000	51,970	741,000	12,000	13,000	45,000
2010	3,800	54,670	811,000	12,000	13,000	50,000
2011	3,800	51,430	975,000	12,000	13,000	50,000
2012	3,890	56,970	995,000	13,500	13,000	55,000
2013	4,400	57,600	995,000	13,500	13,000	55,000

\* RMC: Ready Mix Concrete.

Source: KPC (Korea Price Information Corp).

#### 4.5.2. Construction industry wages

In construction like other industries, the salaries and wages have mildly increased since 2006. For instance, the wage for special daily workers was 73,572 won and gradually increased by 106,569 won in 2014. In the first half of 2014, the average wages per day were 109,664 won (about 104.9 dollars) for chief workers, 106,569 won (about 102.0 dollars) for special daily wage, and 86,686 won (about 82.9 dollars) for normal daily wage.

Table 4.5.2. Wages in the Construction Industry

(unit : Korean won)

	2006	2007	2008	2009	2010	2011	2012	2013	2014.9
Chief worker	78,124	81,700	87,995	90,889	97,000	101,726	104,876	105,500	109,664
Special daily wage	73,572	79,027	83,141	84,862	91,396	96,325	95,232	101,635	106,569
Normal daily wage	57,321	59,715	65,076	68,437	71,456	74,808	81,088	84,071	86,686

Source: CAK (Construction Association of Korea).

## 4.6. Import and Export of Construction Work

### 4.6.1. Annual exports of construction work

Such a tremendous increase in export of construction work was experienced in 2010, because the United Arab Emirates (UAE) nuclear power plant contract signed at the end of 2009 was brought into 2010 calculation. The 18.6 billion dollar UAE project accounted for most of the increase in the amount. Meanwhile, the exports in 2011 showed a little decreasing by the global depression sparked in Europe. The total value in export in construction was recorded 44,696 million dollars by August 2013, and this was similar pace compared with that the same period the previous year.

Among construction sectors, the export of plant occupied the largest portion recording 36,350 million dollars in 2014, but it already similar to the record in 2013. On the other hand, the export of civil in construction sectors decrease by 3,527 million dollars, which was six times less than the value over the past year in 2013.

Table 4.6.1. Annual Exports of Construction Work

year	Total	Contract Amount by work type(million US\$)					
		Civil	Architecture	Plant	Electric	Telecomm	Engineering
2006	16,468	1,532	3,433	10,920	474	3	106
2007	39,788	5,232	8,177	25,268	690	41	381
2008	47,640	9,364	9,192	26,764	1,336	19	965
2009	49,147	5,746	6,273	35,692	756	20	660
2010	71,578	4,124	7,724	57,285	770	458	1,217
2011	59,144	5,857	7,846	43,269	954	61	1,157
2012	64,880	8,795	14,332	39,549	1,323	73	818
2013	65,211	18,128	5,446	39,650	761	238	988
2014.8	44,696	3,527	2,935	36,350	507	184	1,193

Source: ICAK (the international Construction Association of Korea).

### 4.6.2. Five major foreign markets by value

Middle-east Asian countries are usually included in top five countries for construction export of Korea. Iraq were the highest countries in construction exports, in addition, Venezuela and Algeria recently entered into the five major export countries. The construction service of exported to middle-east Asian countries is mainly plant construction sector and the service to south-east Asian countries is infrastructure or architecture construction sector.

In 2013, Iraq was the most important country in construction exports, where 9,975 million dollars of construction service was exported. It was noteworthy that Uzbekistan in Middle Asia held the third rank in the construction export.

Table 4.6.2. Top Five Countries for Construction Export

(unit : million US\$)

Rank	2010		2011		2012		2013		2014.8	
	Country	Value	Country	Value	Country	Value	Country	Value	Country	Value
1	U.A.E	25,602	Saudi Arabia	16,588	Saudi Arabia	16,167	Saudi Arabia	9,975	Iraq	8,061
2	Saudi Arabia	10,531	Brazil	4,606	Iraq	9,636	Australia	5,855	Kuwait	7,166
3	Kuwait	4,893	Iraq	3,666	Kazakhstan	4,161	Uzbekistan	4,534	Venezuela	4,338
4	Vietnam	3,298	Vietnam	3,459	Vietnam	3,416	Vietnam	4,044	Algeria	4,248
5	Australia	3,246	Singapore	3,289	Singapore	3,345	Singapore	3,516	Saudi Arabia	2,673

Source: ICAK (the international Construction Association of Korea).

## 5. Construction Outlook 2013 / 2014

The Korea's GDP growth had sharply dropped off after the global financial crisis, and the growth rate was only 0.7 percent in 2009. In 2010, however, the growth rate rose to 6.5 percent with economic activity increasingly led by the private sector. The recovery was led by the rebound in fixed investment and the turning of the inventory cycle. Nevertheless, the growth rate in 2011 dropped again into 3.7 percent with the stagnant domestic economy and the financial crisis triggered by Europe. The growth rate in 2012 was 2.0 percent lower than that of last year. The economists in Korea, meanwhile, would forecast that the world economic growth rate will be 3.8% with reflecting the recovery of world economy and on the other hand,

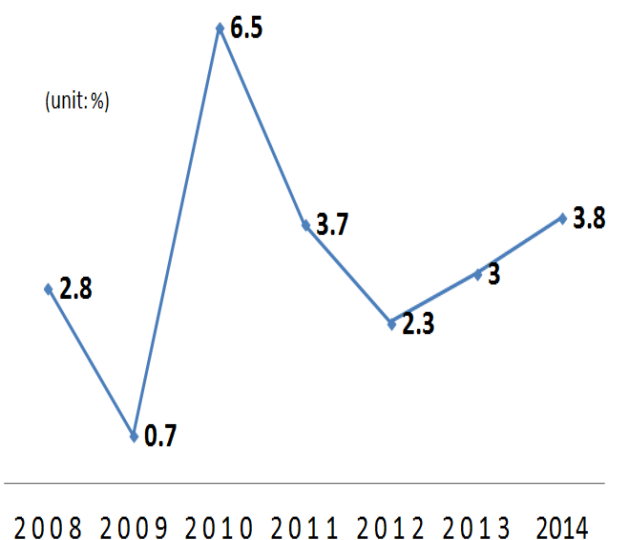


Figure 5.1: Korea's GDP growth

Korea economic growth rate will be 0.5 more than the average growth rate of the world economic. The growth rate in construction investment was converted from negative in 2012 into positive in 2013, which reached 6.7% in 2013. The government announced that the growth rate in the first half of 2014 is 1.9% provisionally, which is lower than expected value. It is expected that the annually rate will be about 1.3%, also lower than original expectation.

Table 5.1. Prospect of Construction Investment in 2014

(Unit: %, compared with the same period)

Segment	2013 annually	1 <sup>st</sup> half of 2014	2 <sup>nd</sup> half of 2014	2014 annually
Construction Investment	6.7	1.9	0.8	1.3

Source: Korea Research Institute for Human Settlements

The prospects for the Korean economy next year is a little hopeful. The government of Korea plans to strengthen its investment for healthcare, welfare and the research of new growth engines, while cutting the budget for social overhead capital including road construction in 2014. There are so many uncertainties ahead in the Korean economy as well as the global economy. Even though the government in the next year plans to cut down construction investment sector, the GDP growth rate in 2015 would be predicted to be about 4.0% due to the recovery of domestic demand and the growth of export.

# **An input-output analysis of the Korean construction industry's supply side**

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Six years after the commencement of the downturn in construction activity, it is not difficult to observe sequelae in the epicenter of the global financial crisis such as US and UK. The labor market and the public construction market are seen as drags on construction growth. The former remains with deep scar from the crisis and the uncertainty of the latter is generated by the concern over the public deficit. However, it is also true that the housing market has been keeping up construction industry and that the non-residential building market has turned the corner. In sum, the construction industry is cautiously optimistic about future prospects.

To respond effectively to a recovery in demand, the construction industry should not suffer from capacity constraint or price inflation. It means that, in order to encourage further investment by the private and public sector, the industry needs to endure an extended period of depressed price level. In this context, it is of crucial importance for the supply chain to play its role in driving value, reducing cost and eliminating waste.

However, in general, the crisis provides opportunity to move the industry away from unsustainable patterns of production and consumption. Indeed, through

cases of developed European countries, we know that the period of recession was a time of transformation for the construction industry. After the World War II, western European countries experienced an economic growth until the beginning of the 1970s. This economic growth was significant and relatively regular. During the growth phase, the construction industry contributed to the economic growth through the massive development of housing projects, non-residential buildings and civil engineering infrastructures. The stock of residential and non-residential building and infrastructures became highly important.

However, these developed countries went into recession caused by the OPEC(Organization of Petroleum Exporting Countries)'s oil embargo in 1973 and the rise of oil price that followed. Through the recession, the refurbishment and maintenance works have been of the same importance as the new construction. Furthermore, the management of building and infrastructure stocks has become of increasing concern. More and more attention has been drawn to the quality and the cost of the service rendered by the residential and non-residential buildings and the civil engineering infrastructures.

While during the growth phase between 1950s and 1970s the construction industry performed the role of developing massively buildings and infrastructures necessary to meet the needs of the country, the emphasis has been placed through the recession, on the management of the services rendered by such buildings and infrastructures all along the life cycle.

As a result of the transformation, the construction industry can be defined as activities related to "producing and managing the services rendered to end users by the living and working environments throughout their physical life-cycle"<sup>1</sup>,

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<sup>1</sup> Jean Carassus(2004), 'From the construction industry to the construction sector system' p.10, in "The construction sector system approach: an international framework" published by International Council for Research and Innovation in Building and Construction

which comprise production, use, improvement, through to demolition.

The construction industry performs the following three functions: ① continuous management of the existing stock of structures; ② design and complex production assembly on itinerant sites; ③ production and distribution of materials, components, equipment and plant implemented, assembled, installed by construction firms on worksites<sup>2</sup>.

This paper presents a supply-side analysis of the Korean construction industry, by using the input-output tables. They are used in order to find how the global financial crisis has impacted the input structure of the construction industry. This question can be justified by the above described cases of the European countries.

This work deals with the question whether the Korean construction industry is experiencing such a transformation especially as it suffers from the difficulties caused by the global financial crisis in 2008.

To answer the question, we will analyze the construction column in the input-output tables. The construction column indicates intermediate inputs from the other industries besides gross value added, which consists of compensation of employees, consumption of fixed capital and net operating surplus. It may be said to exhibit the supply side of the industry.

Through the analysis, we expect to discover some indices showing signs of the transformation in the Korean construction industry's supply side.

### **Current Difficulties from which the Korean Construction Industry Suffers**

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<sup>2</sup> Ibid. p.12



The current difficulties following the subprime mortgage crisis in 2008 began with the housing market slump that has continued for eight years since 2007. The number of unsold apartments reached a record high of 160,000.

Financial institutions showed the tendency to perform more conservative risk management, especially in relation to the construction industry. The lending rates increased.

The sustained real-estate market downturn subsequently contributed to the rise of non-performing loans in the construction industry. Related to real-estate project finance, non-performing loans have been concentrated among a few large firms. Consequently, as many as 35 construction contractors out of top 100 were brought to the brink of bankruptcy.

In contrast with banks, savings banks did not tide successfully over a crisis caused by the increase of non-performing loans in the construction industry along with those in shipping and shipbuilding industries. Between 2011 and September 2012, 20 of the country's 105 savings banks, comprising 38% of the sector's assets, were closed.

Furthermore, there is the household debt problem. It has in general been evaluated as one of potential risk factors which are supposed to threaten the stability of the macroeconomic stability. In 2012, the size of the household debt was 1.6 times that of the national disposal income, compared with an average 1.3 for the OECD<sup>3</sup>. The household debt is rising much faster than both GDP and the average household income. The problem can be more serious as it is consistently linked to the economic slowdown and ongoing real-estate slump.

Figure 1 shows the trend of the construction industry's outputs and the rates of

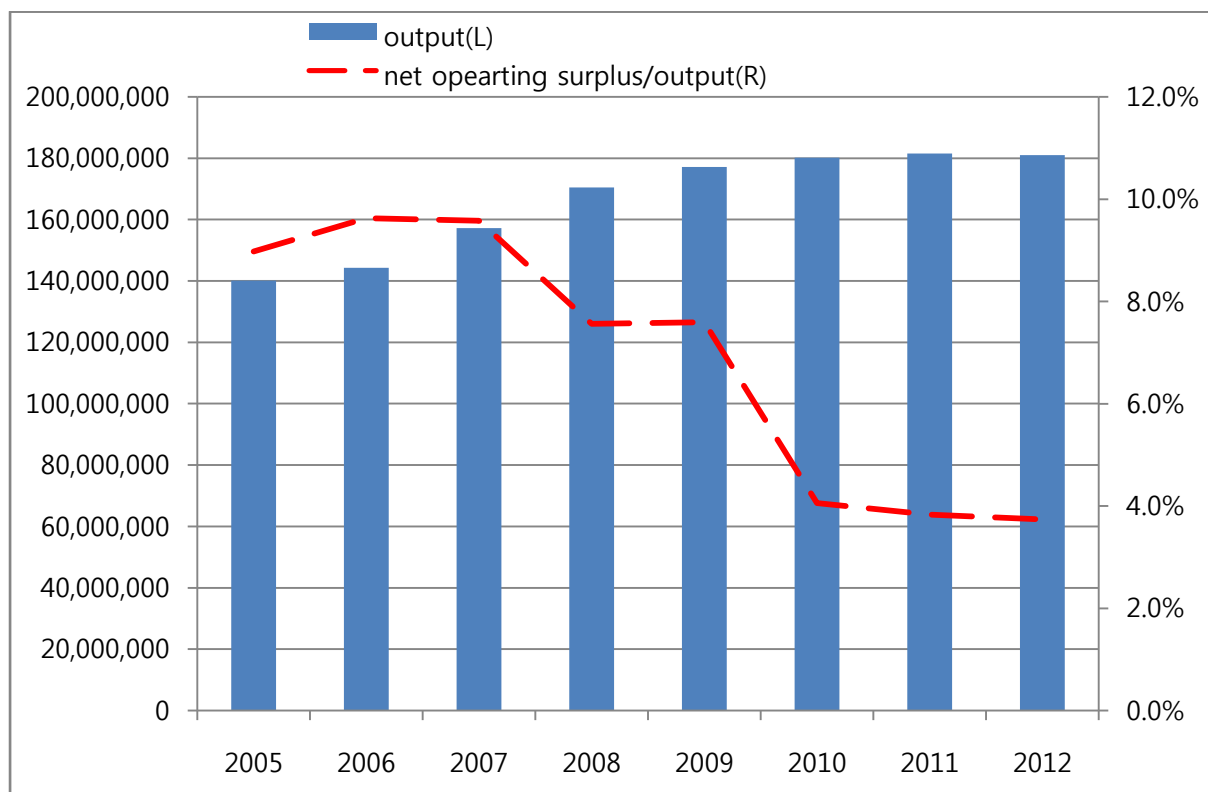
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<sup>3</sup> The Economist (2014), 'South Korea's Household debt, Hole in Won', May 31<sup>st</sup> 2014.

net operating surplus to output from 2005 to 2012.

The difficulties are not expressed in terms of the output which has continuously increased. The average annual growth rate of the output over the period from 2005 to 2012 is 3.8%. In contrast, the difficulties are explicit in terms of the profitability of construction firms. In fact, the profitability was sharply worsened after the subprime mortgage crisis. The rate of net operating surplus to output fell from 9.6% in 2007 to 3.7% in 2012. We can conclude that the Korean construction industry has managed to survive the difficulties by maintaining or even increasing the production in spite of the deterioration in the profitability.

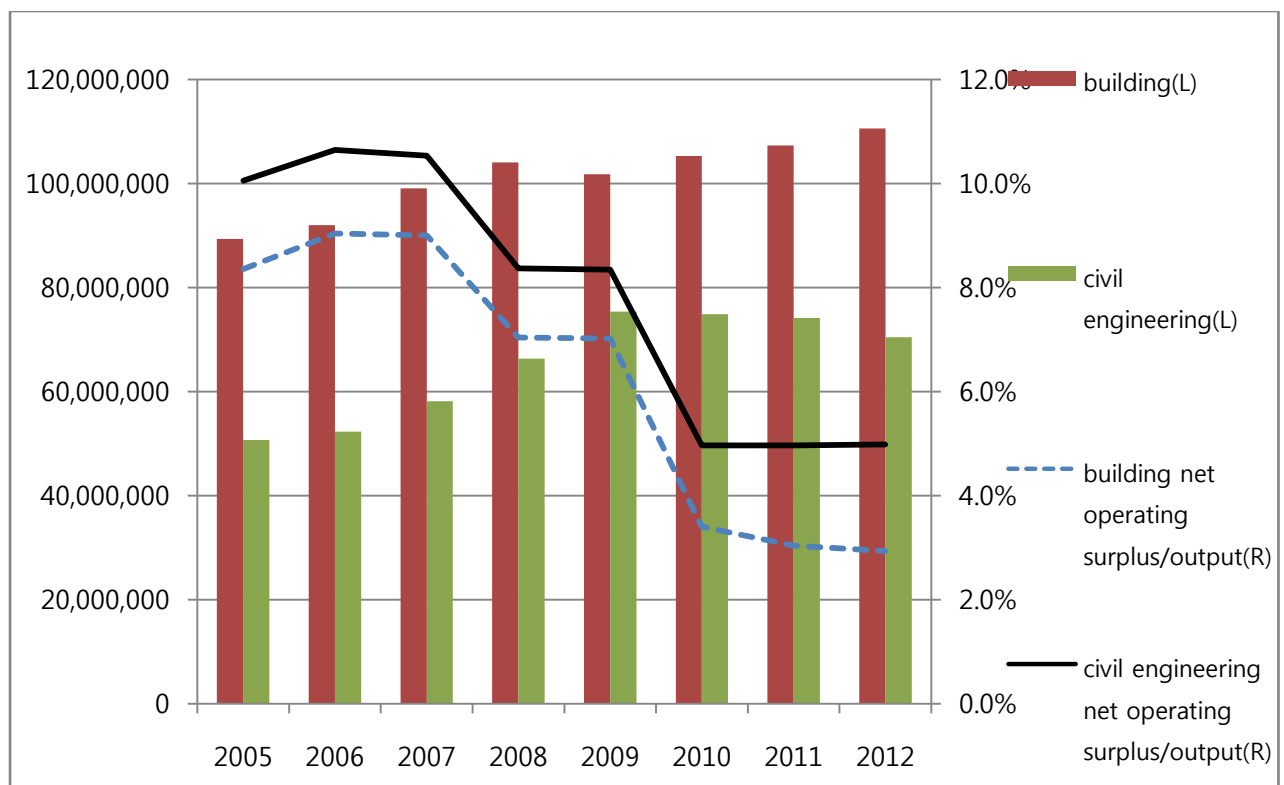
**Figure 1. Evolutions of the construction industry's output<sup>4</sup> and rate of net operating surplus to output**



<sup>4</sup> The unit of the output is million Korean won through the paper.

To deepen the understanding the performance of the construction industry during the period, we divide it into two categories: building construction and civil engineering as shown in Figure 2. According the figure, the output of the building construction decreased 2.2% in 2009 from the previous year. However, the output regained the growing trend in 2010 and went beyond the level of 2008. On the contrary, the rate of net operating surplus to output suffered the reduction from 9.0% in 2007 to 2.9% in 2012.

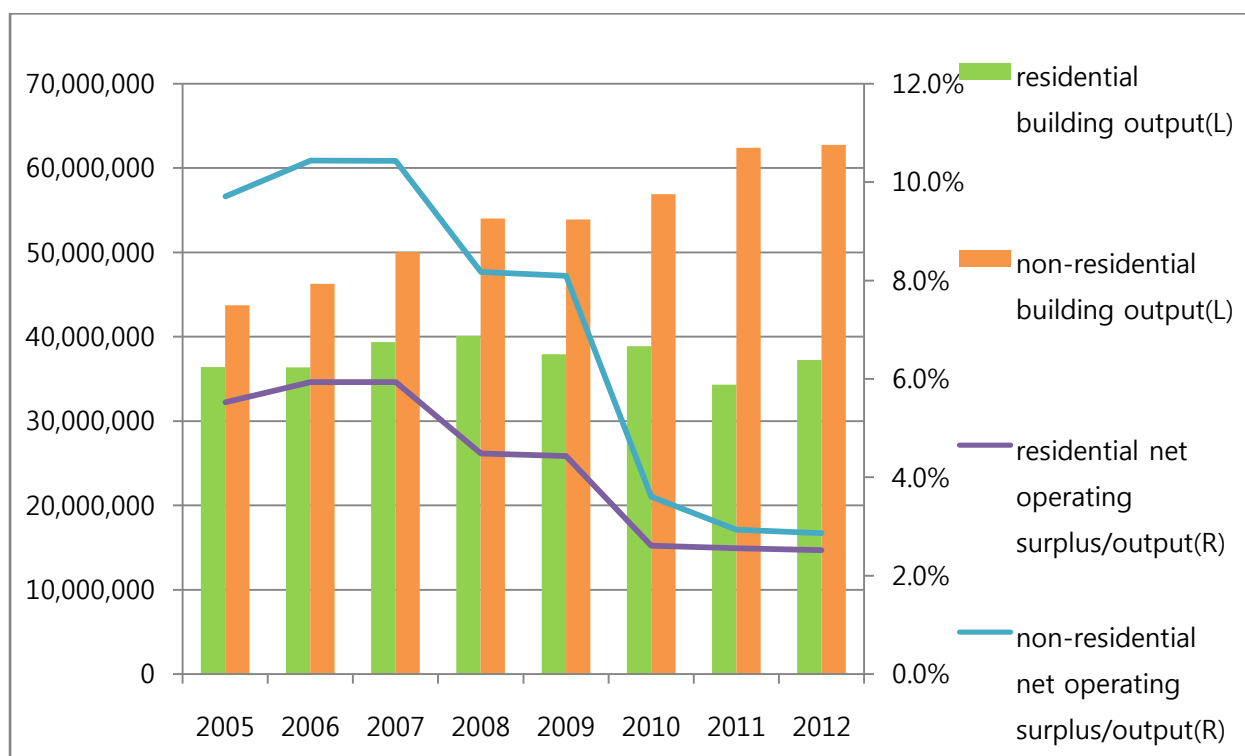
**Figure 2. Evolutions of building construction's and civil engineering's output and rate of net operating surplus to output**



In regard to civil engineering, the output reached the highest level in 2009 owing

to the economic stimulus package enacted in 2008. But the level has decreased since then. However, the output in 2012 is more than that in 2007 before the recession. The rate of net operating surplus to output suffered a decrease from 10.6% in 2006 to 5.0% in 2010. This decrease is less severe than that in building construction.

**Figure 3. Evolutions of residential and non-residential building construction's output and the rate of net operating surplus to output**



We further the analysis in order to regard the evolution of the two subsections of the building construction: residential and non-residential building construction as depicted in Figure 3.

The output of the residential building construction fluctuated continuously during the period from 2005 ~ 2012. In 2009 it decreased 5.4% from the previous year,

but it increased 2.5% in 2010. And, it fell 11.7% in 2011 and rose 8.4% in 2012. On the other hand, the rate of net operating surplus to output suffered a decrease from 5.9% in 2007 to 2.5% in 2012.

The output of the non-residential building construction showed an increasing trend with an exception of a fall of 0.2% in 2009. In contrast, the rate of net operating surplus to output suffered a spectacular fall from 10.4% in 2007 to 2.9% in 2012.

### **Input Structure**

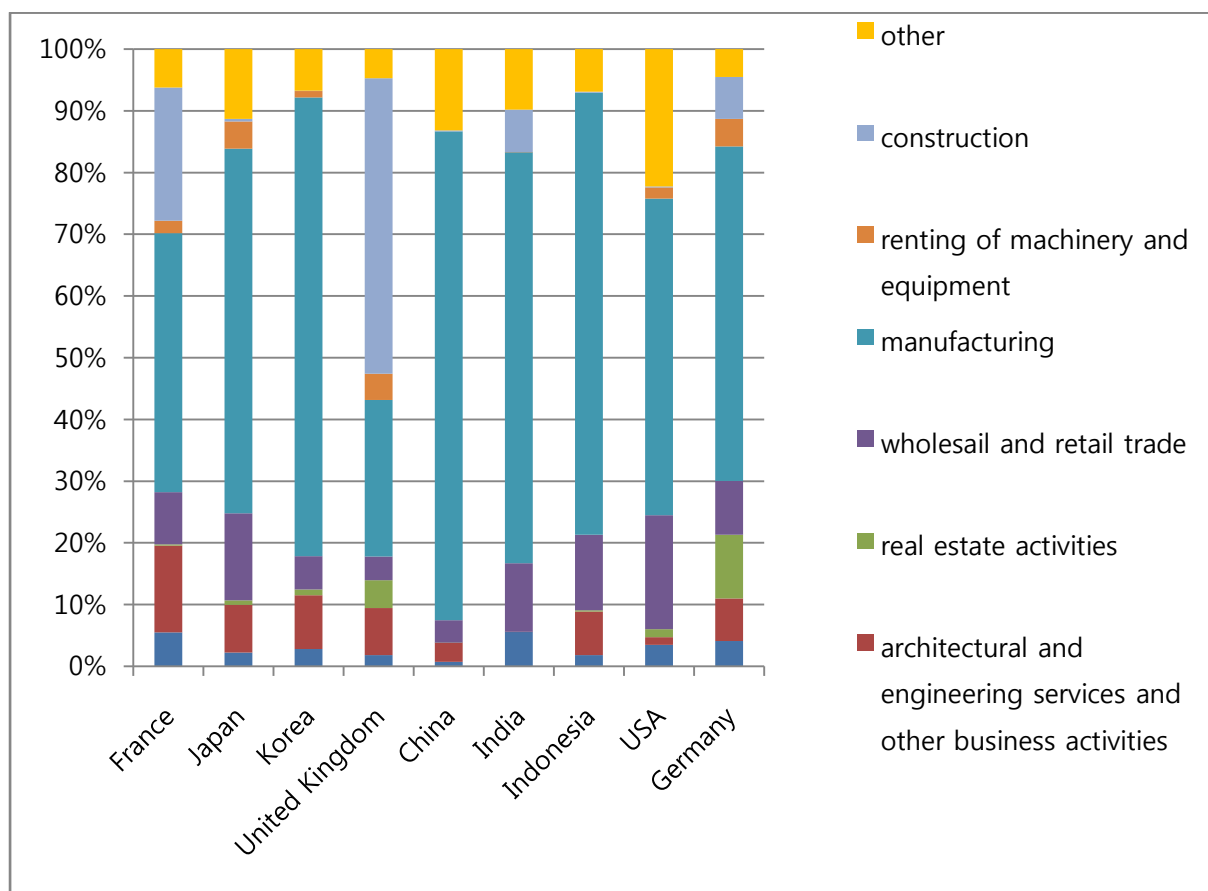
As mentioned above, most of European advanced countries experienced the transformation of their construction industry through the recession from 1970s to 1990s. The industry has laid as much emphasis on continuous management of the existing stock of housings, buildings and infrastructures as on new construction. With the transformation, the professionalization of in-house facilities management or the outsourcing of this management has been advanced. This implies that the shares of services and construction industry in the construction input structure has sensibly risen as much as the share of the inputs from manufacturing has shrunk.

As showed in Figure 4, advanced economies have a relatively significant share of the inputs from services. The shares are 36.2% for France, 40.1% for Japan, 26.6% for the United Kingdoms, 47.9% for the United States and 38.7% for Germany while those are 25.5% for Korea, 20.2% for China, 25.9% for India, and 28.2% for Indonesia.

Especially, the share of the inputs from the construction industry itself is relatively

higher in United Kingdom(47.5%), France(21.4%) and Germany(6.7%) among developed countries. It means that the construction industry of these countries uses considerable amount of intermediate inputs from the construction itself. These intermediate inputs have in turn been produced and enter as a fixed asset in the production process. For Korea, the share is almost equal to zero.

**Figure 4. International comparison<sup>5</sup> of construction industry's input structure**



On the other side of the coin, they have a relatively reduced share of the inputs from manufacturing in which the products of primary industries are included. The

<sup>5</sup> It is based upon data from OECD. The input-output tables are used of 2005.

shares are 41.7% for France, 58.6% for Japan, 25.2% for the United Kingdom, 51.0% for the United States and 53.8% for Germany while those are 74.0% for Korea, 77.6% for China, 65.1% for India, and 71.6% for Indonesia.

The higher share of the inputs from manufacturing means that the majority of materials and components are manufactured off-site and that the inputs from services are used in a limited extent. It implies that the construction industry is concentrated on the production rather than on the management of services derived from built environments.

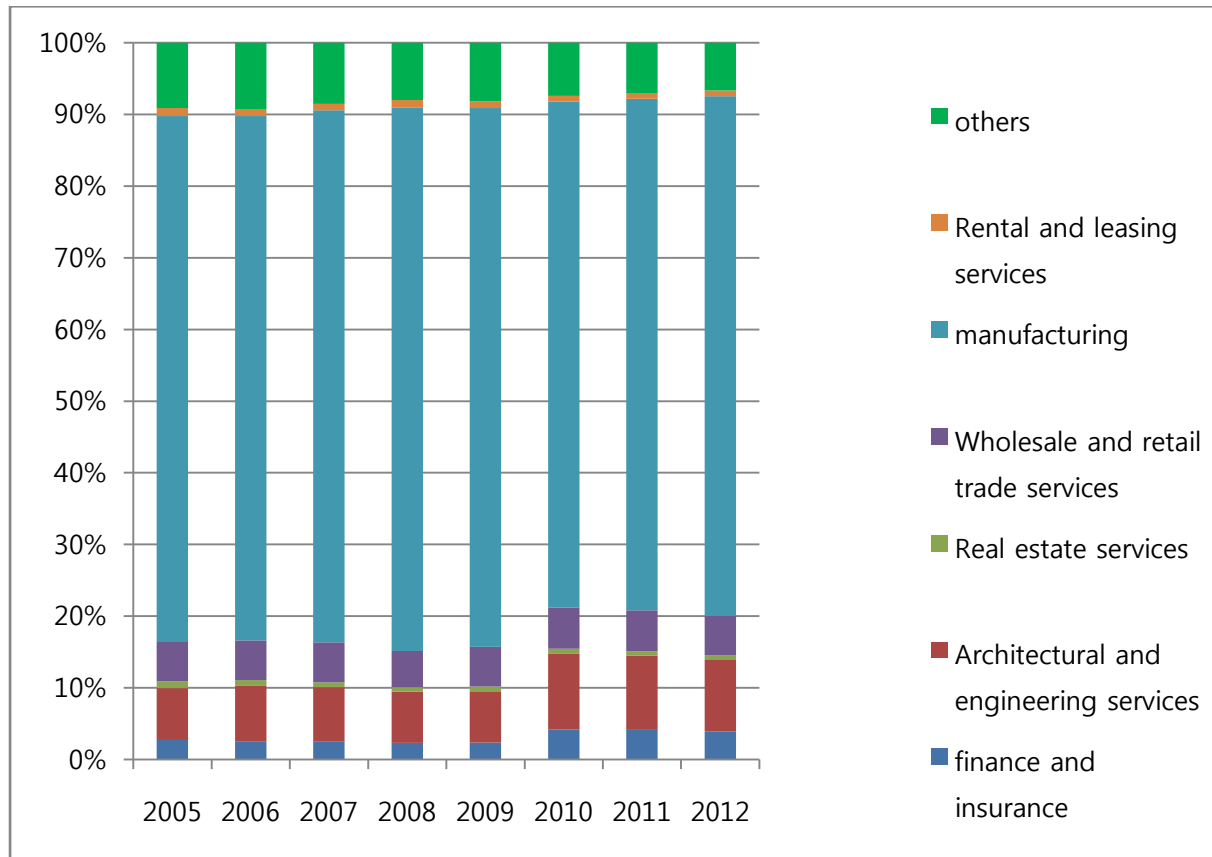
Now let us look at how the input structure of the Korean construction industry has evolved through the period around the global financial crisis. The share of inputs from manufacturing fell sensibly from 75.1% in 2009 to 70.6% in 2010. However, the share returned to 72.6% in 2012.

The share of the inputs from services reached the lowest level of 23.5% in 2008, but it turned back to 26.7% in 2010 and was placed at 25.1% in 2012, which is similar to the level before the recession.

However, two components of the construction industry's input structure are worthy of notice: 'finance and insurance' and 'architectural and engineering services'. The input from finance and insurance increased its share from 2.3% in 2008 to 4.3% in 2011. The share was placed at 3.9% in 2012. The inputs from architectural and engineering services also raised its share from 7.2% in 2009 to 10.6% in 2010. Their share was situated at 10.1% in 2012.

Another characteristic of the Korean construction industry's input structure is that the share of the inputs from construction industry itself has been close to zero.

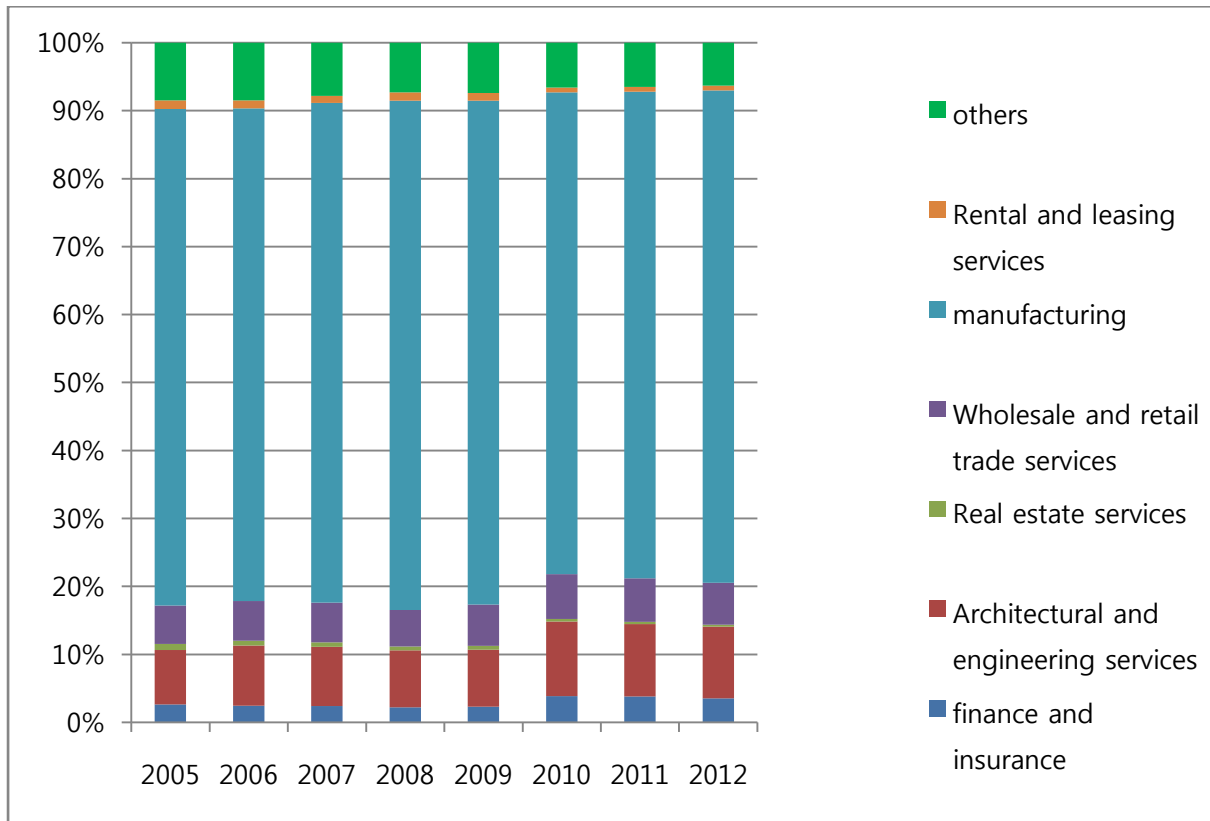
**Figure 5. Input structure of the Korean construction industry**



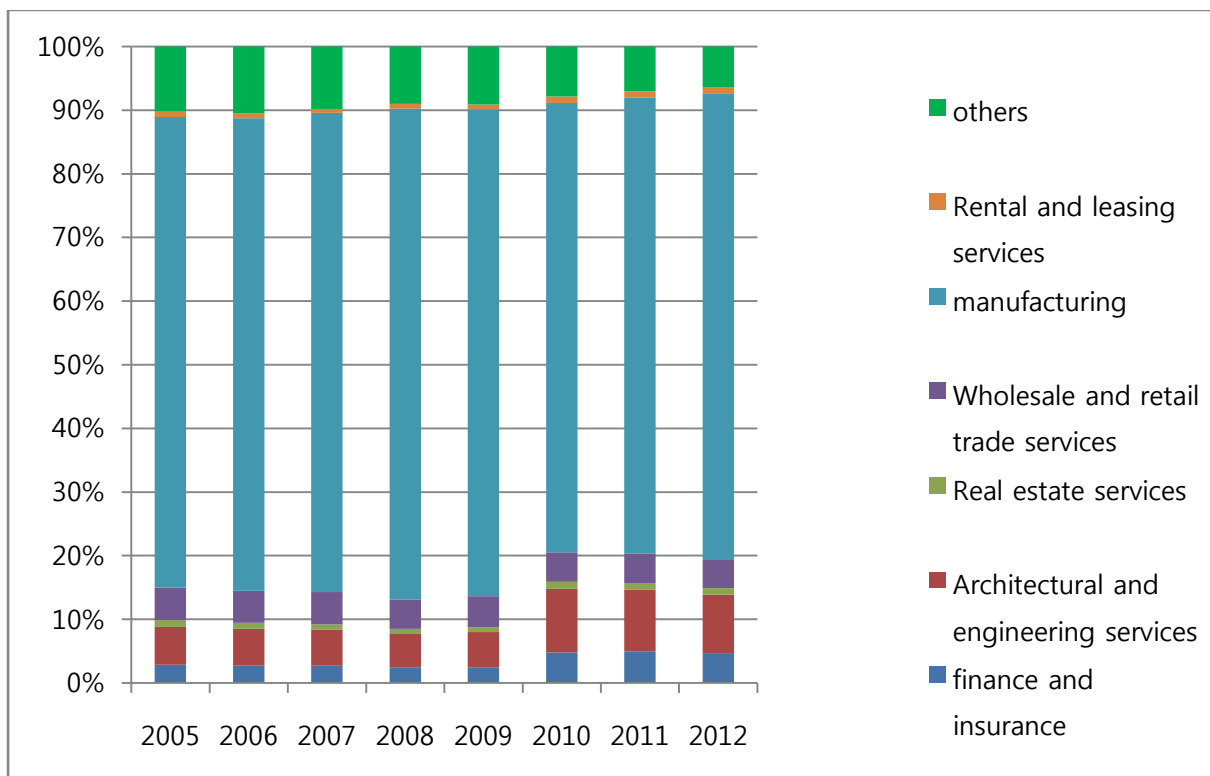
The similar input structure is found both in the sections of building construction and civil engineering and the subsections of residential and non-residential building construction as shown in Figures 6 to 9.



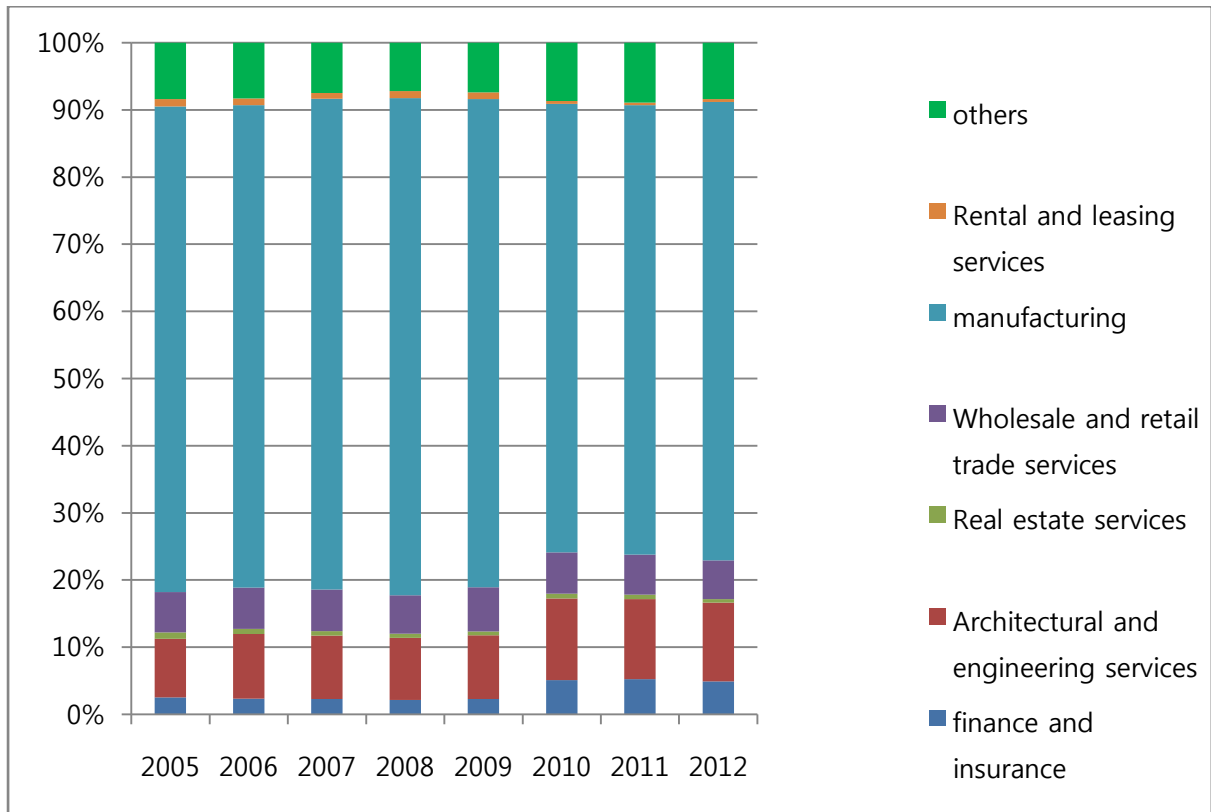
**Figure 6. Input structure of the Korean building construction**



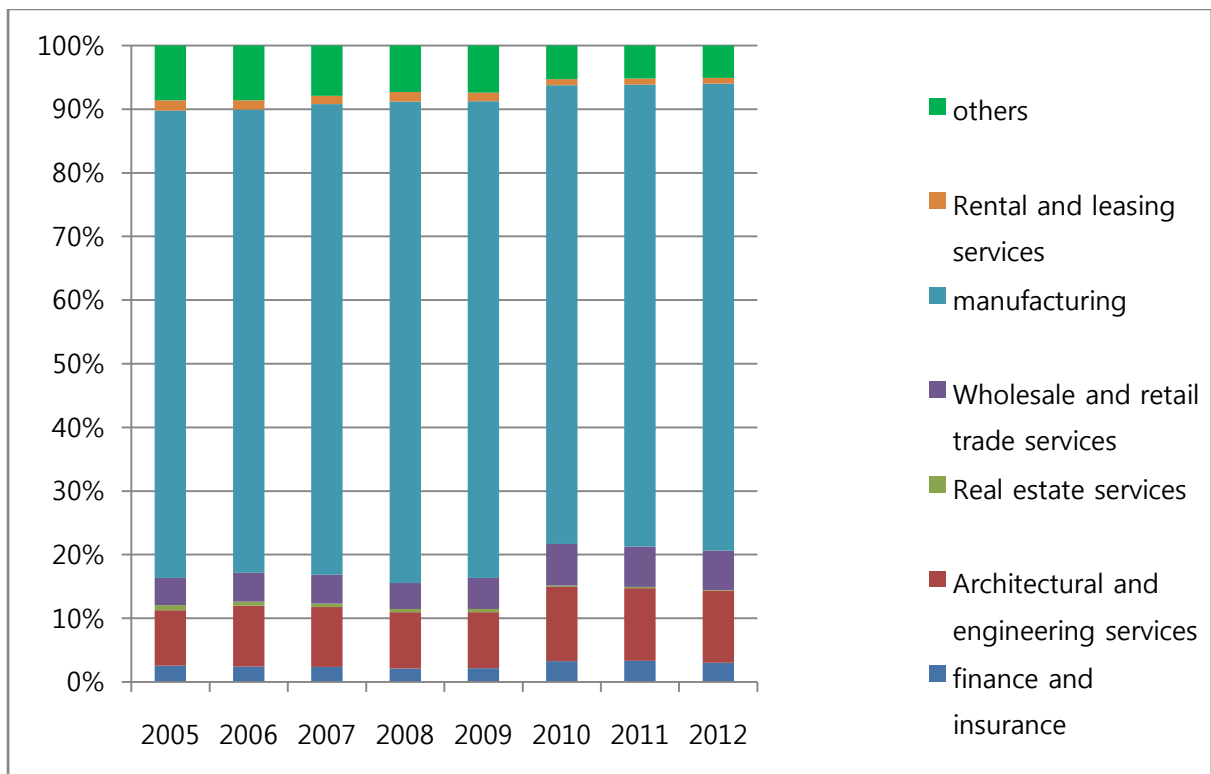
**Figure 7. Input structure of the Korean civil engineering**



**Figure 8. Input structure of the Korean residential building construction**



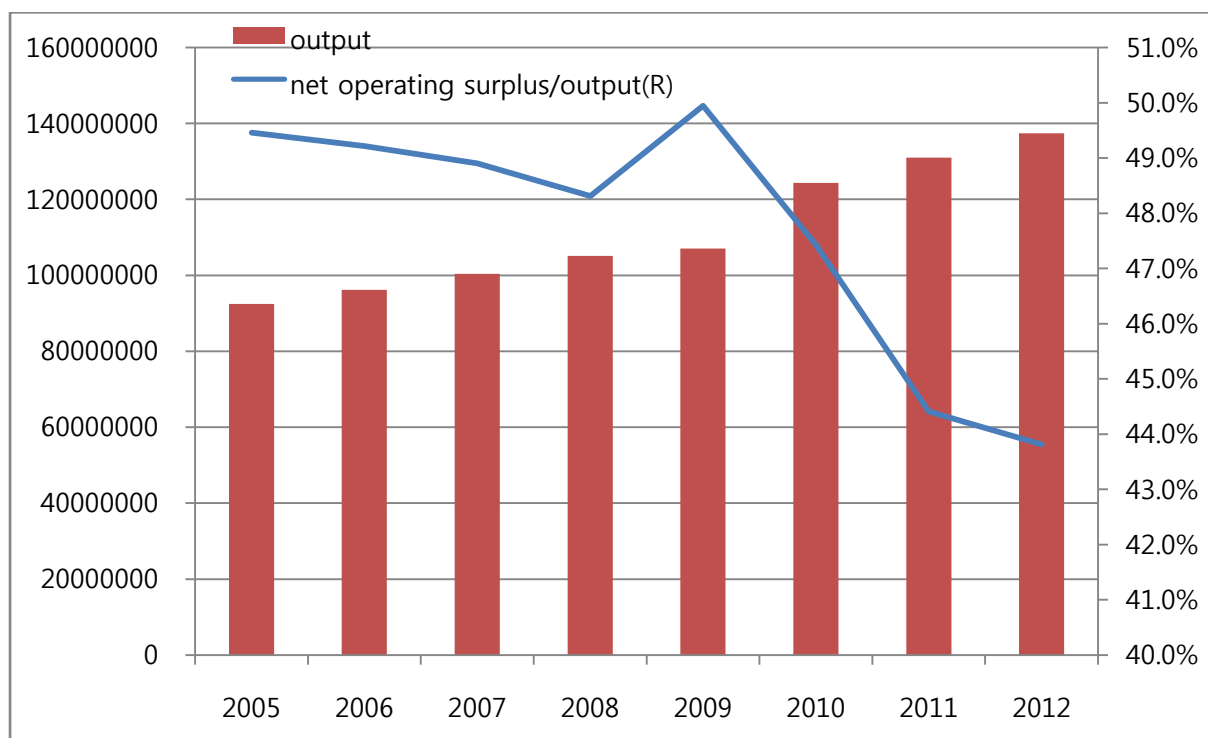
**Figure 9. Input structure of the Korean non-residential building construction**



So far, we analyzed the Korean construction industry's input structure. However, we did not find any indices suggesting that the Korean construction industry experiences the transformation.

Now, to evaluate the importance of the management of the existing stock of structures, we are going to show the evolutions of the output and the rate of net surplus to output of the real estate services and those of one subsection of the construction industry which is building maintenance & repair.

**Figure 10. Evolutions of the real estate services' output and ratio of net operation surplus to output**

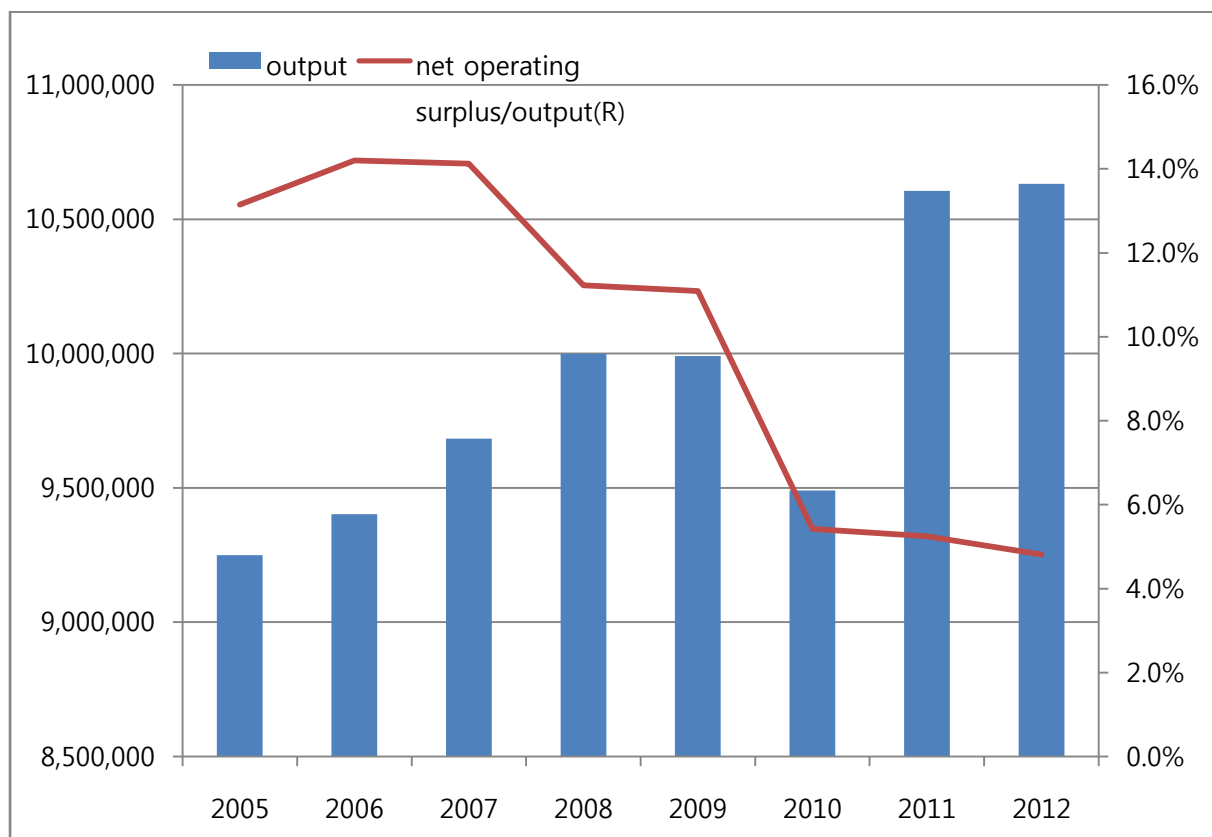


To begin with, real estate services' output kept on increasing and rose 48.6% au total during the period. Especially, in 2010, it increased sensibly 16% from the previous year.

The growing importance of the sector can be described as follows. The size of the out of real estate services was 1.24 times that of building construction in 2012, compared with 1.03 in 2005.

The ratio of net operating surplus to output has maintained a substantially high level, compared with the other subsections of the construction industry, even though it shows a decreasing tendency.

**Figure 11. Evolutions of the building maintenance & repair' output and ratio of net operation surplus to output**



The output of building maintenance & repair rose insistently except 2009 and 2010. It increased 14.9% during the period. It rose by 11.8% in 2011.

However, the portion of building maintenance & repair's output in building construction's output showed fluctuation during the period. It fell from 10.3% in 2005 to 9.0% in 2010 and rose to 9.9% in 2011 and fell again to 9.6% in 2012.

On the other hand, the rate of net operating surplus to output suffered a decrease from 14.2% in 2006 to 4.8% in 2012.

## **Conclusion**

The cases of developed European countries such as France, the United Kingdom and Germany show that, as an economy develops, the construction industry changes its role. From producing massively buildings and infrastructures, the industry puts more emphasis to managing the services rendered to end-users by the existing stock of buildings and infrastructures.

This change implies that of the industry's input structure. As the management of the stock of structures is enhancing its importance in construction industry, the share of the manufacturing sector in the construction industry's input structure decreases whereas the share of the services sector increases.

Around the global financial crisis, the outputs of real estate services and building maintenance & repair grew consistently in Korea.

The share of the inputs from manufacturing lessened somewhat. The most significant reduction occurred in the residential building construction. The least reduction did in the non-residential building.

The share of the inputs from services fluctuated. The shares of both "finance and insurance" and "architectural and engineering services" increased markedly. In particular, the increase was substantial in residential building construction and

civil engineering.

However, although the inputs from services have increased, it is not possible to conclude that services sector substituted for the manufacturing as main suppliers of the construction industry.

In this respect, we think that the unshrinking output of the construction industry has been a barrier to the transformation. However, the current difficulties from which the Korean construction industry is suffering may in the end come to accelerate the transformation of the Korean construction industry. For the fall of the ratio of operating surplus to output may imply that the industry would not do business any longer in the way it used to.

# An input-output analysis of the Korean Construction sector

# Backdrop 1

- In spite of the persistence of sequelae especially in the labor market and the public construction market, the construction market has turned the corner, in the epicenter of the global financial crisis.
- Supply chain analyses have been undertaken in order to enhance the efficiency and the competitiveness, in order for the industry to respond to a lukewarm recovery in demand.
- The crisis provides opportunity to move the industry away from unsustainable patterns of production and consumption as some European countries' cases demonstrate.



# Backdrop 2

- While during the growth phase the construction industry performed the role of developing massively buildings and infrastructures, the emphasis has been placed through the recession, on the management of the services rendered by such buildings and infrastructures along the life cycle.
- It has been defined as activities related to producing and managing the services by the living and working environments throughout their life-cycle.
- It performs: ① continuous management of the existing stock of structures; ② design and complex production assembly on itinerant sites; ③ production and distribution of materials, components, equipment and plant implemented, assembled, installed by construction firms on worksites.

# This paper presents

- On the basis of the above European cases, a supply-side analysis of the Korean construction industry, by using the input-output tables in order to find how the global financial crisis and the difficulties that followed have impacted the input structure of the construction industry.
- It will analyze the construction column in the input-output tables.

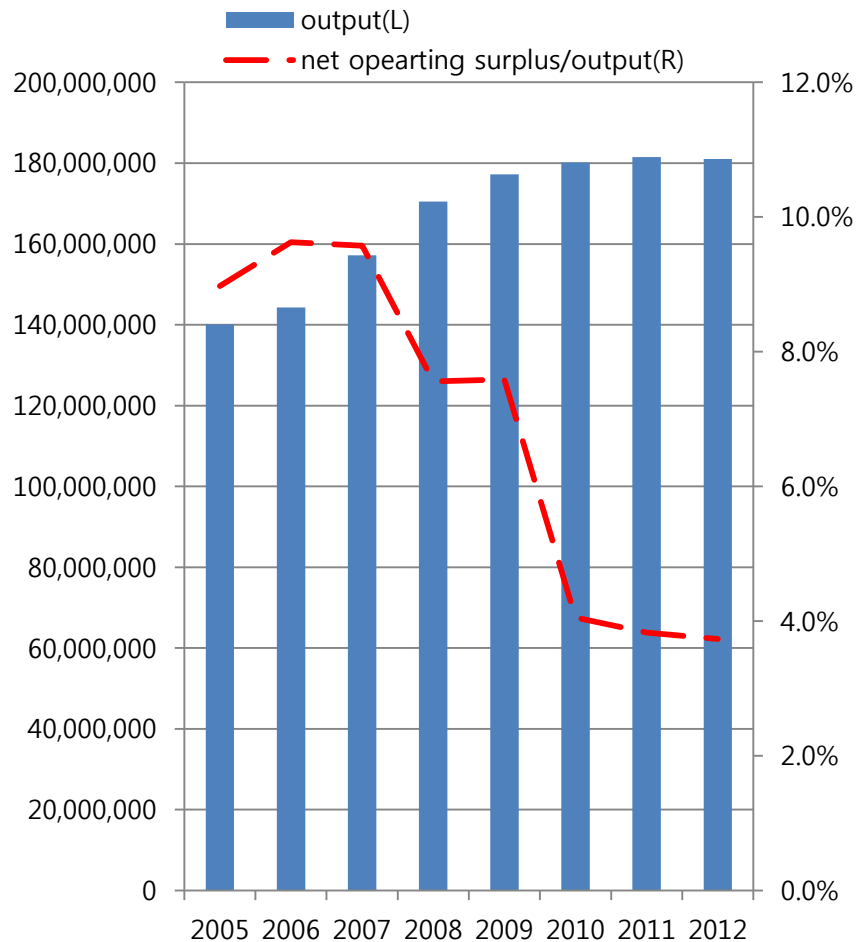
# Input-Output Table

- It describes the interconnectedness of the industries, households, and government entities in an area.
- The construction column shows the supply side of the industry.
- It comprises intermediate inputs from the other industries, besides gross value added (compensation of employees, consumption of fixed capital and net operating surplus).

# The Korean Construction Industry's Current Difficulties

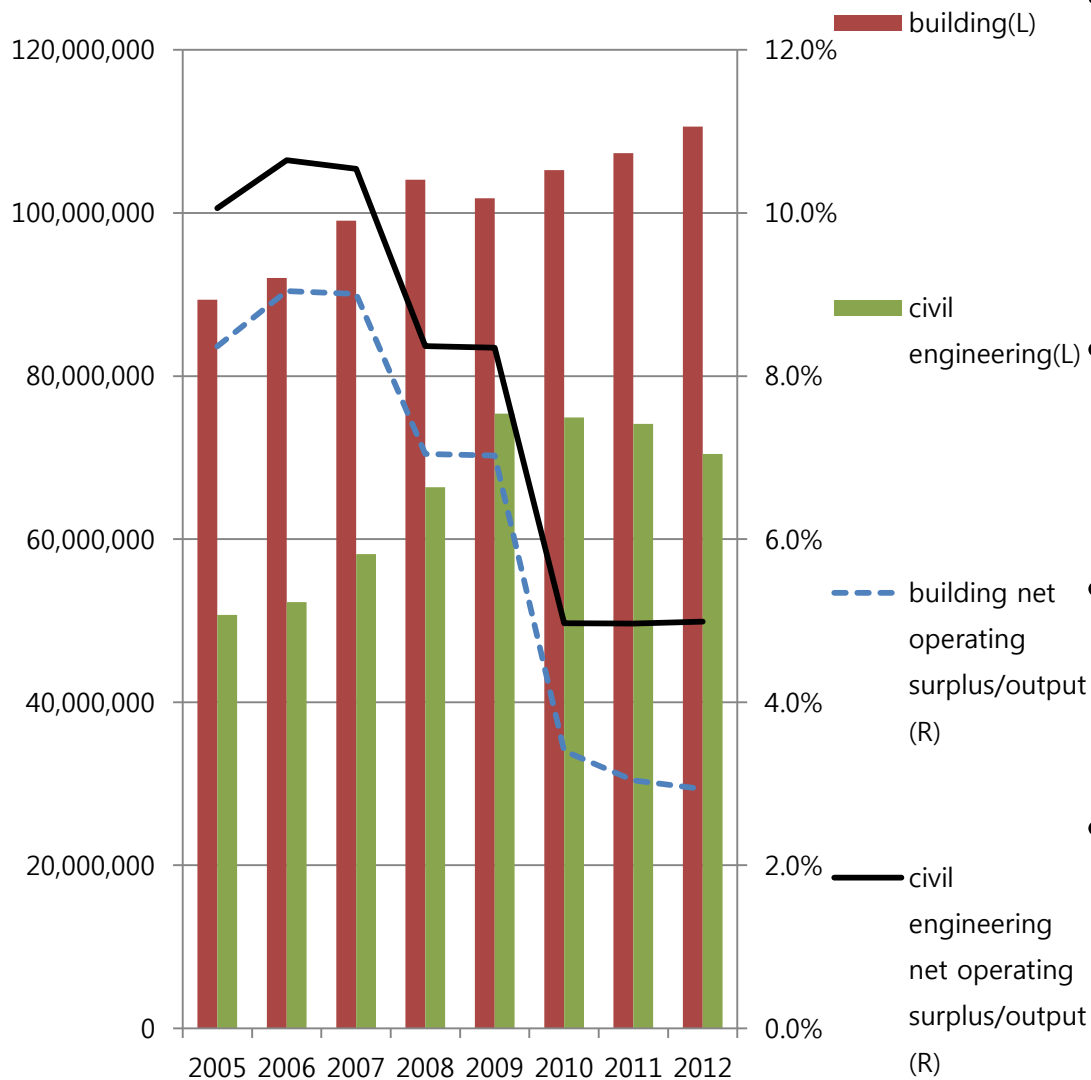
- The housing market slump has continued for 6 years after the global financial crisis.
- Credit crunch → the rise of non-performing loans → 20 of the country's 105 savings banks went into bankruptcy.
- The household debt problem as one of potential risk factors which are supposed to threaten the stability of the macroeconomic stability.
- In 2012, the size of the household debt was 1.6 times that of the national disposal income, compared with an average 1.3 for the OECD.
- Consequently, 35 construction contractors out of top 100 went to the brink of bankruptcy

# The Construction industry's output



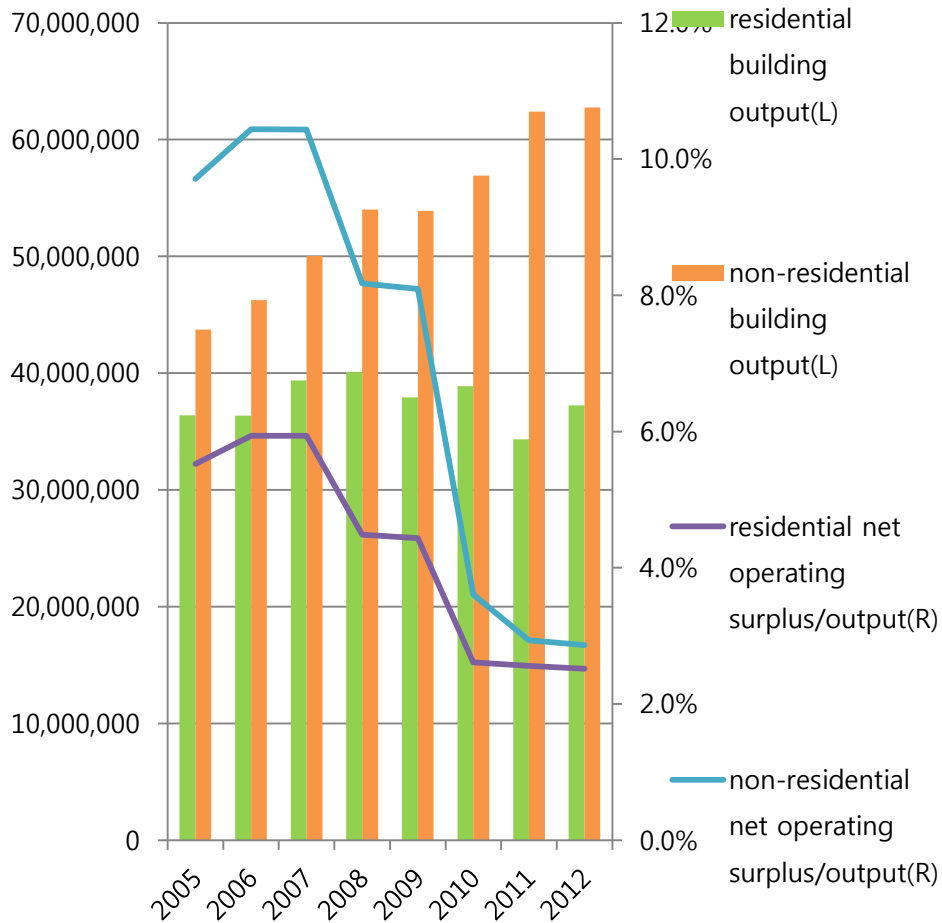
- The recession is not expressed in terms of the output but in terms of the profitability.
- The average annual growth rate of the output over the period is 3.8%.
- The rate of net operating surplus to output fell from 9.6% in 2007 to 3.7% in 2012.

# Building Construction & Civil Engineering



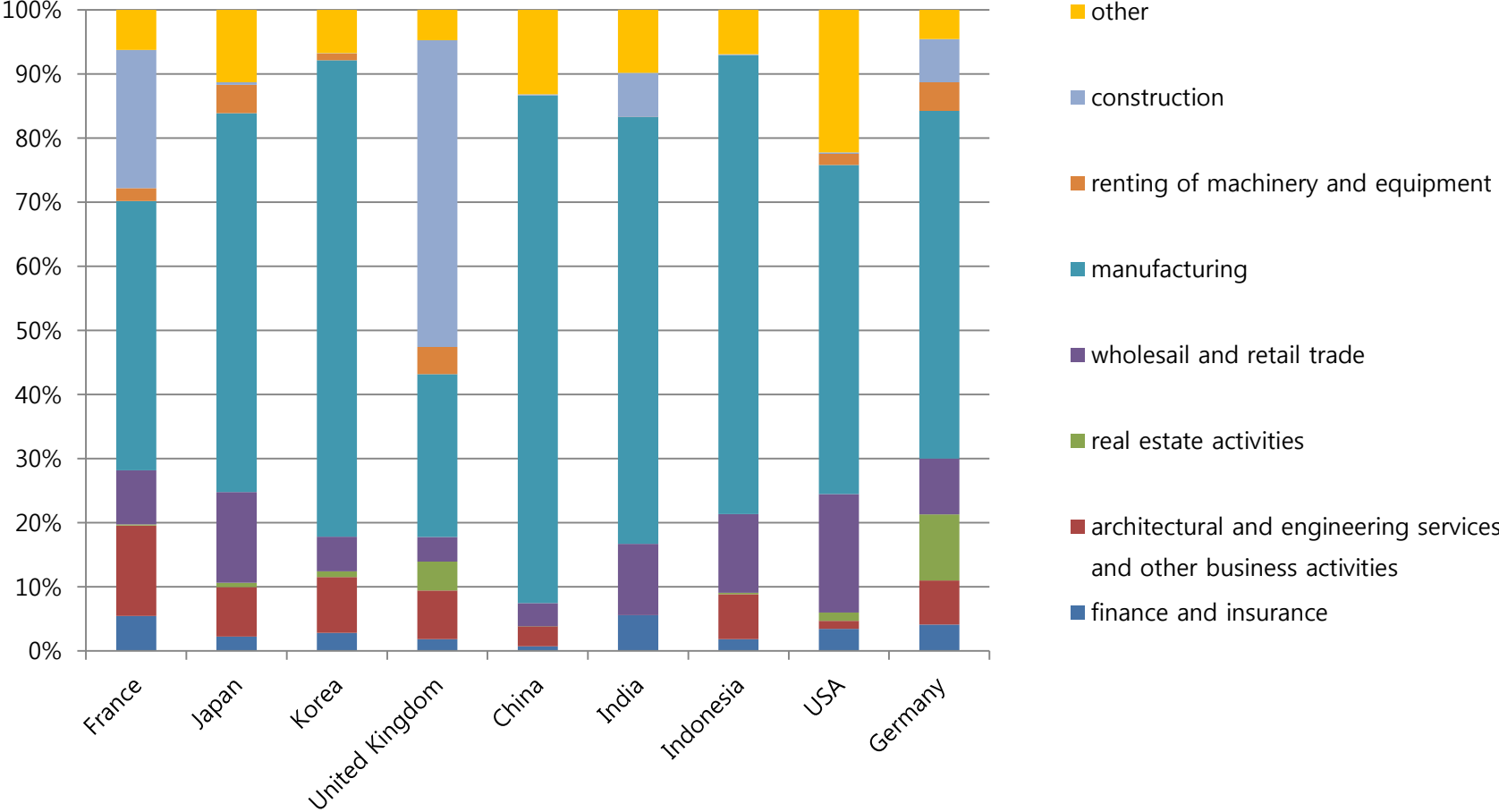
- Having decreased in 2009, the output of the building construction regained the growing trend and went beyond the level of 2008 in 2010.
- The rate of net operating surplus to output fell from 9.0% in 2007 to 2.9% in 2012.
- Having reached the highest level in 2009, the civil engineering's output has decreased since then.
- The rate of net operating surplus to output suffered a decrease from 10.6% in 2006 to 5.0% in 2010.

# Residential & Non-Residential Building



- The output of the residential building construction fluctuated continuously during the period.
- The rate of net operating surplus to output suffered a decrease from 5.9% in 2007 to 2.5% in 2012.
- The output of the non-residential building construction showed an increasing trend.
- The rate of net operating surplus to output suffered a fall from 10.4% in 2007 to 2.9% in 2012.

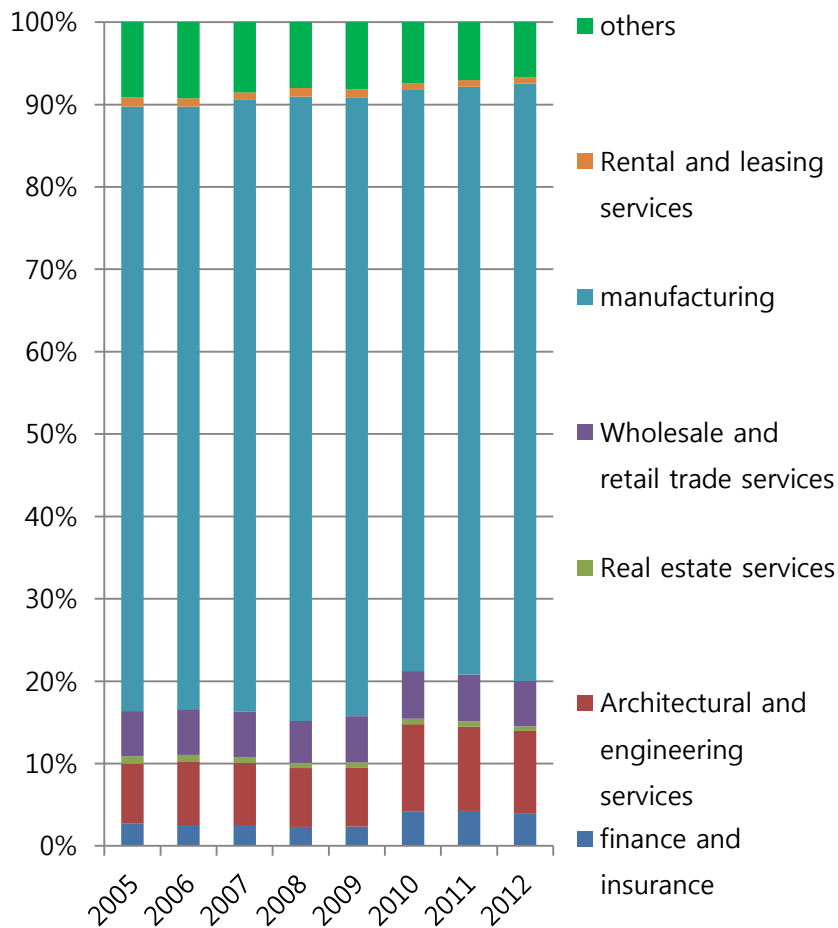
# Construction Industry's Input Structure Comparison





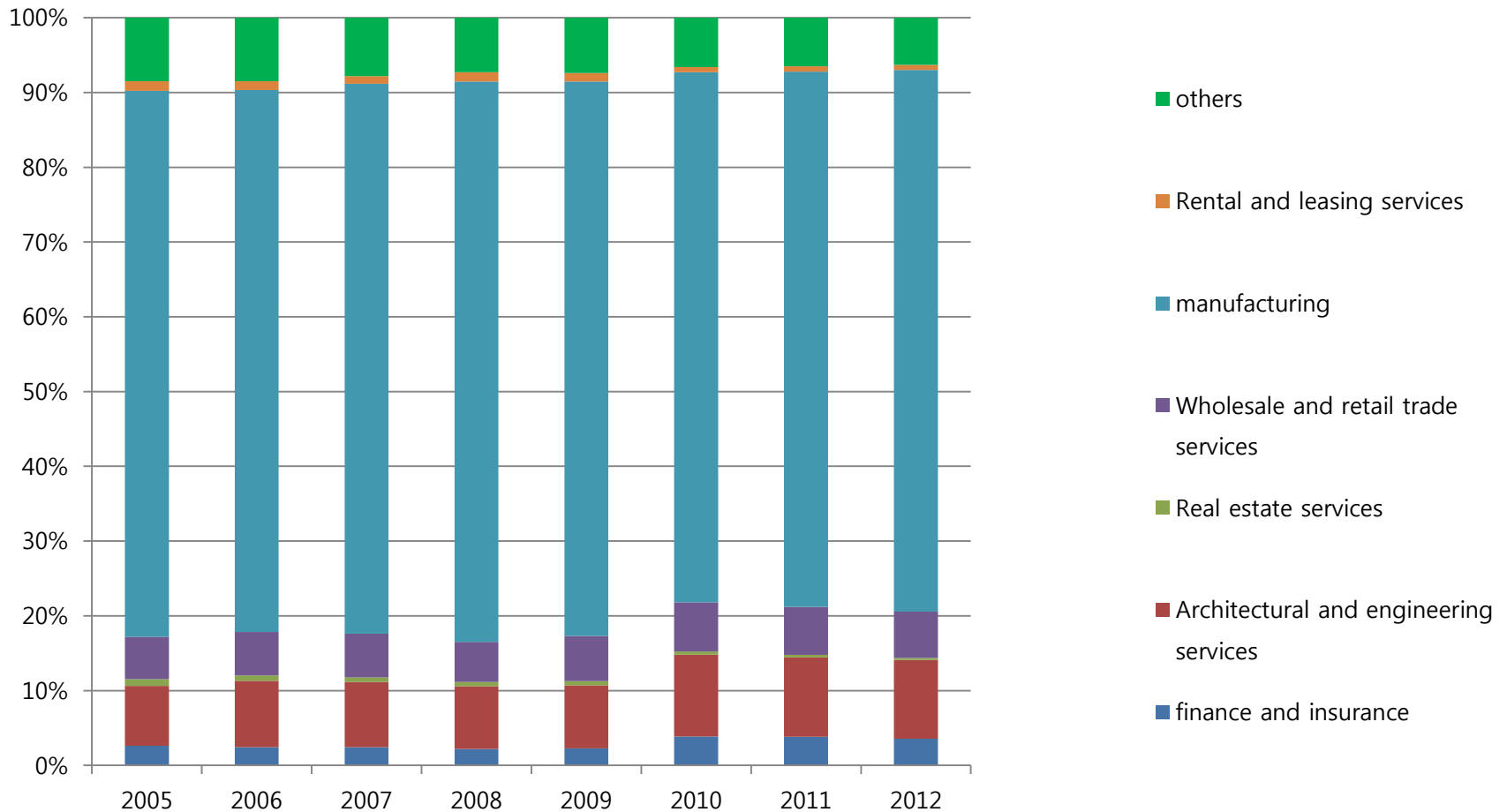
- With the transformation, the shares of services and construction industry in the construction input structure has sensibly risen as much as the share of the inputs from manufacturing has shrunk.
- The shares are 36.2% for France, 26.6% for the UK and 38.7% for Germany while those are 25.5% for Korea.
- The share of the inputs from the construction industry itself is relatively higher in United Kingdom(47.5%), France(21.4%) and Germany(6.7%) among developed countries.
- The construction industry of these countries uses considerable amount of intermediate inputs produced in the construction itself.

# Korean Construction Industry's Input Structure

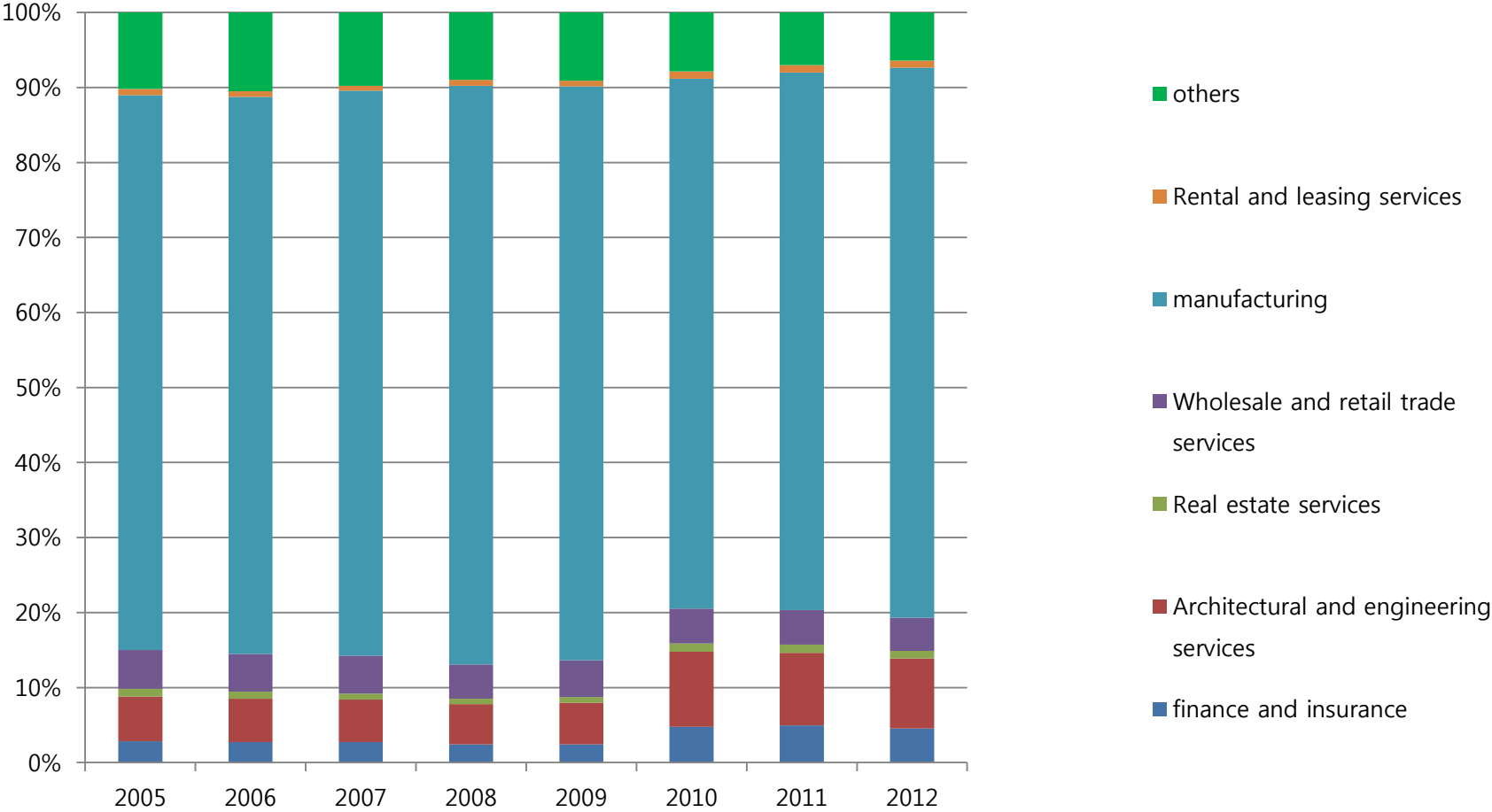


- The share of the inputs from services reached the lowest level of 23.5% in 2008, but turned back to 26.7% in 2010 and was placed at 25.1% in 2012.
- Two components of the construction industry's input structure are worthy of notice: 'finance and insurance' and 'architectural and engineering services'.

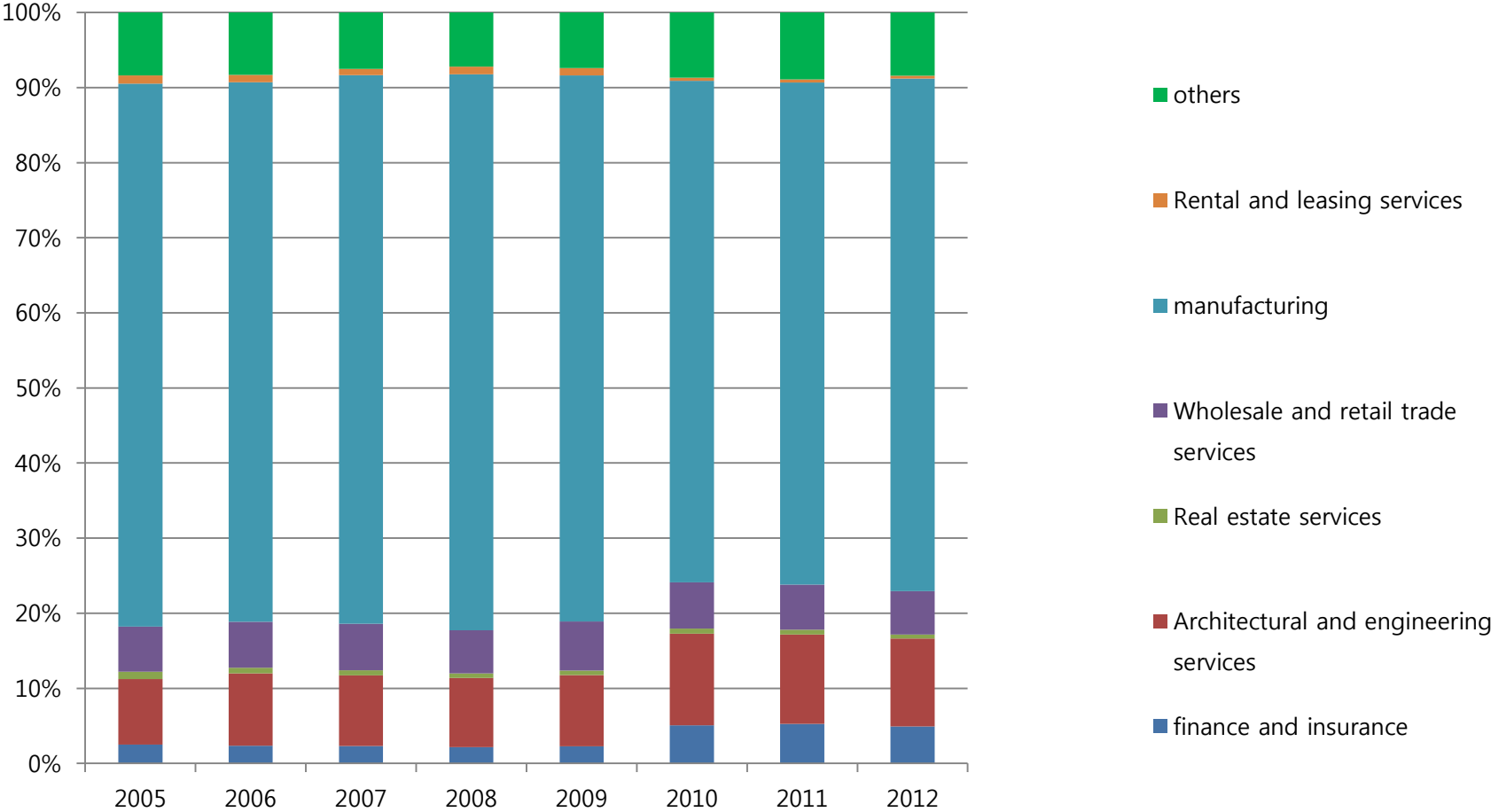
# Building Construction's Input Structure



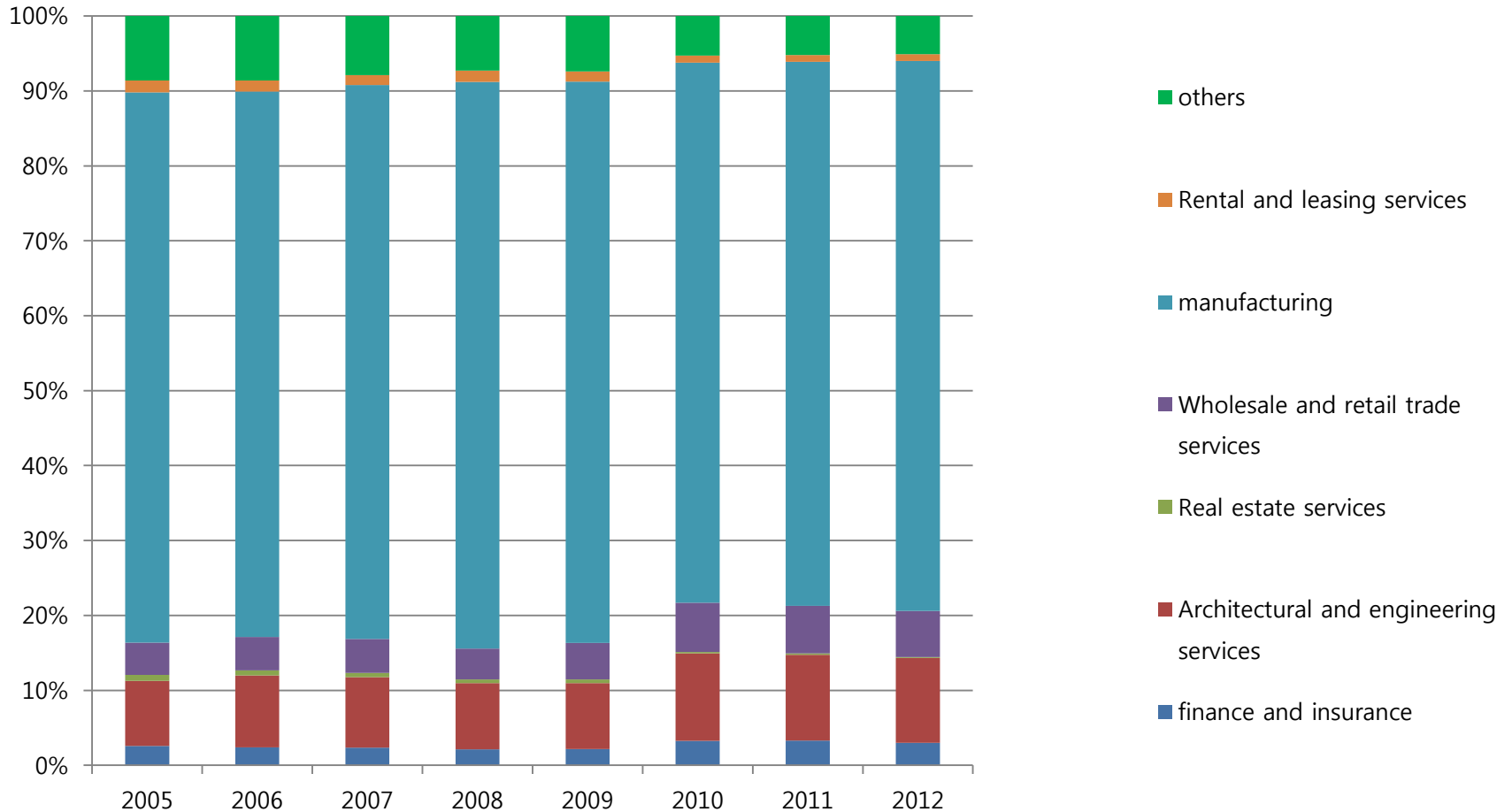
# Civil Engineering's Input Structure



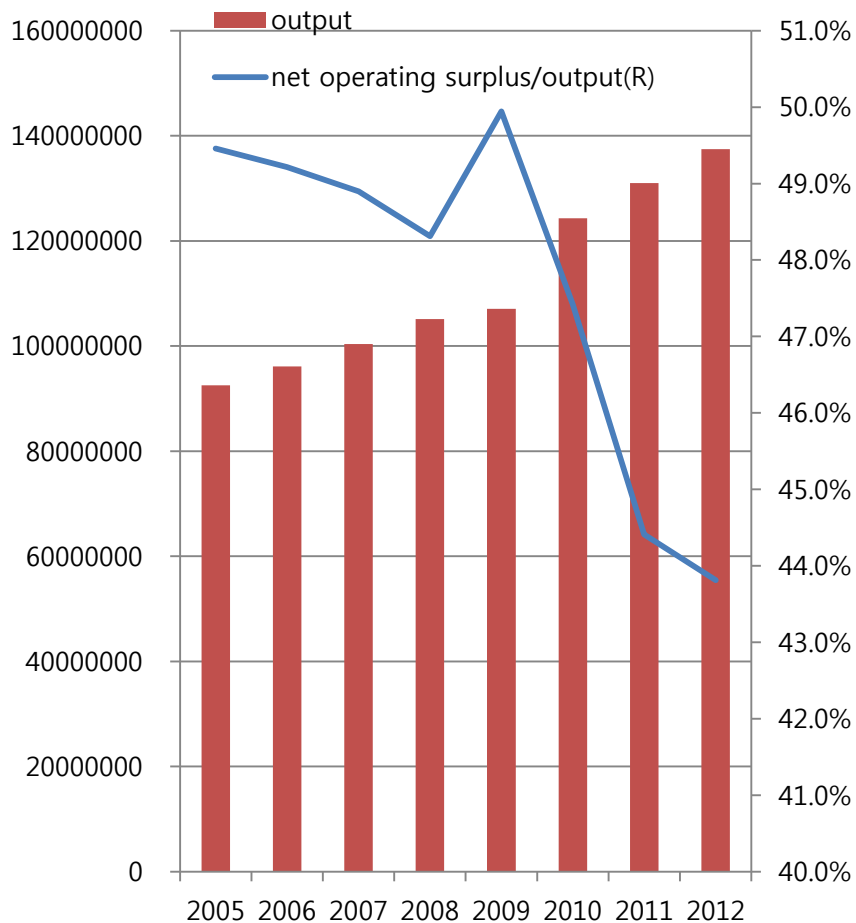
# Residential Building Construction's Input Structure



# Non-Residential Building Construction's Input Structure

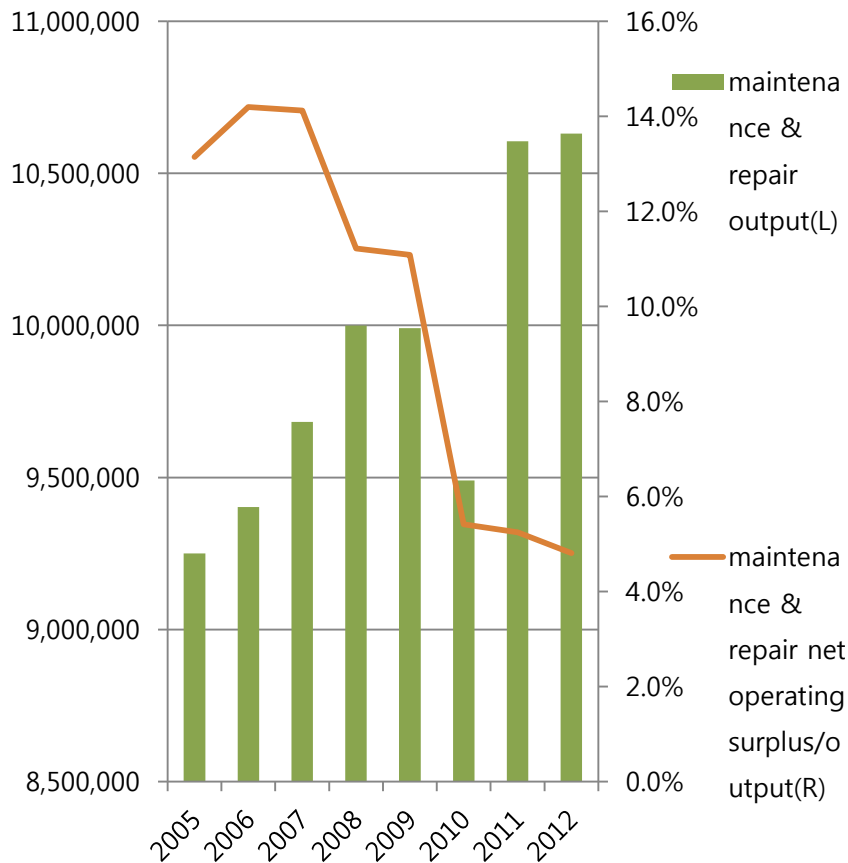


# Real Estate Services



- Real estate services' output kept on increasing and rose 48.6% au total during the period.
- The size of the out of real estate services was 1.24 times that of building construction in 2012, compared with 1.03 in 2005.
- The ratio of net operating surplus to output has maintained a substantially high level, even though it shows a decreasing tendency.

# Building Maintenance & Repair



- The output of building maintenance & repair rose insistently except 2009 and 2010.
- On the other hand, the rate of net operating surplus to output suffered a decrease from 14.2% in 2006 to 4.8% in 2012.



# Korean Construction Sector

- Around the global financial crisis, the outputs of real estate services and building maintenance & repair grew consistently in Korea.
- The share of the inputs from manufacturing lessened somewhat; the most significant reduction occurred in the residential building construction; the least reduction did in the non-residential building.
- The share of the inputs from services fluctuated.
- The shares of both “finance and insurance” and “architectural and engineering services” increased markedly; the increase was substantial in residential building construction and civil engineering.

- However, although the inputs from services have increased, it is not possible to conclude that services sector substituted for the manufacturing as main suppliers of the construction industry.
- In this respect, we think that the unshrinking output of the construction industry has been a barrier to the transformation.
- However, the current difficulties from which the Korean construction industry is suffering may in the end come to accelerate the transformation of the Korean construction industry.
- For the fall of the ratio of operating surplus to output may imply that the industry would not do business any longer in the way it used to.

Thank you!