



KOREA UNIVERSITY

Food Security Prospective and Strategic Plan for Korea



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● Predict supply & demand for future unification, then set acquisition method for 70 million people's food

- Analysis of **food situation** in South & North Korea
- Study based on the **nutritional anthropology**
- **Potential assessment** of North Korea's food production
- **Prediction** of Korean food supply & demand assuming future unification
- **Comparison** of the two camps' sea food production, **survey** of changing consumption, and **study** of further improvement

➔ **Six suggestions of food policy for Korea unification**

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- 5. Food industry of Korea**
- 6. Food policy projects for Korea unification**

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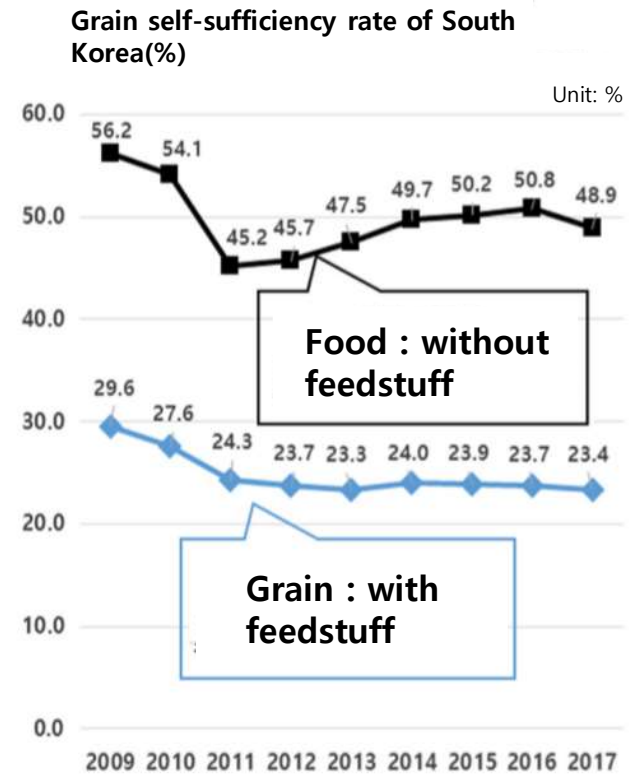
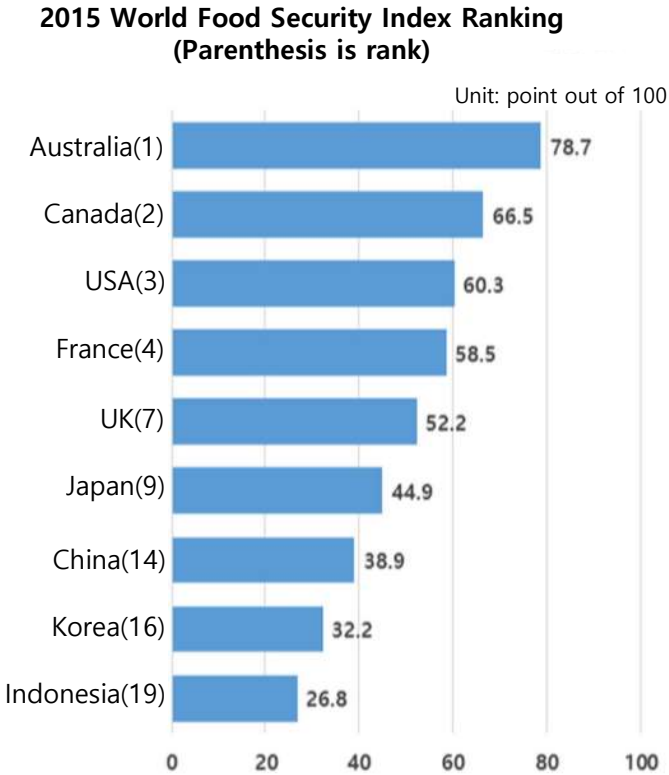
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Food situation in Korea

World Food Security Ranking

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➔ Food & Grain self-sufficiency of Korea is critical
 Low self-sufficiency can become a potential threat in the food war

Food crisis of North Korea

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Food Situation

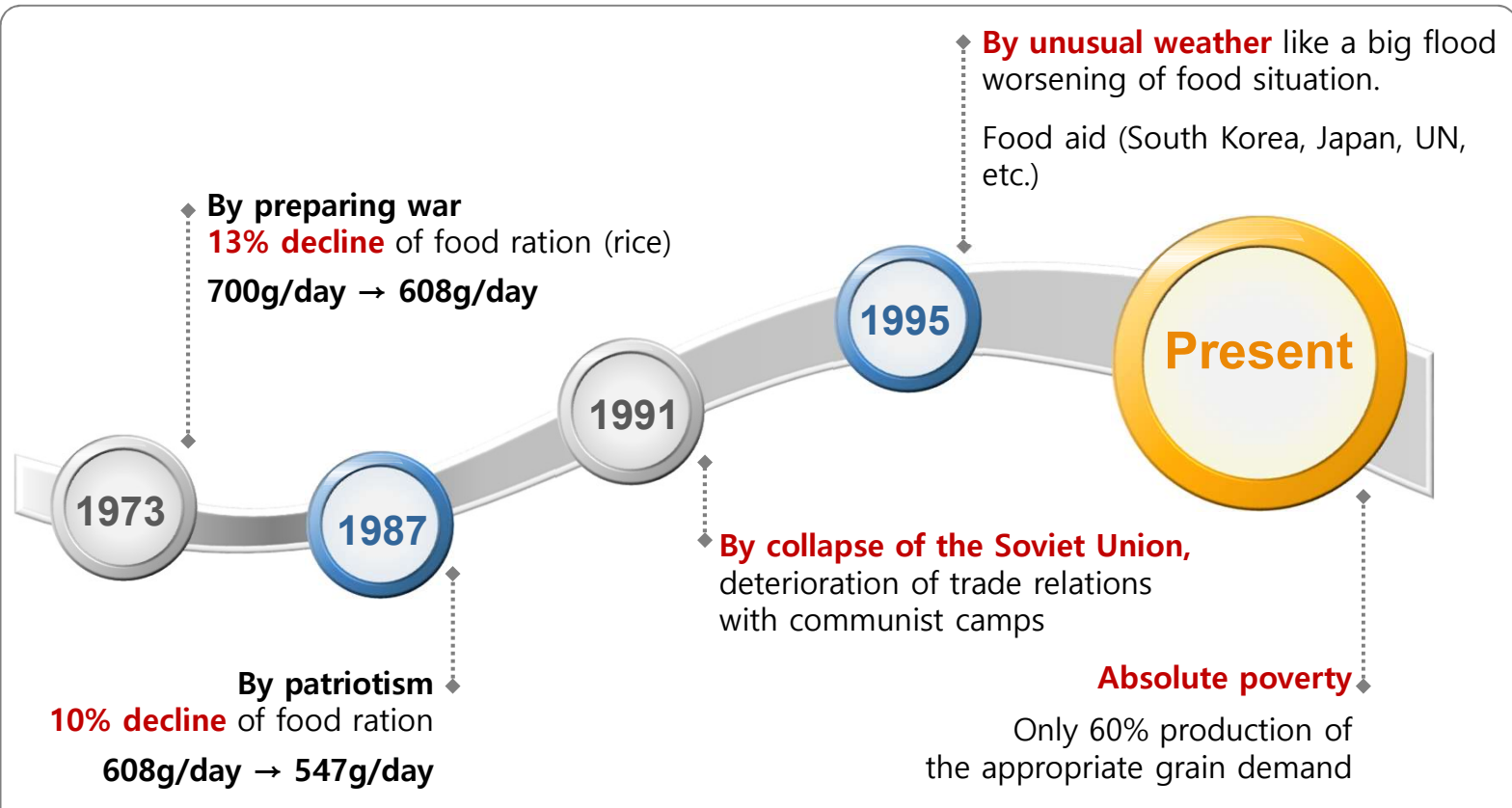
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➔ Food shortage of North Korea is expected to continue

because of **inefficiency** of agricultural system, **shortage** of agricultural materials (fertilizers, pesticides, etc.), and **contradiction** of economic regime

Aid of North Korea by South Korea

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1995

Free aid of rice 150,000 tons



After 2000

Loan (10 year-grace, 20 year-repayment, interest rate: 1%/year)



1995 ~ 2007

Rice 2.5 million tons, Corn 0.2 million tons



2008

- The Korean government interrupted food & fertilizer aid to N. Korea (Worsening of the two Koreas' relationship)
- Provide aid for vulnerable group (infants) through government, private and international organization



2009

Supply vaccine and hand sanitizer for swine flu



After 2010

No further aid as sanctions were imposed on North Korea due to the sinking of the Cheonan vessel

Change of Food energy supply

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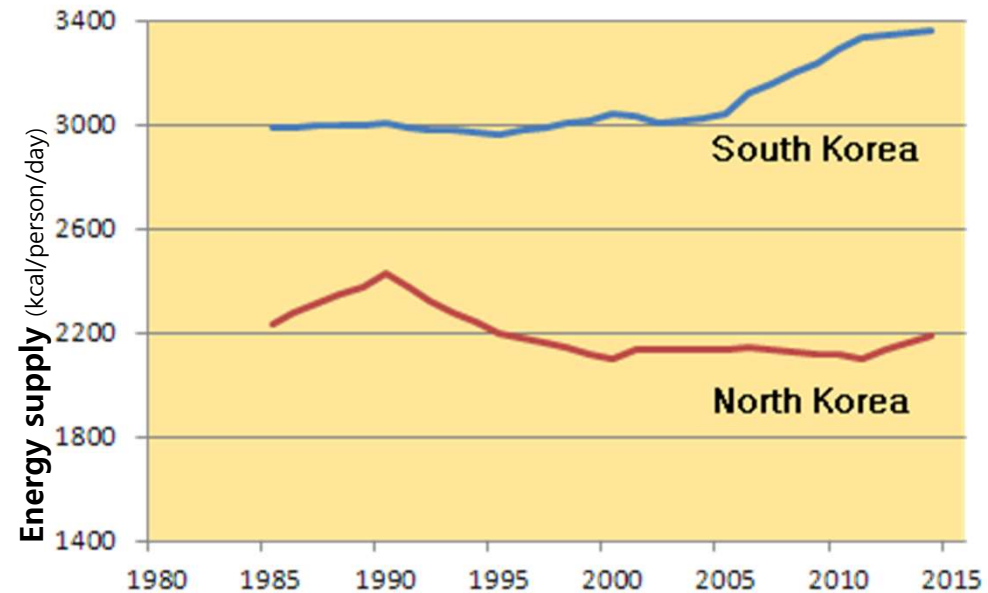
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Energy supply (kcal/person/day) of Korea



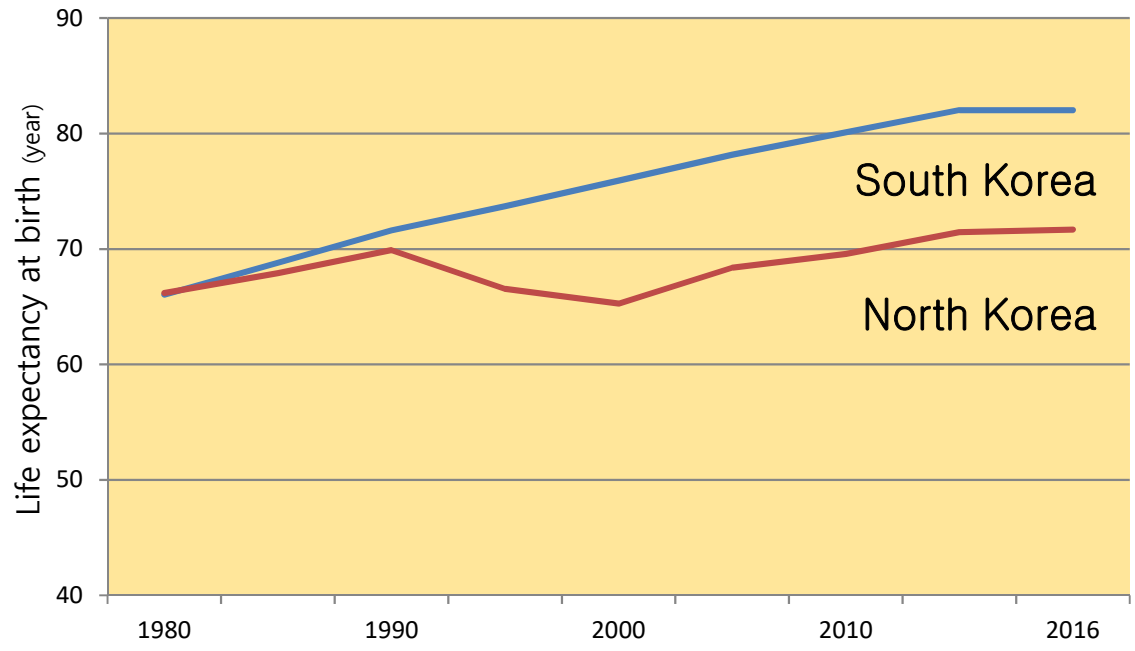
➔ The food energy supply of North Korea(2014) was **2/3 of the supply of South Korea**

Change of Life expectancy at birth

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● **Life expectancy at birth (year) of Korea**



➔ The recent Life expectancy at birth of North Korea (2016) was **10 years shorter than Life expectancy of South Korea**

Food supply and demand of the North Korea

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	Rice	corn	A sort of barley	Miscellaneous grain	potato	soybean	Unit (1000 tons) total
Supply (A)	1,573	2,200	71	137	473	268	4,722
Main crop production	1,573	2,200		137	148	268	4,326
Spring crop production			71		325		396
Demand (B)	1,819	2,677	201	137	473	267	5,524
For food	1,525	2,073	177	105	302	245	4,427
For feed	-	110	-	-	20	-	130
For seed	50	70	12	10	80	9	230
Harvest loss	245	374	12	22	71	13	737
Expected amount of imports (C)							150
Deficiency amount (B-A)	246	427	130	-	-	-	802
Net deficiency amount (B-A-C)							652

- ➔ • **The total food deficiency amount of 2017/2018 was 802,000 tons**
- Even if the planned 15,000 tons of food imports were made as planned, the **net deficiency amount** of North Korean food in 2018 amounted to **652,000 tons**

Food and nutrition situation of North Korea

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- **Vulnerable(weak) groups be more than 7.6 million people**

- Children, pregnant & nursing women, the elderly, the disabled, and tuberculosis patients

- **The UNICEF/WFP/North Korea survey on 2013**

- One-third of **pregnant women** are malnourished and anemic
- Percentage of **underweight children** under 5:
 - ✓ Urban- 13.2%
 - ✓ Rural – 26.7%
- **Food shortage** in rural areas is more serious than in urban areas

❖ UNICEF (United Nations Children's Fund)

❖ WFP (World Food Programme)

Food and nutrition situation of South Korea

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- **Increase adult diseases** by nutritional excess and overweight
- Face high level of **food dependence** on overseas import because of food waste and lowered food self-sufficiency
 - **Flour**: 100% imported
 - **Edible beans**: 30% self-sufficiency, 70% imported
 - **Feed grains**: Less than 3% self-sufficiency, 97% imported
- Reduced **rice consumption** by westernization of diet
- Increase in **flour consumption** due to intake of instant noodle

Change of food self-sufficiency of South Korea

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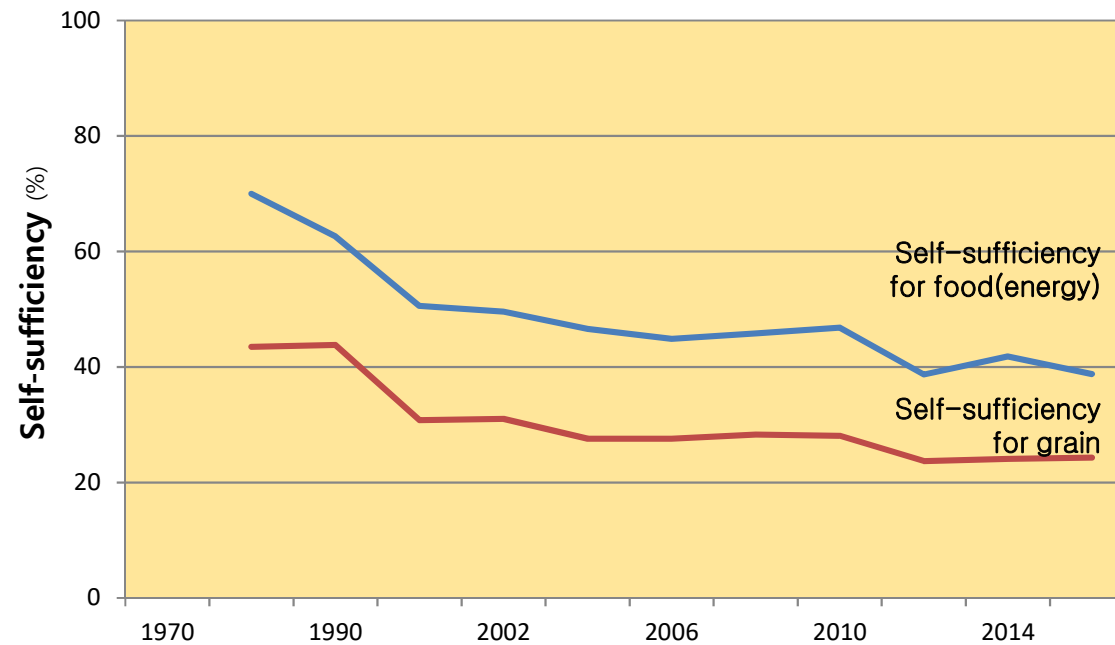
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● Food self-sufficiency of South Korea



➔ Decline of total food self-sufficiency

Obesity in South Korea

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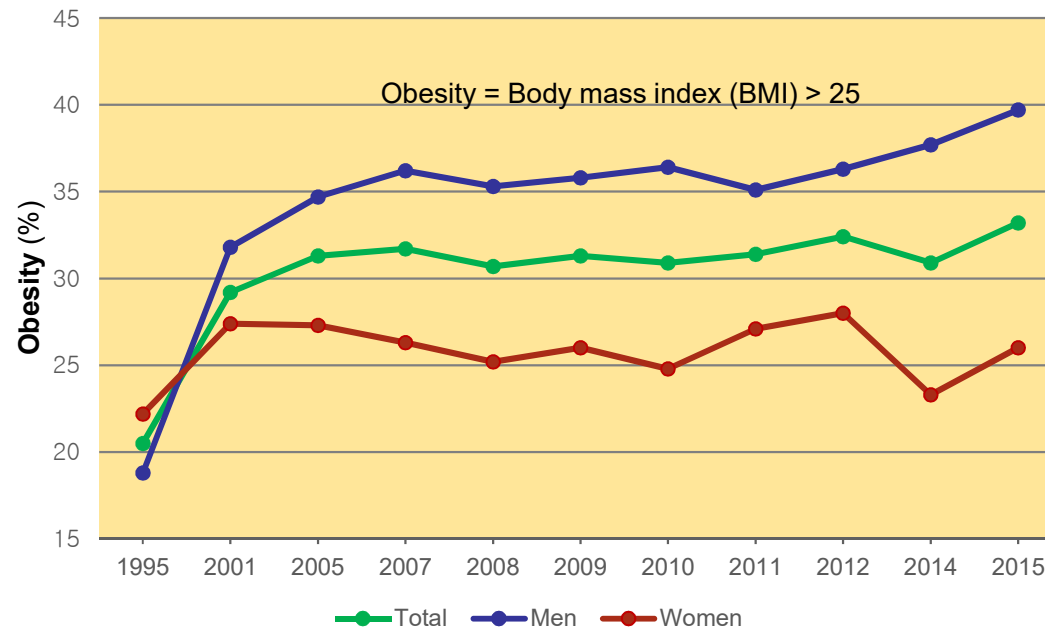
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- In 1995 : Men: 18.8%, women: 22.2%, and total: 20.5%
- **In 2015** : Men: 39.7%, women: 26.0%, and **total: 33.2%**



➔ Increase of obesity population by westernization of diet, increased food intake, and excessive ingestion of animal foods

Trend of food supply and consumption of South Korea

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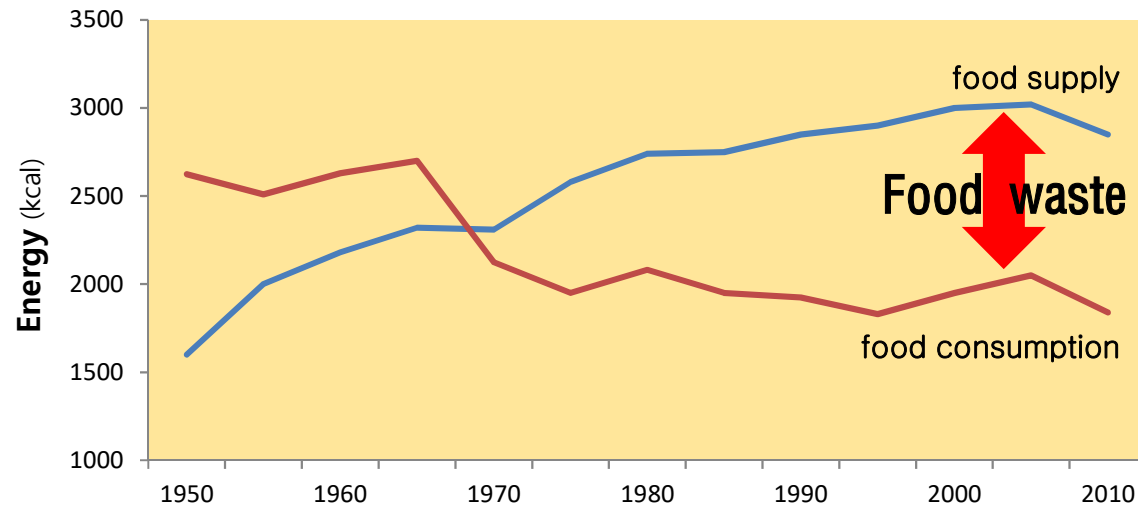
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● Food supply and consumption (1person/day) of South Korea



- Prior to 1970s: Consumption was higher than supply
High consumption of various hunger crops
- Since 1970s: Supply was higher than consumption
Imported insufficient food
- **Pattern:** Gap between supply and consumption is increasing
➔ waste **more food**

Assessment of nutritional anthropology of Korea

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	S. Korea	N. Korea
Farming population (1000 person)	1,367 (2018)	2,930 (2014)
Ratio of farming population (%)	4.9 (2018)	11.7 (2014)
Average food intake (g/person/day)	1,300	500 (+)
Energy intake (kcal)	2,400	1,600
Component ratio of energy (Carbohydrate : protein : fat)	65 : 15 : 20	80 : 12 : 8
Self-sufficiency of grain (%)	26	63
Average height (cm, men/women)	173/159	166/155
Change of weight (%)	obesity rate of adult, 33	chronic malnutrition, 42
Incidence rate of tuberculosis / mortality rate (person / 100,000 person)	90/8	344/25
GDP per person (US \$, 2019)	29,743	648
Political system	open free liberal democracy	closed communitarianism

→ South Korea : High obesity rate by high fat intake,
Low self-sufficiency of food

North Korea : Malnutrition and tuberculosis patients due to lack of food & energy intake

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North Korea's food production

North Korea's food production and composition

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- **Food production of North Korea in 2017: 4.7 million tons**
 - About **1.8 million tons of insufficiency** compared with the average of standard calorie requirement which recommended by FAO

(1000 ton)

	Crops	Rice	Corn	Barley	Pulses	Potatoes	etc
2013	4,807	2,101	1,762	176	165	582	21
2014	4,803	2,156	1,722	174	171	558	22
2015	4,512	2,016	1,645	164	164	502	21
2016	4,803	2,224	1,702	154	154	550	19
2017	4,702	2,192	1,667	146	146	532	19
Average	4,725	2,138	1,700	163	160	545	20
Composition ratio (%)	100.0	45.0%	36.0%	0.03%	0.03%	0.12%	0.00%

Solutions for increase of food productivity of North Korea

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1. Set-up for **infrastructure** of agricultural materials

- Modernization of old manure factories in North Korea
- Aid from South Korea

2. **Mechanization** of agriculture

- Mechanization of agriculture have stopped since 1980s due to shortage of fuel and machine parts

3. Improvement of **production system**

- Development of superior species
- Improvement of cultivation techniques
- Improvement of irrigation facilities

Food production strategy after unification

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1. Increasing the self-sufficiency of rice

- **South Korea** : maintain and improvement of rice paddy area
- **North Korea** : improvement of the productivity per acre

2. Improve the usage of field crop cultivating area of North Korea

- Switch corn planting to soybean
- Development for soybean species
- Mechanization of farm industry

3. Decrease the level of dependence on animal feeds

- Produce own animal feed in North Korea's field crop cultivating area
- Expand area of meadow in the North Korea region

4. Maintain the current state of other crops production

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Food demand in case of the sudden unification

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● Prediction of food demand for 10 years after unification (KFSRF)

- **Plan 1**

- Step 1. **Maintain calorie intakes** per each North Korea resident right after unification
- Step 2. Increase to regular calorie intakes after 10 years, unification

- **Plan 2**

- Step 1. Provide **food ration** and transfer to the **market economy** right after unification
- Step 2. Increase food intake** as same as food intake of 1980's South Korea after 10 years, unification

Prediction of food demand

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Prediction of food demand after unification (KFSRF)

million tons

Year	Korea					Import (3)	Shortage of products in Korea	
	Demand		Supply	Shortage			Plan 1 (1)+(3)	Plan 2 (2)+(3)
	Plan 1	Plan 2		Plan 1 (1)	Plan 2 (2)			
2020	29.0	29.5	28.5	0.6	1.0	15.7	16.3	16.7
2025	30.5	30.7	29.5	1.0	1.1	15.8	16.8	16.9
2030	31.9	31.7	30.4	1.4	1.2	15.8	17.2	17.0

➔ Shortage of food after 10 years of unification

- Plan 1 : 17.2 million tons
- Plan 2 : 17.0 million tons

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● Implication of food demand after unification

- **Increase food production** from Korea.
- **Improve the self-sufficiency of soybean.**
- **Improve self-sufficiency of animal feeds** to decrease the dependence on animal feed import.
- **Maintain and enhance** the superior farmlands.
- **Establish food policies** for preparation of the unification.

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Fishery products in Korea

Total Fish Catch in Korea

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- **Total Fish Catch of North Korea in 2017: 0.8 million tons**

	N. Korea	S. Korea
2013	749	3,135
2014	842	3,304
2015	931	3,337
2016	1,009	3,269
2017	884	3,749
Average	883	3,359

(1000 ton)

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• Potential areas of fishing industry after Unification

Potential cities : Nampo, Sinuiju - Growth potential to international markets due to accessibility

1) Nampo

- ✓ Nampo shipyard
- ✓ Able to supply to Pyongyang city and Pyongan buk-do
- ✓ Many salterns

2) Sinuiju

- ✓ Agriculture and fishing are major industries
- ✓ Many salterns

• Surrounding condition after Unification

- Set agreement with surrounding countries in cooperation fishing industry with China and Russia

Fishing Industry of North Korea

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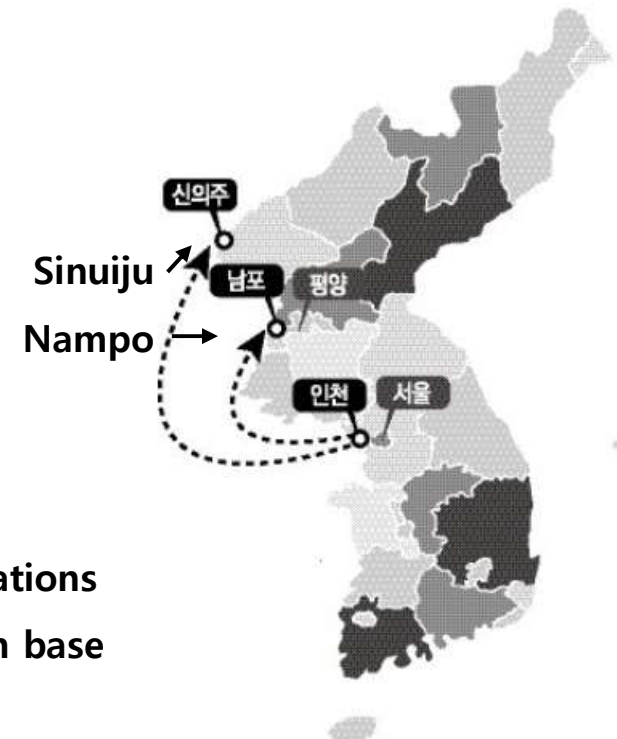
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• Potential areas of fishing industry after Unification

- Potential cities : Nampo, Sinuiju

• Plan

- Connecting with North Korea Economic development
- Utilizing international organizations
- Establishment of joint research base



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Status of South Korea Food Industry

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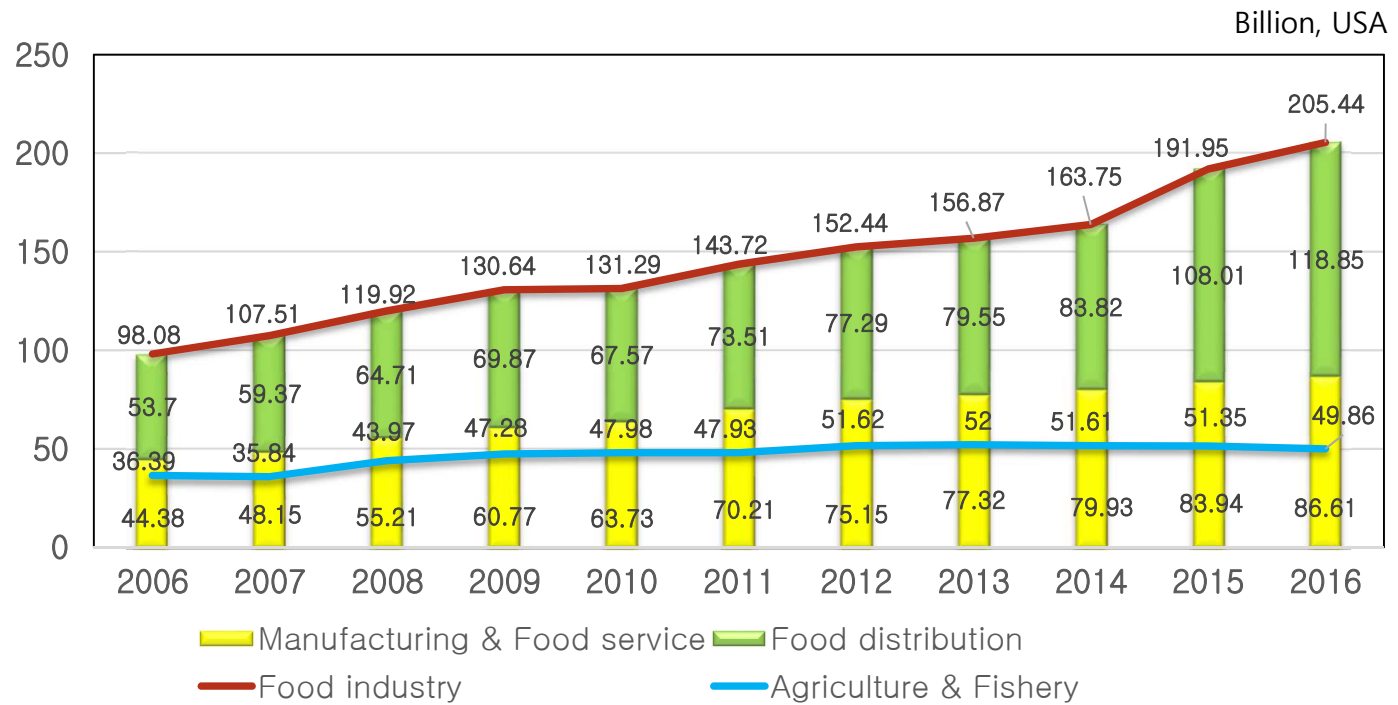
- South Korea is almost a **developed country in the economic level**
 - Emphasis of high quality foods
 - Easy to eat meals
- Aiming **well-being** functional foods
- Increasing demand of **stability** and **safety**
- Preference of **environment friendly** products
- Companies with sales over US \$890 million (Korean currency 1 trillion won) : **20 companies** (2017)

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• Food industry is composed of **Manufacturing & Food service** industry and **Food distribution** industry

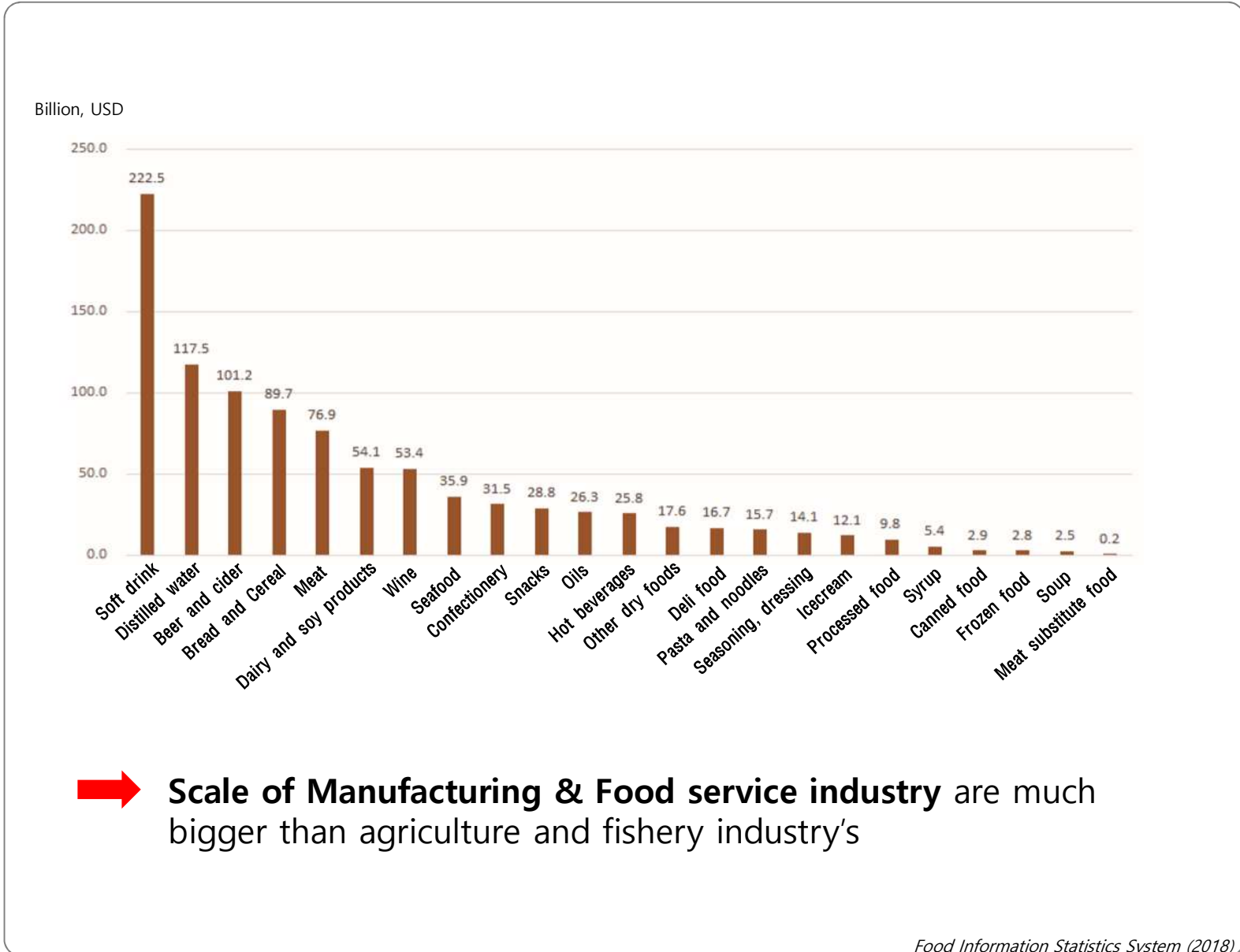


➔ Scale of Manufacturing & Food service industry are much bigger than agriculture and fishery industry's

Market size estimate of South Korea

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Scale of Food market of South Korea (2016)

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Ranking	Country	2016		Ranking	Country	2016	
		Scale of market	Portion			Scale of market	Portion
1	USA	1,167,443	19.0	12	Mexico	131,406	2.1
2	China	1,150,066	18.8	13	Canada	129,895	2.1
3	Japan	395,403	6.5	14	South Korea	108,014	1.8
4	Germany	316,661	5.2	15	Australia	99,332	1.6
5	Brazil	251,868	4.1	16	Turkey	82,177	1.3
6	France	241,627	3.9	17	Poland	69,497	1.1
7	UK	238,997	3.9	18	Indonesia	66,162	1.1
8	Italy	205,748	3.4	19	Thailand	63,771	1.0
9	Russia	176,208	2.9	20	Philippines	62,997	1.0
10	Spain	149,653	2.4	Total of top 20 countries		5,251,775	85.7
11	India	144,850	2.4	Total		6,128,376	100

Unit : \$ 1 Billion, %

 The scale of South Korea's food market was **\$ 108 billion** and ranked the **world's top 14**

Food trade of South Korea (2017)

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Rank	Country	Food imports	Food exports	Food trade	Rank	Country	Food imports	Food exports	Food trade
1	USA	124,132	125,595	249,727	12	India	31,244	23,554	54,798
2	China	97,051	60,634	157,685	13	Japan	49,080	5,282	54,362
3	Netherland	59,676	85,578	145,254	14	Indonesia	17,781	36,195	53,976
4	Germany	76,196	63,164	139,360	15	Mexico	20,288	30,005	50,293
5	France	49,848	55,185	105,032	16	Russia	25,071	17,255	42,326
6	Brazil	10,498	66,740	77,238	17	Thailand	11,236	29,936	41,172
7	Italy	36,670	40,468	77,138	18	Malaysia	14,838	24,862	39,700
8	Canada	34,049	41,677	75,725	19	Poland	16,150	21,156	37,306
9	Spain	31,645	43,747	75,393	20	Australia	14,495	22,110	36,605
10	Belgium	34,154	37,883	72,037	23	South Korea	22,504	7,128	29,632
11	UK	43,611	25,379	68,991					

Unit : \$ 1 Billion, %

 **Serious imbalance** between imports and exports

- Amount of food imports (75.9%) + amount of food exports (24.1%)

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- **Planned production systems** based on the government control
 - Production of raw materials for domestic need
 - Due to the economic recession and difficulty in providing the raw materials and power supply, **food supply has almost been stopped**
- Food produced (soy sauce, soybean paste, cooking oil, candies, biscuits etc) **by hand**

North Korea food processing factory

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- **Grain processing factory :**

- Most important food processing plant in North Korea
- The **yield has decreased in recent years**

- **Milling factory :**

- Processing capacity of flour, being estimated at 450,000tons/year
- **Production** capacity is **decreased** significantly due to the decline of factory operation

- **Dairy factory :**

- Rarely produced

North Korea food processing factory

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- **Korean sauce factory :**

- **Significantly reduced production** due to the lack of raw materials
- Rely on the production of basic foods such as doenjang and soy sauce in **private markets** or the production by **residents themselves**

- **Seafood factory :**

- **Significantly reduced production** due to the lack of raw materials
- Most of the processed seafood products are **supplied to soldiers, hotels, and party cadres**

- **Salt factory :**

- Chronic salt deficiency
- Produced salt is used for military supplies factory and industrial purposes

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Food policy projects for Korea unification

1. Legislation of 1.2 million tons of rice holding program

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- Legislation of 1.2 million tons of rice holding program based on Trust-building process policy

- Storage of Rice:

- Storing 0.6 million tons of rice annually for 2 years and then releasing **the reserved rice** to processing industry



2. Implementation of rice coupon system

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- **Implementation of rice coupon system to improve the welfare of the poor**
 - After unification, it can be **legal basis** to supply the rice reserves to North Koreans
 - Set the **welfare system** for poor people in **South Korea**
 - After Korea unification, almost all **North Koreans** fall under the **lower income family**, so they can receive the benefits



3. Increase rice production

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● Increase rice production

- To generate rice demand because of **rice storage(1.2 million tons)** for unification, **rice coupon system**, and **policy support of rice processing industry**
- **Requirements of 4.8 million tons of rice** production annually in South Korea
- Current Rice production: 4 million tons

Additional demands for 800,000 tons of rice each year



4. Plan for self-sufficiency in soybean

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● Plan for self-sufficiency in soybean

- **Traditional Korean diet based on rice and soybean dishes**

- Soybean sprouts, tofu, soybean paste soup, etc.

➔ Need to self-sufficiency of rice and soybean

- **Self-sufficiency of soybean in South Korea :**

- 1990 (60%) → 2016 (29.1%)

- **North Korea is suitable for production of soybean :**

- Geography of North Korea is mostly mountainous, and wide field area
- Need of conversion of corn field into soybean field.



5. Improve self-sufficiency of animal feeds

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● Improve self-sufficiency of animal feeds

- Self-sufficiency of animal feeds in South Korea

- Feed grains: usage (8.8 million tons), self-sufficiency 2.1%

➔ Main reason of decline in self-sufficiency of foods in South Korea

- 1) **Set the Limit of animal population** per farmland area
- 2) Development of compulsory **self-sufficiency of animal feeds** to a certain level
- 3) Reasonable **licensing system** for livestock industry



6. Develop food industry

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• Develop food industry as a main body of food supplier in case of an food crisis in Korea/world

- Korea Food Industry works as a main body of Food Supplier for Korean People
- A plan for balanced development of food industry in Korea
- Need for transport/logistic systems along the major ports in North Korea
- Enhancement of national competitiveness of Korea food industry





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Thank you for listening