Projection of Construction Resources in Korea
: Regeneration of Local Construction Supply Chain

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1. Introduction

Korea's construction resource projection must find in national development strategy. After the Korean War from 1950 to 1953, Korea had focused on economic development through uneven development of nation, mainly centered Seoul to Busan Axis. As a matter of fact, Korea has no enough resource to elicit even the selected unbalanced development. So, Korea agglomerated all the industrial ability in two regions, the Seoul capital and Busan area. We could not avoid massive migration from rural to the two regions. Construction Resources served for economic efficiencies through providing efficient infrastructures (road, highway, railroad, airport and Dams) and housings to migrated population.

Overtime the central government had tried to resettle the uneven settlements through population redistribution policies such as creating industrial clusters and moving public administration and state-owned enterprises to the all regions evenly. As people migrated to find jobs in developing age, the central government tried to create jobs here and there through creation of industrial complex and moving public institutions. While infrastructure construction resources to serve networking all industrial and public facilities have almost finished their tasks to construct efficient nationwide hardware, housing construction resources remain in deadlock due to uneven population settlements.

Both infrastructure and housing constructions have depended on massive provision within short period of time, based on public procurement system. The problem comes from massive housing settlement style that people reside in big apartment building. Now 60% of households has lived in apartments as of 2016. Construction resource to build these massive apartments depend more on large enterprise, since small & medium company can not provide adequate resource. Apartment supply has also concentrated on the Seoul capital region, while local area's single family housing and medium public facilities are alienated institutionally. Such an alienated small and medium housing settlements leads to small number of construction company composed of under 10 persons. Compared to other countries, we have 200,000 companies less. With this alienation of small and medium building and large concentration of apartment building in the capital region, construction supply chain in local area disappeared as well.

Now, the new Moon's administration toward balance development of region has focused on provision of Life Infrastructure such as library, sports facilities, child care centers, cultural facilities, per se. It could be a solution to enhance welfare of local people's settlements. However, it needs more research in that it is limited in creating jobs as a main component of people redistribution. In this respect, this report deals with regeneration of local construction supply chain to bring construction resources such as architects, small & medium construction contractors, and construction materials, to the local area.

2. Status Quo and Projection of Population

(1) The lowest birth rate

- In 2017, birth rate is only 1.05 that is historically the lowest birth rate in Korea. In 2018, birth rate would be 1.0 in this path.
- This lowest birth rate is over the projection of the Statistics Korea, which projected 1.20 in 2017 and 1.22 in 2018.
- This catastrophic birth rate comes from avoidance of marriage and delay child bearing by young generation, accrued by high housing price, infant care for only women burden

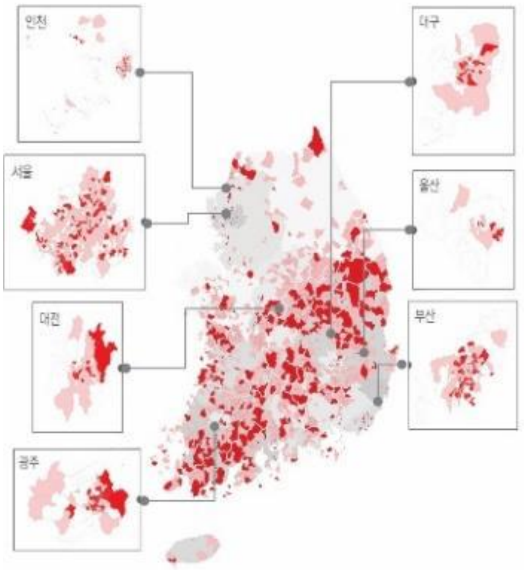
	2016		2017		2018(projection)	
	# of birth	Birth Rate	# of birth	Birth Rate	# of birth	Birth Rate
Statistics Korea(Projected.)	41.3 (10,000)	1.18	41.3 (10,000)	1.20	41.1 (10,000)	1.22
In Reality	40.6 (10,000)	1.17	35.8 (10,000)	1.05	32.0 (10,000)	1.0

(2) Aged Society in 2018

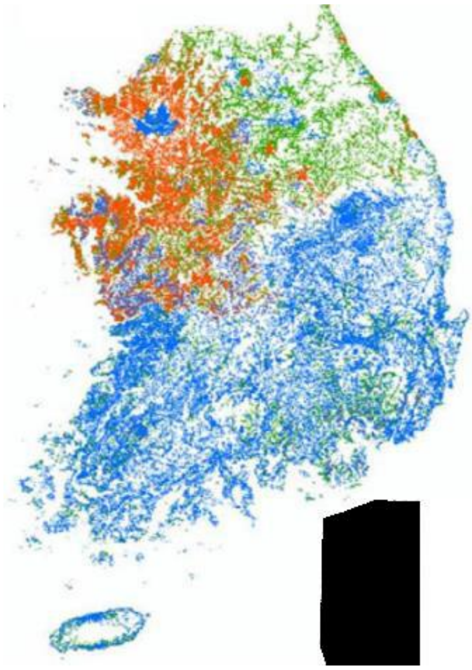
- In 2018, Korea is already aged society, meaning that over 14% of population is composed of elderly.
- The proportion of elderly in population would be projected that it is over the European countries in 2030, while it is the world top over the Japan in 2060.

	2030		2040		2050		2060	
	EU28	Korea	EU28	Korea	EU28	Korea	EU28	Korea
%elderly	24.1%	24.5%	27.1%	32.8%	28.5%	38.1%	29.0%	41.0%

(3) Regional Disparity in Population, Jobs, and Old Building: Degradation of local area



(4) Projection of population in 2040: Polarization to Capital Area



- Enhancing Quality of Life through improving Life SOC toward balanced development is the main task to solve in Korean society.
- So, Regeneration of local construction supply chain is the task faced by construction field.

3. Circumstance change in the Small & Medium Construction Resources in Korea

(1) Facing the limitation of Apartment Supply

- Massive Apartment Supply contribute to large architectural & constructional enterprise and threaten survival of small & medium architectural & constructional enterprises
- It also contributes to construction production system that is composed of large enterprise as a contractor and small & medium enterprise as a sub-contractor.
- Currently, construction labor market is composed of foreign worker, since sub-contractor usually hire rather low-wage foreign workers.
- As it is introduced in the introduction, Apartment supply concentrated in large cities, and brought imbalance of regional development and settlement

(2) Increasing demand of single family housing

- People have been Pursuing quality of life in housing selection from apartment, and thus more household demands single family housing unit
- As an evidence, permit for single family housing units has been increasing 161.6% from 44,703 units in 2010 to 72,243 units in 2017.
- During 8 years from 2010 to 2017, yearly demand of single family housing units is around 60,000 units.

year	Permit for single family housing units	Growth rate compare to previous year	Average growth rate
2010	44,703	-	-
2011	49,903	11.63	5.66
2012	51,232	2.66	4.65
2013	51,724	0.96	3.71
2014	57,493	11.15	5.16
2015	68,701	19.49	7.42
2016	75,673	10.15	7.81

2017	72,243	-4.53	6.18

(3) Increasing Government Investment in local Life SOC for Regional Balance

A. Change of Investment Paradigm focusing on Human Resource Economy

- Paradigm shift from civil SOC to People oriented Life SOC
- New administration tries to invest intensively on public Life SOC such as library, sports facilities, child care facilities, and cultural facilities
- New Administration invested $5billion ($1/1,100 won) in local friendly Life SOC in 2018 and planned to invest $7.9billion in 2019.
- Including local government's investment, it would be around $11 billion in 2019

B. Quality of Life, Balance Development of Region, Creating Jobs

- Enhancing quality of life in local area's people
- Trying to find balance development of region through proving universal & equal public service to all region
- Facilitating local economy through creating jobs

Government, in particular, propels the local projects such as local civilian initiative and local closed project through coalition system of the central government, local government,

(4) Focusing on New Regional Growth Pole Centered on Innovation Cities

<History of Innovation Cities> Roh Administration (2003~2007) initiated polarization reversal policy through Innovation City, Enterprise City, and Administration City, in order to accomplish balanced development of nation. Innovation city is a city for state owned public

enterprise, while enterprise city is a city for private company. Currently in 2018, 150 of 153 public enterprises moved their sites from previous capital area to each local area's 10 innovation cities such as Wonju, Naju, Jinju, Jeonju, Jeju, and etc.

A. Specialized Development

B. Agglomeration of Private Enterprises

C. Improvement of Settlement Condition

D. Win-Win Development with existing local area

- Expanding Local Employing up to 30% of each public enterprise' employment till 2022

(5) Appearance of Leisure culture based on institutional Change

A. Legitimized Working 52 hours per week

- The central government of Korea legitimized working 52 hours in a week in July 1, 2018
- Previously, Korean workers' severe working hours were ranked 3rd in OECD countries.
- It could be projected that reduced working hours will be contributing to balance of working and Life. (Korean say, 'wo-la-bal')

B. Proceeding Baby Boomers' Retirement

- Korean Bay boomers had born during 1958 to 1965 and now starting to retire
- They are well educated and financially sustainable compared to previous generation.
- Their demand for single family housing that they were born in local area will be increased, and even they might build their own home or second home.
- They are also main consumer for life culture or SOC.

(6) The 4th Industrial Revolution will lead to de-urbanization

A. 5G communication technology will bring new transportation revolution

- Korea will do commercial use of 5G in early 2019, which is the first in the world.
- 5G enables us to use IoT (Internet of Things) and thus induces commercial use of driver free automobile and flying car (Uber's flying taxi in 1923) in near future.
- Distance to commute will be longer with shorten commuting time and try to find cozy privacy in far-away single family housing with clear air and friendly garden.

B. The 4th Industrial Revolution will enhance construction communication

- The network age by the 4th Industrial Revolution enables individuals to organize easily construction communication with architecture, construction material vendors, and contractors.
- If government organizes public construction platform, the communication will be activated with trust.
- As individuals can organize construction communication and approach easily to the public platform, construction of single family housing unit by individuals will be increased. And thus, DIY (Do It Yourself) market, which is B2C construction material market, will be flourishing in upcoming Era.

4. Current Situation of the Small & Medium Construction Resource in Korea

(1) Small number of construction company under 10 person

A. Comparison with England, Germany, and U.S.

- The number of construction companies with over 250 employees is many compared to other countries.
- However, the number under 10 employees is very few in Korea around 200,000 companies less than the other three countries.
- The proportion of construction companies under 10 employees is only 57.6% of the total number of construction companies in Korea, while it is 93.3% in England, 83.3% in U.S. and 83.5% in Germany.
- The main reason that Korea has very small number of small companies comes from government's apartment supply policy that single family housing construction has not been supported.

Size of Company(person)	England # of Company	U.S. # of Company	Germany # of Company	Korea # of Company
Over 250	315	~1,500	230	~570
50~250	1,832	~18,200	3,417	~3.870
20~50	4,873	~31,000	11,180	9,078
10~20	11,003	~58,500	41,135	14,430
Less than 10	252,747	~545,300	~282,570	38,011
Total	270,770	~654,500	338,535	~65,959

B. The Few Architects Compared to Japan

- Architects are usually served for upstream construction supply chain through designing and audit reviewing building.
- Apartment leading construction policy that is mainly composed of land provision also led to few competitive architecture offices that hire only 20% of 21,196 certified architects since 1960s.

Year	# of Certified	Accumulated #	Year	# of Certified	Accumulated #
Before 1995	7,942	7,942	2006	502	16,010
1996	1,048	8,990	2007	200	16,210
1997	1,316	10,306	2008	377	16,587
1998	973	11,279	2009	454	17,041
1999	1,119	12,398	2010	296	17,337
2000	919	13,317	2011	370	17,707
2001	642	13,959	2012	455	18,162
2002	468	14,427	2013	589	18,751
2003	467	14,894	2014	478	19,229
2004	421	15,315	2015	904	20,133
2005	193	15,508	2016	456	20,589
			2017	607	21,196

- In particular, we do not offer certification for small size construction.
- japan provides certification for small size building, called the 2nd architect.
- Also First rank architects do design and audit review only for over 500 m^2 and 13m height. (It seems that second rank architects are well protected in Japan construction resource market)
- Astonishing thing is the fact that the second rank architects' number is 761,558 in April 1, 2017.

Kinds of certified architects	# of registered architects (2017. 4. 1.)	Scope of design and audit review
First rank architects	366,755	Over 500 m^2 and 13m height
Second rank architects	761,558	Under 500 m^2 and 13m height
Architects for timber materials	17,825	Under 300 m^2 and 2 floors

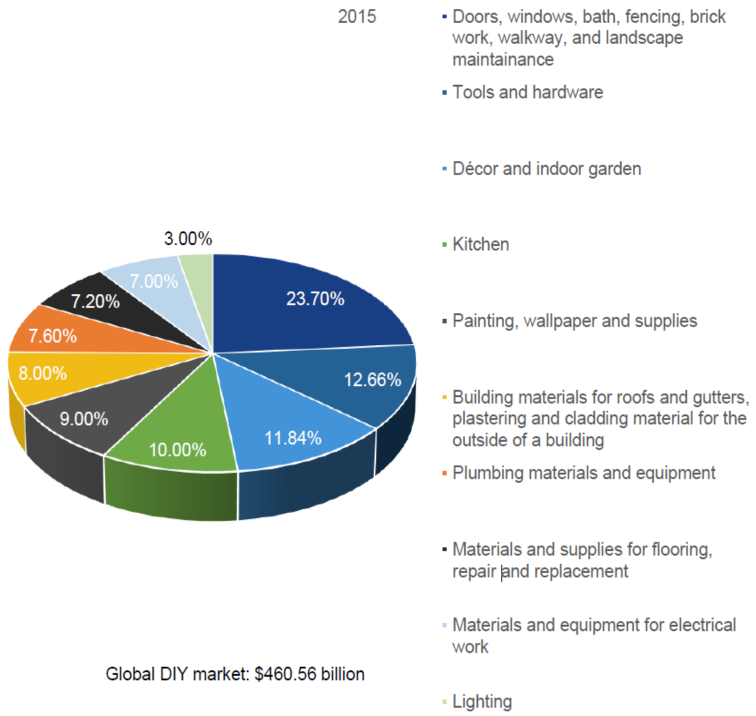
(2) Minimal development of B2C DIY market of Construction Materials

A. Size of Global Construction Materials

- Market size of Construction materials in 2015 was $460.56Billion and projected that it will increase up to $535.98Billion.
- This amount would be equal to around 50% of global construction size $ 1.1 trillion that is estimated by Global Industry Analysis, Inc.

Year	Yearly Growth Rate	Global Sales ($ Billion)
2015	2.42%	460.56
2016	2.61%	472.72
2017	2.86%	486.24
2018	3.08%	501.22
2019	3.30%	517.76
2020	3.52%	535.98

B. Components of Global DIY market



C. Korea's B2C DIY market (just beginning)

- Massive Infrastructure and Housing development by the central government led to G to B and B to B construction material market, while B to C market is marginal in Korea
- Recent economic development let people find more quality of life that led to B2C DIY market, which is mostly interior or infill.
- Deterioration of housing and increase of vacant housing will lead to more interior market and more increase of B2C DIY market.
- However, if government encourages people to build small & medium housing & life SOC and make assistant policies, construction material B2C market would also grow in new building construction material such as skeleton, which occupies over 60% of DIY market.

5. Case Study of Self/Custom Building in England

(1) Concept of Self/ Custom building

A. Concept of Self Build (mostly Architect/Contractor Building)

On The Self Build Portal we define self-build as projects where someone directly organises the design and construction of their new home. This covers quite a wide range of projects. The most obvious example is a traditional 'DIY self-build' home, where the self-builder selects the design they want and then does much of the actual construction work themselves. ***But self-build also includes projects where the self-builder arranges for an architect/contractor to build their home for them****; and those projects that are delivered by kit home companies (where the self-builder still has to find the plot, arrange for the slab to be installed and then has to organise the kit home company to build the property for them). Many community-led projects are defined as self builds too – as the members of the community often do all the organising and often quite a bit of the construction work. Some people have summarised self-build homes as those where people roll their sleeves up and get their hands dirty by organising or doing the physical work themselves.*

B. Concept of Custom build (Specialist Developer Building)

Custom build homes tend to be those where you work with a specialist developer to help deliver your own home. This is usually less stressful as you'll have an 'expert' riding shotgun for you. A new breed of custom build developer has emerged over the last two years, and these organisations take on most of the gritty issues for you – everything from securing or providing a site in the first place, through to managing the construction work and even arranging the finance for you. This is more of a 'hands off' approach. It also de-risks the process for the person who is seeking to get a home built. Some people are concerned that by going to a custom build developer you'll get less of a say in the design and layout of the home you want. But this shouldn't be the case; a good custom build developer will be able to tailor it to perfectly match your requirements.

(2) Types of Self/ Custom Building

	Types of S/C Builds	Contents
Self	**Contractor built one-off home**	Here the self builder manages the design process, selects a contractor and then the contractor takes care of the construction work. The vast majority of 'self build' homes are constructed this

Build		way – perhaps **two thirds.**
	Self built one-off home	The self builder manages the design and construction process and undertakes a significant proportion of the actual building work too. This is the classic DIY route, but only a modest proportion of people actually procure a home this way – perhaps **10-15 per cent.**
	Kit or package home	Here the self builder finds the plot of land, but then they tend to work alongside a specialist kit home provider to finalise the design and to plan the construction.
	Independent community collaboration	Under this approach a group of self builders is formed to acquire a larger site to split up into individual plots. They then organise the design and construction of their own homes. This approach is more common in Continental Europe and it is expected to grow in popularity in the UK.
Custom Build	**Developer built one-off home**	The self builder finds a developer with a site and a design they like – the developer then takes care of almost everything.
	Supported community self build group	This method involves a group of people coming together to pool their skills so they can build a number of self build houses collectively.
	Developer/contractor led group project	A developer/contractor organises a group and builds the homes; often, to save costs, the self builders finish them off.

(3) The reasons for England government's Self/Custom Building

- It is important to the national economy (value is estimated over £3bn annually)
- It makes an important contribution to housing supply (the sector collectively builds as many homes annually as any of the major house builders)
- The sector protects and **creates local jobs, strengthens local construction supply chains and is a vital part of local economies**
- Self build housing offers more local choice and is demonstrated to often offer better value for money, bringing with it the option to make housing more affordable for a new generation of home owners
- This type of housing reflects the Government's localism ambitions.

(4) Policies to support Self/Custom Building

A. Funding

- Custom Build Investment Fund (closed) : The Fund was available over three years up to 31 March 2015 for schemes of five or more units to provide short-term finance for land acquisition and early development costs such as site preparation, section 106 obligations, and construction. The money could cover 75% of early costs and was repayable at the end of the project.
- Custom Build Serviced Plots Loan Fund (closed) : The Government announced a £150 million fund in the 2014 Budget, designed to provide loans for the provision of 10,000

serviced building plots for self-builders.

- Home Building Fund : In October 2016 Sajid Javid, Secretary of State at DCLG, announced that several existing funding streams, including the £525 million Builders Finance Fund; the £1 billion Large Sites Infrastructure Programme; and Build to Rent, would be merged to form the Home Building Fund with additional investment of £800 million for long-term loans and £325 million for short-term loans. The £3 billion fund is open to bids from small builders, community builders, custom builders and regeneration specialists, as well as larger builders and developers.
- Others : Get easy in Self-build mortgages, and Help to Buy equity loan scheme available for self/custom build.

B. Planning and land release

- Accelerated Construction : This programme, through which the Government is aiming to build out surplus public sector land, was announced in October 2016. The Government said that it would pilot accelerated construction on public sector land, backed by up to £2 billion of funding.
- Community Infrastructure Levy exemption : In October 2013 DCLG confirmed that all new developments by individuals extending or building their own home would be exempt from paying the community infrastructure levy (CIL).
- Section 106 exemption : for section 106 affordable housing contributions, the Government removed most section 106 charges for schemes of 10 units or less, with respect to specific criteria such as self/custom build.

C. The Self-build and Custom Housebuilding Act 2015

- Duty to maintain self/custom build registers by local authorities :

  The new Self-Build and Custom Housebuilding Act, which received Royal Assent on 26 March, provides the legislative framework for the first part of the Right to Build requiring local planning authorities to establish local registers of custom builders who wish to acquire a suitable land to build their own home. This Act also requires local authorities to have regard to the demand on their local register when exercising their planning and other relevant functions.

D. The Housing and Planning Act 2016

- A Right to Build : The Housing and Planning Act 2016 has placed a duty on local authorities in England to grant "sufficient suitable development permission" of serviced plots of land to meet the demand for self/custom build housing. The duty came into force on 31 October 2016. Regulations amended the 2015 Act and implemented Chapter 2 of the 2016 Act.

6. Conclusion

Korean apartment has been the main housing supply. However, recent statistic shows that the demand of single family housing unit has increased sharply. In comparison to 2010, the construction permit of the single family housing unit in 2017 has increased around 162%. Annual demand of the single family housing unit is around 60,000 unit. Overtime GDP per capita in Korea has been over $30,000, demand of quality of life has been increased, and demand of single family housing has been also increased.

The demand of single family housing is also supported by circumstance change such as the 4th Industrial Revolution and Baby boomers' retirement. The 4th Industrial Revolution has been bringing self-driving car and flying car based on practical use of Iot through Korean first business use of 5G communication technology in the world. This is another transportation revolution that enhances people's long distance commuting, and thus creates de-urbanization that people are willing to reside in single family housing unit. Furthermore, retirement of baby boomers who are well educated and financially stable will enjoy their leisure time in outdoor activity that may be enhanced by building their secondary home in local area.

Such a demand increase for single family housing unit will be met by self/custom build supply policy. However, self/custom build is not well introduced. This research is firstly searching for the concept of self/custom build and identifies the concept and its types. The research finds that.self building is not totally self building. The most of the self build is composed of hiring registered construction and architecture company, while the portion of self build is only 10 to 15% of the whole self building. The custom build is also different from our common sense in that it includes developer concept.

Based on these concept of self/custom build, the findings show that the small size building mechanism is not well prepared in Korea. First, the small size construction company registration is not described in the law of Construction Industry, since Korean construction company registration has focused on massive development of apartment. Such a limitation in the law has brought small number of small and medium construction enterprises, compared to other countries such as England, Germany, and U.S. So does the creation of construction jobs. Second, the number of architects who deal with design and audit review of the small size construction has been minimal, since the certification of the second rank architects who deals with small size building is not defined in Korea. In Japan, the small size building under 500㎡ is designed and audit reviewed by the second rank architects, who are around 760,000 persons. They really constitute upstream supply chain in local construction resource.

England's self/custom build is similar to Korean situation in that the proportion of single family housing units constructed by self/custom build is around 10 to 20% of whole constructed housing units. Recently, they try to increase the number of single family housing units by self/custom build. In 2015, they even enacted the Self-build and Custom Housebuilding Act. And its main contents focus on land supply through providing central and local government land. They also emphasize social landlord who takes part as a custom build developer so that the local custom developer connects national & local land to self builders. The Custom Build Investment Fund was used for financial support of the local custom build developer's land buying. They also create Self Build Portal as a function of self/custom build platform so that all participants of self/custom build communicate and acquire information about architects, construction company, housing material company, and land available.

Through all these analyses this research suggest that Korean housing supply should change to provision of small & medium housings and life SOC by inducement of self/custom build mechanism. In order to do it, the Special Law of the Self/Custom Building should be enacted focusing on land supply for self/custom build. And the Association of Self/Custom Build including managing self build portal is also created. This research also insists that the small size construction and design & audit review are specified in related laws.

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