Geographical Relations Dynamics (6)
- Hell to Limbo via Economic Growth -

MINORU UEDA Ph.D.
York Institute of Technology
Narita
JAPAN
minoru-ueda100@nifty.com, http://www.york-it.com/

Abstract: - Mankind had long dreamed that once any country's economic growth would take off, people would be liberated from all traditional disasters such as poverty, famine, pandemic, and infant deaths. However, contrary to popular belief of population bomb, recent developments in the most economically advanced countries such as EU, and Japan, and Korea indicate that those developed countries get into Limbo rather than the promised paradise, mainly due to aging and shrinking population. Through the case study on Japan, the author examines feasible solutions to the world which will face the same destiny soon.

Key-Words: - demographic type, bonus period, Lewisian turning point, a critical birth rate number 2.1, FDI (foreign direct investment),targeted production system, Internet Grandma, reverse urban engineering

1 Introduction

1.1 Population Bomb?!

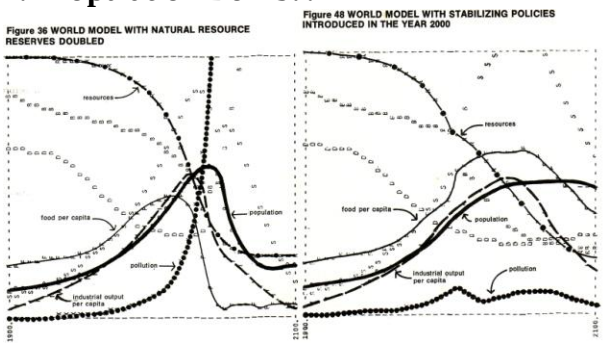


Fig. 1: Catastrophe warned by "Club of Rome" in 1972 (after [1])

In 1972, the year of the first energy crisis due to Arab Israel war, MIT group published the famous book, "*Limits to Growth*" warning the coming population bomb would bring the global catastrophe because of the conflicts between man's increasing needs and limited supply of resources, i.e. food, energy, resources. The group has been developing their studies over 30 years [1] [2] [3] [4]. An outstanding French scholar J. Klatzmann also has supported MIT group's idea, questioning whether mankind can support 10 billion people [5] [6].

1.2 The Latest Phenomena

In 2008, General Motors, and in 2009, JAL (Japan national flag carrier) got bankrupted. Both companies had been representing US and Japan economies that had stood for No.1 and No.2 positions in terms of GNP in the post WWII period respectively. Their huge legacy costs are regarded as the major reason for their failures. It implicates that even incumbent working people (15 to 55 years old) in the most economically advanced countries can not support retired aged people.

Mankind had been suffered from famine and pandemics. In history, out of 8 children born, six died before puberty. Most children born even in 1800 did not live long enough to reproduce. Life expectancy was very low (less than 50 years old)[7].

Since 19thC, quick improvement in medical science made infant death rate lower and availability of more food resulted in an increase in life expectancies. As a conscience, in 1970's, Club of Rome warned the population explosion might ruin the mankind.

However, as of 2010, we have to begin to worry about the aging and shrinking population.

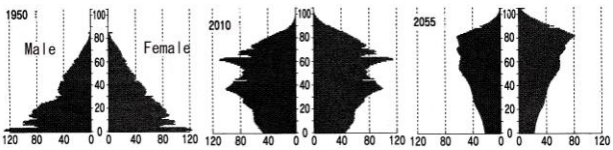


Fig. 2 : Japan's demographic trend in 1950 to 2055

Figure 2 shows the demographic trends and prediction of Japan in 1950, 2010, and 2055 respectively[15]. UN regards that Japan, whose critical birth rate number 1.3, is the front runner of this phenomena. But South Korea is far worse of 1.1 that

means, if this would prevail, before 2200 Korean Peninsular will be no-man's land and soon Japanese islands becomes no-man's land. Among other developed countries, Germany follows the same trend.

1.3 Modeling of Demographic types

Based on Japan's demographic trend with other examples, the author tried the modeling of demographics types in figure 3 and summarized their characteristics in table 1.

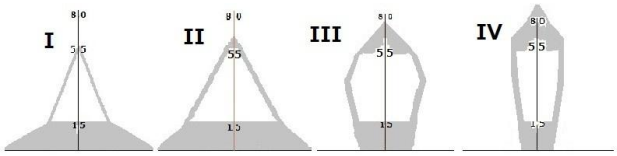


Fig.3: Demographic types over history

Demographic Type	I	II	III	IV
	traditional	expanding	bonus	aged & shrinking
Birth rate	high	high	low	low
Death rate	high	low	low	high

Table 1: Characteristics of demographic types

They are;

1.3.1 Type I: traditional type with many births and many deaths.

1.3.2 Type II: expanding with many births and fewer deaths, due to advanced medicine with better nutrition. A typical pyramid shape.

.3.3 Type III: a happy period which a demographer names "bonus period", where many working population (age 15 to 55) can easily support fewer children and fewer aged people.

1.3.4 Type IV: aged and shrinking population, which most young adults do not want to have children and the aged population increasing quickly so that pension and medical aid become the most serious financial issue. Today, almost all economically advanced nations begin to suffer from Type IV problems.

1.3 Population and Economic growth

In 1956, R.M. Solow first presents the basic idea about the relationship of population pattern and economy [8]. C.I. Jones had improved his formula in 1995 and 2003 [9] [10]. They say;

GNP = Labor (population) x Technology (1)

Figure 4 is a schematic sigmoid curve representing GNP growth and the curve might be divided into four major stages (i.e., traditional, take off, high growth, and mature & stagnant). Table 2 tells the relationship of population type (I, II, III, and IV) corresponding to each growth stage. Today, most economists agree that 60 percent of any GNP is contributed by its working population size.

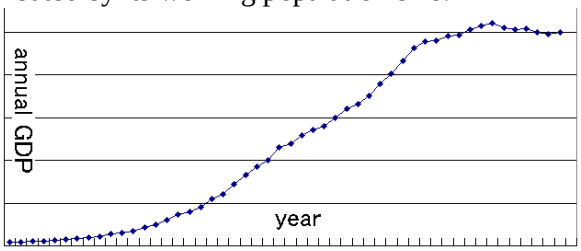


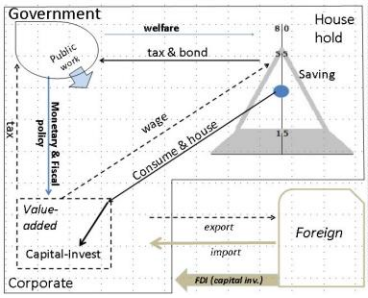
Fig.4: Sigmoid curve of an economic growth (GDP)

economy	traditional	take-off	high-growth	stagnant
major industry	agriculture forestry fishery	manufacture	manufacture	service IT
popula-tion	type I	type II	type III	type IV

Table 2: Stages of economic growth with population

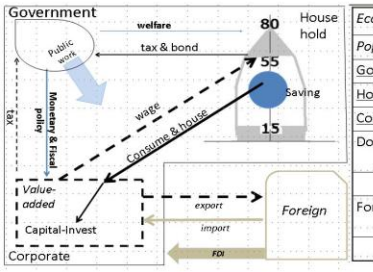
The author overlapped the Japan's GNP growth and her demographic types in Figure 4 and Table 2.

2 Problem Formulation



Economy	*take off*
Population	*Type II: expanding*
Government	Fewer tax revenue
Household	Small Saving
Corporate	Small Capital investment
Domestic demand	Very large
supply	small
Foreign trade import	larger import demand not enough money
export	not able to earn money

Fig 5-a & Table 3-a: Before "take off" (short of money)

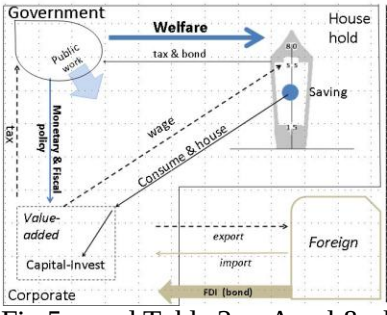


Economy	*high growth*
Population	*Type III: bonus period*
Government	large Tax revenue
Household	large Saving
Corporate	large Capital investment
Domestic demand	very large
supply	large
Foreign trade import	enough money to buy
export	able to earn money

Fig 5-b & Table 3-b: The "bonus period"

Figure 5(a,b,c) and table 3(a,b,c) are schematic diagrams of nation-state economy, where three

economic sectors i.e., "Household", "Corporate (manufacturing & service)", and "Government (service)" inter-act each other. [Manufacture = atom, service = bit] Taking the Japanese economy as an example, A.Matsunami makes an intensive simulation how demographic types would influence the nation state economy [11]. He classifies a national economy associating with demographic types (II, II, and IV)



Economy	*mature, stagnant*
Population	*aged & shrinking*
Government	less Tax revenue
Household	less Saving
Corporate	??
Domestic demand	smaller
supply	??
Foreign trade	smaller
import	
export	??

Fig.5-c and Table 3-c: Aged & shrinking period

2.1 Take-off (Figure 5-a and Table 3-a)

The most serious problem for "take-off" is whether "corporate sector" can afford fund for capital investment such as land, building, and equipments. Thanks of public health improvement, the population starts to expand so that domestic demand becomes larger. But, SAVING in "household sector" is yet small due to smaller wage. Though import increases inevitably but neither "Government" nor "Corporate" sectors do not have foreign currency for import. Indian government kept her policy that the government keeps custom tax high to protect her weak manufacturing industry against the strong and cheap goods from abroad. China had struggled to take off by her own efforts. Both countries had been suffered from long stagnation after their political independence.

Finally, both China (1980's) and India (1990's) changed their economic policies to accept FDI (foreign direct investment) mostly from U.S.A. On the other hand, post WWII Japan who did not have money, took a special fiscal policy, which invested scarce domestic money to industrial good production, called **targeted production system**, first coal mining (energy), secondly steel industry (raw material), thirdly industries to manufacture goods for export to obtain foreign currency.

2.2 High growth (Figure 5-b and Table 3-b)

Today, China and India enjoy high economic growth. According Solos and Jones theories, they are in a "bonus period", when large number of working age population and fewer aged population. Household **SAVING is quickly expanding**, with together affluent FDI, "Corporate sector" can afford huge capital investment. First, produced goods get exported to OECD countries continuously. Secondly, affluent production can satisfy the growing domestic demand, because higher wage can buy consuming goods. While intensive export shrives, inflation is the most important domestic problem in this period.

2.3 Mature and stagnant (Figure 5-c and Table 3-c)

Since 1990, Japan has stopped growing and been suffered from stagnation. In 1997, the "aged and shrinking population" period has actually begun so that "Government sector" has been on a tight rope how to deal with increasing pension and medical care for aged population (figure 6). With lesser tax revenue, Government has been selling Japanese Government Bond, which has accumulated to the level of twice of Japan's GDP (the worst in OECD countries). Then, in 2008, Lehman Brother's shock! At moment, 95% of JGB is owned domestically so that there would be fewer chances to be attacked by international hedge funds different from Greece case. Even Japan, with together China, is still buying US Government Bond.

No Japanese politicians, no high-rank officers, no corporate executives are able to find feasible solutions against "aged and shrinking population" economy. A. Matsunami argues that "corporate" sector must reduce their capital investment systematically proportional to shrinking domestic demand. He warns that it requires an immense carefulness not to provoke a serious depression.

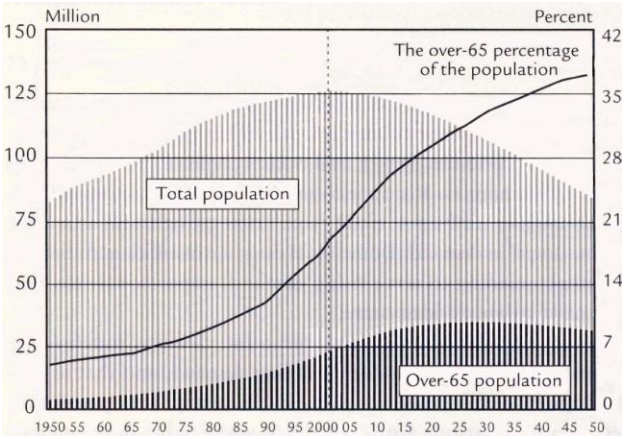


Fig. 6: Japanese population change 1950 to 2050[11]

2.4 Rural and Urban relationship

In high growth period, "Corporate sector" affords huge capital investment to develop manufacturing industry concentrating in a few urban areas. "Corporate sector" needs more labor. In country side, the first industry such as agriculture, forestry, and fishery can not absorb increasing younger population so that young workers migrate to urban area to become factory workers.

Today, migrant workers phenomena are prevailing globally; in North America (Mexico to USA) and EU (North Africa and Eastern Europe to Western Europe). There is a huge flow of migrant workers from inland China to coastal China domestically. But as of 2010, major media report that China has crossed the Lewisian turning point when a flow of migrant workers from rural to urban area stops then the urban workers' wage starts to rise sharply [6].

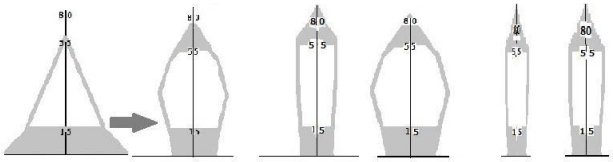


Fig. 7: Rural to urban population interaction

Period	A	B	C
		Cross ***Lewisian turning point***	
rural	young workers migration	aged & shrinking	aged & shrinking
urban	expanding	Money back to rural	aged & shrinking Higher urban costs

Table 4: Rural to urban population interaction

A rural population density is in an order of les than 100 persons per square Km, while urban one is ca. 5,000 to more than 10,000 in the industrialized cities globally. Because agriculture need far larger land to produce the unit GNP value.

2.4.1 rural to urban migration period

In period A in table 4, young workers migrate to urban area who need factory workers. As both agriculture (1st industry) and modern manufacturing produce materials (atom), there is huge demand for infrastructure for better logistics system.

2.4.2 Aged and shrinking rural area period

As a result of period B, the rural population starts to shrink first. But prosperous urban area easily redistributes money back to rural areas. The country has crossed the Lewisian point when the rural area stops the unlimited manpower supply to the urban area[12].

2.4.3 Aged and shrinking urban area period

The serious situation will begin when both rural and urban areas get into the aging and shrinking population period because urban area becomes not able to support urban area by itself (period C).

2.5 True reason of shrinking population

After WWII, Japan and West Germany both were suffered from serious food shortage. To overcome, Japan adopted birth control (the Eugenic Protection Act of 1948) and Germany invited foreign workers.

Korea and China adopted Japanese policy (all are in Confucian culture). It was good as long as bonus period lasts, but its negative effects materialize in Japan, Korea, and China (**i.e.,** kick-off the aged and shrinking population period inevitably). Germany had to stop immigration policy due to heavy social costs. It is too late for Far Eastern countries and Germany. If a country dares to manipulate their population artificially, the avoidable side effects can not stop over several decades.

2.6 Problems of Global population shrinking

Among all socio-economic statistics, demographic data are most reliable and predictable in a long period. Today, all OECD countries begin to be suffered from the increasing welfare burden, while their GDP growth have gotten stagnated.

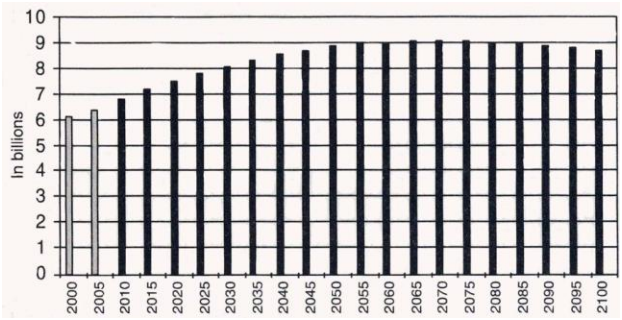


Fig. 8: the World population trend (after UN) [7] [16]

UN forecasts that in 2050, the global fertility rate will decline to an average of 2.05 births per woman. That is just below the 2.1 needed for a stable world population. UN, which has the best data available, is predicting that by the year 2070, population growth will be either stable or declining dramatically [22].

Figure 8 implies a dooms day for mankind, when the global population, contrary to population bomb explosion, will begin to decrease around 2070. It indicates that not only OECD countries but all countries on the earth get into the stagnation.

3 Problem Solutions

3.1 Strategies before 2070: Indian subcontinent

The author has presented papers using the same schematic world map where 24 areas interact [13].

Table 5 Population (million) and Urbanization rate in 2030[7]

Polar Canada 3 (3)	North EU 71 (38)	E Rusia 101 (3)	Cent. Siber. 5 (1)	East Siber. 5 (1)	
USA 432 (33)	South EU 443 (139)	Caspian 143 (92)	C Asia 99 (12)	N China 686 (167)	Korea Japan 181 (329)
C America 359 (64)	Sahara 454 (28)	Arab 475 (60)	India SEAsi 2513 (349)	S China 695 (323)	
Amazon 311 (26)	Congo 1594 (77)				marin Asia 457 (167)
Patagonia 107 (22)	S Africa 154 (34)				Oceania 47 (5)

Table 6 When each area gets its population peak?

Alaska	Polar Canada	New Found land	Green land	N EU 1990	Russia 1980	C. Siberia 1980	E. Siberia 1980	Kam-chaka
	N America 2070			S EU 1990	Caspian 2050	C. Asia 2050	N. China 2030	E. Asia 1990
	C. America 2070			Sahara 2090	Arab 2050	Continental S. Asia 2070	S. China 2030	
		Amazon 2070		Congo 2090			Maritime S. Asia 2050	
		Patagonia 2070		S. Africa 2070			Oceania 2050	

Table 5 and table 6 tell when specific world areas will arrive at their population peaks in different times in the 21st century respectively.

Japan, European countries, and Russia have already gotten into their aged and shrinking population stage in the late 20th century [14] [15].

While USA can enjoy her population growth throughout the 21st Century, because of perpetual migration flow from Mexico and other South American countries. On the other hand, Russia has been suffering from her continuous population decrease.

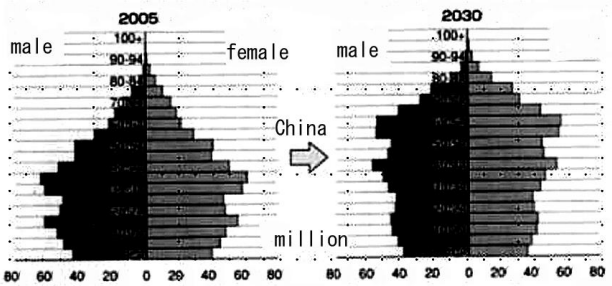


Fig. 9: Prediction of China's population [15]

Table 5 tells that Africa's population will grow. Only in the least developed part of the world, in countries like Congo and Bangladesh, will populations continue to increase until 2100. Their population explosion is ending. However, even in 2100, the total population in Africa will not be great, compared to China (ca. 1.4 billion people) and Indian subcontinent

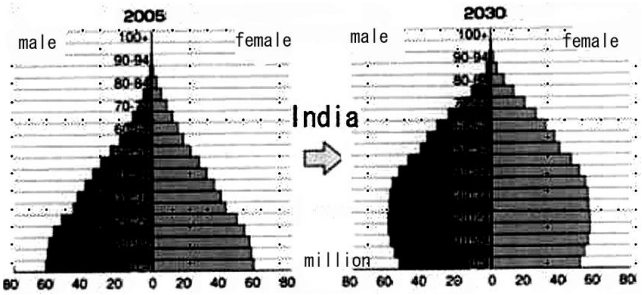


Fig. 10: Prediction of India's population [15]

(more than 2.0 billion) so that economic power will not be great.

3.1.1 China and Indian subcontinent

Now, China is governed by a very strong central government and minority peoples are weak. However, due to one-child policy, China will get into her aged and shrinking population era soon so that China's economic growth will slow down around 2030 (Figure 9). China will become inward-looking; whose government is busy to take care of her domestic problems.

On the other hand, Indian subcontinent (India, Pakistan, Bangladesh, and Sri Lanka altogether) will become the world growth center in the mid 21st Century (figure 10). The subcontinent consists of very difficult areas, because of the huge diversities (people, religions, cultures, and so on). Governments in this

area are still weak and unstable to take-off and keep growing.

3.1.2 Interaction of OECD and emerging countries

Matsunami intentionally does not deal with the possibility of international economics and IT (or

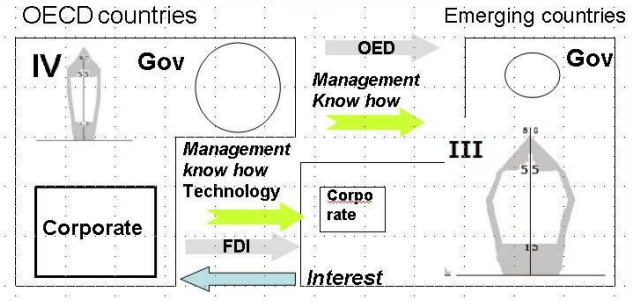


Fig. 11: Global interactions of OECD & Emerging

service industry) as tools to solve the nation state economy dilemma in aged and shrinking population period. Compared to national level economics, international or global level economics are still on its developing stage, though intensive efforts are being done by outstanding economists such as P.R. Krugman [16].

Dr. J. L. Hennessy, the president of Stanford University stated that even Silicon Valley needs more than 50 years to develop as the leading IT industry center. He commented that many foreign visitors come to him and ask whether they could create their IT industry area within 10 years [17].

OECD countries (before their stagnancy becomes serious) should be able to provide fund (FDI), technologies, and management know-how to make emerging countries could develop smoothly. In case of China, the Chinese economists have learnt developed countries especially Japan's know-how with prudent and eagerness. As a result, China's economy develops in good balance in terms of industrial structure.

The Indian subcontinent has many difficulties to make a balanced development. The reasons are; (1) today, the Indians are proud of their IT industry. But, the Indian companies are nothing but sub-contractors, who write program according to the specification which made by Silicon Valley American VB leaders. Based on intensive marketing research on American society, those US leaders read the social needs precisely and make a specification consisting of both necessary software and hardware. (2) Lack of interest in hardware manufacturing. e.g., the world heritage Taj-Mahal was built by Persians not Indians. The Indian IT engineers openly claim that they have no interest in hardware manufacturing (Craftsmanship belongs to the lower caste people's job). With unbalanced industrial structure, India would suffer herself soon

3.2 Strategies after 2070: Internet grandma

Individual area in the world has to set up two policies

1 Establish a policy to increase birth rate and stabilize the population as a sustainable society

2 Devise a new quality of life which the area can manage for a sustainable world.

3.2.1 Internet Grandma

3.2.1.1 French way:

France has made trial and error efforts over 60 years and her birth rate has begun to increase finally. It is considered that well devised government financial aid and day-care system are the keys to success. Recently a Japanese journalist (Ms. Maki) publishes a report based on her own experience on birth and bring-up babies in France and a collection of interviews with French working women. Ms Maki found out the actual practice in France; In general a mother can go back to her work just 4 months after the birth. Ms Maki states that mere money and day-care centers are not the solution. Both the aid and the day-care-centers are not enough. Young mother use the government aid money to hire a baby sitter, who are poor Islam immigrant women (**nounou**).

The author observed that at Beverley Hills, LA, USA, there are many small private parks inside. There famous movie stars ask there infant to baby sitters. To avoid ransom crime, those baby sitters are UCLA students who are the children of very rich family.

3.2.1.2 German way:

Recently, Germany has devised a social system which a young mother can employ an aged German women living in neighborhoods, using governmental subsidy. Either an old woman goes to the young mother's house or a young mother brings her children to an old woman's house. A mother pays a part of governmental aid to an old woman so that the old woman can get additional income upon her pension. This method does not need day-care center. Individual residence is used to accommodate children.

3.2.1.3 Internet Grandmamma :

In traditional society, a young mother could ask her baby to her actual grand mother or a grand mother in-law and could work with her husband in a field or at a small shop. Because living place and working site

are side by side (within 15 minutes walking distance as a rule of thumb). Bloodline solved the problem.

In modern city, any worker has to spend a lot of time to commute between their house and working place. Even a financially affluent government has had difficulty to build day-care centers densely and employ many nurses. On the other hand, aged people leave their traditional family house and move to live in a nursing home. So, in an industrialized urban area, there are two types of group accommodations. One is a day-care center for small children only and another is a nursing home for old people only. In principle, these type types are nothing to do each other. As the financial environment becomes worse, any government becomes not to afford to build and maintain enough number of day-care centers and nursing homes.

German method mentioned above implies the appearance of a Grandmamma based Information Technology. Via the Internet camera with GPS, a mother and authorized association staff can monitor children with an Internet grandmamma at her home on real time basis. Any urgent incident would be realized and reported either by a Grandmamma or the monitoring center staff. NPO or NGO in charge make day to day setup between young mothers and old women based on individual's daily life schedule. Different generations (mother-child and aged people) living in a same area interact by means of SNS (social networking service).

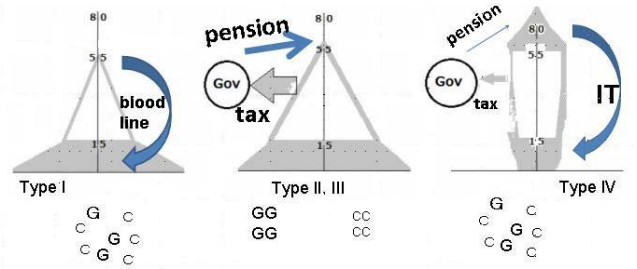


Fig.11: Grandma and children interaction

3.3.2 Reverse urban engineering: compact city

In stage A shown in figure 7 and table 4 as for rural-urban interaction, urban governments have to deal with building social infrastructure such as water and sewage system with abundant supply of working-class housings. Road and railway for material logistics and electricity for the information networks. Those infrastructures require huge fund. Without the infrastructure, any urban area can not develop manufacturing industry. Large-scale regional development projects take place in urban area which often causes severe environmental problems.

In rural area, at the same time, marginal land will be turned into farmland for rapidly increasing food demand which also destroy the nature. Today, urban areas in the developed countries have gotten materialized as a result of huge land development.

However, we can observe on-going processes in Japan. First, there increasing abundant villages or remote settlements in rural area, and fewer aged people live in suburban residential zones. Fewer public transportation services due to few community users. Local governments begin to get suffered from higher financial deficits to keep minimum public services increasing every year.

This reverse phenomenon indicates a need of somewhat **reverse urban engineering** matching in aged and shrinking population period. Man has to select and decide which social infrastructure (built during expanding population period) and settlements must be maintained and which should be given up according to decreasing financial sources year by year. M.Jenks and E.Burton propose "compact city" in developing countries [13]. But it must be improved.

4 Conclusion: no arbitrage anywhere

T.L.Friedman describes the ongoing phenomena that business leaders in advanced countries such USA utilizes the cheap labor in emerging countries based on existing large arbitrage differences on labor costs between two countries. He also foresees and warns that in a near future this large arbitrage will disappear and any businessman can not benefit out of price differences geographically. "The World becomes flat!"[20].

At the end of 21st C, most of emerging countries will come to the end of their populations' bonus periods. So neither OECD countries nor emerging countries can not overcome economic difficulties by means of domestic monetary or fiscal policies. International manipulations also lose the usability.

The author recommends;

(1) Decide a sustainable population size for each states because a political measure against declining birth rate needs more than 50 years before its result.
(2) A new urban planning to accommodate people
(3) Need of new Quality of Life standard [15]

In short, from blood-line, via community (neighborhood & workplaces), we have to establish

a new human relationship utilizing SNS, while traditional actual human touch must be on work.

References:

[1] Meadows, G.H., et al, *the Limits to Growths*, NY, Universe Books, 1972

[2] Meadows,G.H., et al, *Beyond the Age of Waste*, Milano,Arnoldo Mondadori Edeitore S.P.A.,1976

[3] Meadows,G.H.,et al, *Beyond the Age of Waste*、VT, Chelseas Green Publishing Book, 1992

[4] Meadows, G.H., et al, *The Limits to Growth: The 30-years Update*, NY, Earthscan Ltd, 2004

[5] Klatzmann, J., *Nourrir dix milliards d'hommes,* Paris, Presses Universitaires de France,1983

[6]Klatzmann,J. J.,*Surpopopulation – Myth ou Menase ?*, Paris, Editions Economica, 1996

[7] Friedman, G., *the Next 100 Years*, Doubleday, NY, 2009

[8] Solow, R.M.,"A Contribution to the Theory of Economic Growth", Quarterly *Journal of Economics*, Vol.70, 1956,pp. 65-94.

[9] Jones, C.I.,"R&D-based Models of Economic Growth", *Journal of Political Economy*, Vol.103, 1995,pp. 759-784.

[10] Jones, C.I. (2003) "Population and Ideas: A Theory of Endogenous Growth", in J.Stiglits et al (eds.) *Knowledge, Information, and Expectations in Modern Macroeconomics*, Princeton Univ.Press

[11] Matsutani, A., *Shrinking-Population Economics: lessons from Japan*, I-House, Tokyo, 2006

[12] Lewis,W.A. "Economic Development with Unlimited Supplies of Labor,". *Manchester School of Economic and Social Studies*, Vol. 22, 1954,pp. 139-91

[13]Ueda,M.,"Geographical Relations Dynamics (4): Haptic Megalopolis", Proc. of EEESD'08, 2008, pp429-435

[14] Dent, S. Jr., *The Great Depression Ahead: How to prosper in the crash following the greatest boom in history*, Free Press, NY, 2008

[15] Komine,T. etal., *Aging Asia: Long-term simulation*, Japan Economic News, Tokyo, 2007

[16]Krugman, P.R. &Obstfeld, M., *International Economics: Theory and Policy*, HarperCollins, London, 2007

[17] Hennessy,J.L "How Silicon Valley could develop" http://hitachi-uvcon.com/

[18] Maki, Y., *Why France can keep her Birth Rate Hight*, Akashi Publishing, Tokyo, 2008(Japanese)

[19]Jenks,M.et al, *Compact Cities-Sustainable Urban Forms in Developing Countries*, SPONS,Loondon 2002

[20] Friedman,T.L., The World is Flat, Penguin, London, 2000

[21] Report by the commission on the measurement of Economic Performance and Social Progress, http: //stiglitze-sen-fitoussl.fr., 2008

[22] UN Div.of Econo. & Socio, Population, *The World Population Prospects 2008*, UN, 2008