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HYPER AGED
JAPAN

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*To be a droplet
in an ocean of knowledge –
beautiful dream*

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INTRODUCTION

The commonly emphasized process of globalization is accompanied by two other phenomena of a world-wide character. They mainly occur in the most developed countries in the world and are characterized by forming information societies and a high level of progress with regard to the process of global population ageing. This process, in general terms, consists in an increasing number of individuals aged 65 and over (65+) and a growing share of this group in the total number of people in a given population, exceeding the group aged 0–14 in the most advanced phases of the process. This phenomenon is a consequence of a systematic drop in the birth rate, a decreasing total fertility rate and a marked increase of life expectancy.

These processes are an effect of the unparalleled pace of the civilization progress of the contemporary world, the improving quality and conditions of life, which are enjoyed predominantly by countries of the highest socioeconomic status. Nevertheless, these are the countries which experience the consequences of such transformations to the greatest extent, both in the economic sense, as well as from the socio-demographic (including cultural) perspective. These problems are addressed in numerous specialist reports and scientific papers. Among them, we may find works

concerning the process of population ageing, including those that are projections-based. It is related to the fact that the processes in question result in problems of a new quality – posing demographic, social and economic challenges. At the economic level, a major consequence of the ageing process is a fall in the labour force supply, ageing of the labour force and soaring social expenditure (Mantel J., 2000, Makino T., 2002, Borsh-Supan., 2003, Dixon S., 2003, Onfori P., 2004, Bongarts J., 2004, Nyce S.A., Schieber S.J., 2005, Han E., 2006, Hamada K., Kato H., 2007, Nagano A., Mori T., 2010). It may result in slowing down the dynamics of the economic development of these countries and will certainly increasingly strain state budgets with retirement and pension benefits and health care for the ever-increasing population of elderly people – seniors.

The population ageing process exhibits a very strong diversification of its progress in different countries. It began at the turn of the 70s and 80s of the 20th century in the most developed countries within the so-called ‘ageing society phase’, which occurs when the share of population aged 65 and over in the total population reaches 7.0%. At the end of the 20th century, it turned into a more advanced transformation phase, i.e. the so-called ‘aged society phase’. A society is said to have reached the threshold for this phase when the share of population aged 65+ in the total number of people amounts to 14.1%. Having regard to the issue of the demographically ageing Europe, where in the year 2000, 14.7% of the total population were people aged 65 and over, numerous empirical and theoretical studies had been conducted (e.g. Van de Kaa D.J., 1987, 2004, Chesnais J.C., 1992, Coleman D., 2001, Mydel R., 2004).

The ever intensifying and rapid process of population ageing was seen as a threat to the further demographic development of the entire Europe and its individual states (as a result of the decrease in birth rate and the extension of the life span). Furthermore, it was accompanied by a smaller and constantly stagnating fertility rate, which was below the natural replace-

ment level, i.e. 2.10 children born per woman (those aged 15–49). Under these circumstances, beginning with 1980s, the phenomenon of population ageing, including the occurring and projected changes in the fertility rate in the most developed countries, has become one of the most significant research problems not only among demographers but also for some economists and sociologists. In the case of Japan, the country in the most advanced stage of the population ageing process in the world, accompanied by a rapidly growing number of the elderly, aside from attempts of reinvigorating the natural movement of population, wide-ranging urban planning and other planning activities have been undertaken that were aimed at creating friendly space of cities and metropolises for the burgeoning population of the city-dwellers.

As regards European countries, the aforementioned process of a decreasing birth rate was in such an advanced stage that given the low mortality rate, in 2010, several of them registered negative rates of natural increase (e.g. Germany: -4.0‰, Italy: -0.4‰) or ranged from 0 to 1.0‰ (e.g. Austria: 0.2‰, Greece: 0.5‰, Poland: 1.0‰). The recorded and projected trends in the evolution of these indicators, combined with a low fertility rate, will result in a real decline of populations of a number of European countries, in the 2050 perspective. For instance, in the case of Poland, this decrement will amount to -9.8% over the years 2000–2050 (a drop in the number of people from 38,6 mn to 34,8 mn), for Germany -9.4% (from 82,2 mn to 74,5 mn), for Lithuania a staggering -47.2% (from 3,6 mn to 1,9 mn persons – *The 2015 Ageing Report for the 28 EU Member States*).

In the case of Japan, a country in the most advanced stage of the process of population ageing, where, already in 2010, as much as 23.0% of all citizens were persons aged 65 and over, the population decline over the period 2010–2050 will reach the value of 24.2% (from 128,1 mn to 97,1 mn persons). It will be the most notable decline in the real population number among all well-developed countries (*Japan Statistical Yearbook 2016 and*

Population Projections for Japan – January 2012; 2011 to 2060). A state of high anxiety that has emerged under these circumstances, associated with the demographic, social and economic implications for countries affected by this problem at present as well as the projected, dynamically evolving process of population ageing, has resulted in an explosion of sorts, of specialist, scientific papers and reports, prepared by a wide array of experts in demography, sociology, economics, medicine and even urbanists and entrepreneurs. This process was accompanied by an emergence of new, national and international institutions and organizations dealing solely with issues related with the process of population ageing and its manifold consequences. Aside from the scientific research, the findings of which have been published in specialist journals and reports, often contracted by government agencies, there are also specialist, statistical yearbooks and reports devoted entirely to the problem of the ageing population.

A classic example of this is the “Ageing Report” published by the Directorate General for Economic and Financial Affairs, treating of ageing problems of the population of the European Union as a whole, but also of individual countries. The latest report of this kind was published in 2015 and was entitled *The 2015 Ageing Report. Economic and Budgetary Projections for the 28 EU Member States (2013–2060)*, European Economy 3/2015, Brussels.

In the case of Japan, which entered the ‘aged society phase’ as early as in 1994, and which is currently experiencing the most advanced state of this process in the world (since 2007, the country has been in the ‘hyper-aged society phase’) at the request of the Ministry of Health, Labour and Welfare, the National Institute of Population and Social Security Research was founded in 1996. Besides the domestic activities, it also carries out vast international scientific and research cooperation in the area of a number of contemporary demographic and social problems of Japan, Asia and select regions and countries of the world. The Institute compiles and publishes,

e.g. statistical materials, reports, scientific surveys on a wide range of contemporary and projected problems related to population ageing. The organization also acts as the editor of the national scientific quarterly entitled “The Japanese Journal of Population” in which papers of specialists from all around the world are published.

Among the most frequently addressed issues connected with contemporary population ageing problems, a problem of particular interest (if not unique) is the research of transformations of the natural movement of population and fertility. When analyzing time variability and evolution of such demographic phenomena as births and deaths (consequently, also the rate of natural increase) and others such as fertility and migrations, the ‘demographic transition theory’ was formulated. It was developed and propagated, making use of as a simple graphical scheme/model (the so-called first and second demographic transition) by Van de Kaa (1987, 1988). In his latest account, he contrasted graphically and descriptively the time variability of indicators of birth rate, death rate and the rate of natural increase with the net migration rate (Van de Kaa D.J., 2004). The fact of taking into account the (positive) net migration rate in the transition phase, referred to as the ‘second demographic transition’, represents one of aspects which enable mitigating the decline of birth rate and provide stabilization of the rate of natural increase at a steady, albeit negative, level (-5,0‰). Considerations regarding migration and migration policies with respect to their inhibiting effect on population ageing and, in the long term, on depopulation of countries, constitute an integral part of this sort of research (e.g. Replacement Migration: Is it Solution to Declining and Ageing Population, UN Population Division 2000, Lutz W., Sanderson W.C., Schrebov S., (eds.), 2004, Lutz W., Schrebov S., 2007). The aforementioned situation in the arrangement of indices of natural movement of population in the modified Van de Kaa’s model is referred to as ‘demographic transition’ (Figure 1), which is characterized by an excess of death rate over birth rate, resulting from the continued extension of life span. In turn, it leads to

substantial transformations of age structures of populations of which the most typical feature is a growing trend of the increased share of people aged 65+ in the total population, i.e. society ageing. In practical terms, this trend is coupled with a decreased number and percentage of persons aged 0–14, in the conditions of sub-replacement fertility.

The demographic changes described in the theory of demographic transition and the straightforward formula of the graphical model of Van de Kaa are characteristic for countries that are highly-developed socially and economically. They will be most severely affected by the consequences of ageing of their populations. The issues in question currently pose some of the most crucial scientific challenges including the search for various factors of the social, economic and cultural nature that impact the pace and scale of the process of population ageing. These efforts also offer solutions of the economic, legal, institutional, family policy and immigration policy nature, aimed at alleviating the demographic trends and their socio-economic implications for the future generations.

This is reflected in the fact that there is vast subject literature, the assessment and classification of which is, in itself, an interesting research problem (e.g. Chesnais J.C., 1992, Dyson T., 2010, Lee R., Reher D.S., (eds.), 2011, Takayama N., Werding M., (eds.), 2011). It is worth stressing that it was in Japan where the trend of demographic changes contained in the ‘theory of transitions’, has achieved its global peak. This is emphasized in all scientific papers of the turn of 20th and 21st century, referring to inhabitants of Japan as ‘the eldest society in the world’ or ‘the country of seniors’. It is validated by the newest statistics according to which, in 2015, as much as 26.8% of the entire population of this country, which has been depopulating since 2010, were persons aged 65 and over (*Japan Statistical Yearbook 2016*). In Japan, also in reference to the longest life expectancy in the world, the process of ageing is in its most advanced stage in the

category of the eldest population (aged 75 and over), which constituted the staggering 13.0% of all citizens in 2015, and is described by the term 'ageing of the aged'. This means that this group outnumbered the group aged 0–14, whose share in the total Japanese population stood at 12.5% (own calculations, based on *Japan Statistical Yearbook 2016*). The result of these structural relations of the relevant indicators is that in all research papers, reports and scientific surveys concerning the wide spectrum of problems related to population ageing, Japan has been treated as a research testing ground, of sorts, both with regard to the current as well as projected consequences and challenges of the socio-economic nature (e.g. Lutz W., Sanderson W.C., Schrebov S., (eds.), 2004, Nyce S.A., Schreiber S.J., 2005, Han E., (eds.), 2006, Jones G., Strongham P.T., Chan A., (eds.), 2011, Takayama N., Werding M., (eds.), 2011, Ogawa N., Shah I.H., (eds.), 2015).

Among the voluminous scientific literature on the subject, works devoted entirely to Japan that deserve credit are those published after 1990 (Hodge R., Ogawa N., 1991, Ogawa N., Retherford R.D., 1993, Sakuragawa T., Makino T., 2002, Coulmas F., 2007, Hamada K., Kato H., (eds.) 2007, Nagano A., Mori T., 2010, Hara T., 2015 as well as Sato R., Kaneko R., 2015). On the basis of sizeable demographic statistics, ranging from the end of 19th century till the present day (as well as projections up to 2050), gathered and published by government agencies (including the National Institute of Population and Social Security Research), the above-mentioned authors conducted descriptive analyses of the select or integrated, substantive demographic, social and economic issues.

The problems of this country, which are very characteristic of the theory of demographic transitions, have been documented by a wealth of statistical data and thematic diagrams. In numerous cases, these authors strived for ascertaining the reasons for the development of the registered trends of changes in a variety of demographic indicator (mainly the

birth rate, mortality rate, rate of natural increase, fertility rate and life expectancy) and their diverse implications (including the projected ones). Based on these aspects, they also formulated proposals for specific actions aimed at decreasing the rate of speed of the process of population ageing such as more pro-natalist and pro-family policies of the government, an urgent need of increasing the retirement age, a reform of the welfare system and a complete reassessment of the immigration policy. In the last case, it is commonly emphasized that Japan needs to slowly 'open up' to foreign economic migrants. The concept of altering the immigration policy in this regard is revolutionary by Japanese standards since has been characterized by a historically and culturally driven, general aversion towards foreign laborers. This means that in the case of the current and projected demographic transformations in Japan, the 'stabilizing effect' of the positive net migration rate included in the second demographic transition, has (so far) been irrelevant. The net migration rate has not been taken into account in terms of the projected assumptions regarding growing socio-economic problems in the context of the dynamically evolving process of population ageing.

The plan of the Japanese government for building a new model of the Japanese society is, from the worldwide perspective, a pioneering initiative. The 'leading elderly society model' (e.g. Nagano A., Mori T., 2010) stipulates taking advantage of/converting the unprecedented demographic transformations that are currently occurring into a source of the socio-economic development of the country. It is intended to focus on the development of medical and care services aimed as well as innovative industries (including pharmaceuticals, medical and electronic equipment, mechatronics), which cater for needs of the elderly. There are also plans to create conditions for various forms of activity, including professional, for the already very numerous population of seniors (Japanese: koureisha). This sort of scheme derives, on the one hand, from the ongoing process

of life expectancy increase (to 82.4 for men and 90.07 for women in the year 2050), as well as from the globally unique attitude presented by a great number of Japanese seniors, referred to as young seniors – *ikigai*. In practical terms, it encompasses the working population aged 65–74. For the major part of them, work is a form of self-actualization and maintaining a good physical and mental health. This fact is unequivocally proven by the statistical data according to which in 2012, 38.0% of men aged 65–69 and 21.5% aged 70–74 were economically active. As indicated by the demographic projections, in 2030, the share of economically active men aged 65–69 will reach the level of 47.6% whereas as regards the old seniors (i.e. those aged 70–74), it will rise to as high as 26.5% of the entire working population (*Population Statistics of Japan 2008*).

The already repeatedly accentuated highest level of advancement and dynamics of the process of ageing of Japanese population as compared to other highly-developed countries of the world, thus, poses new demographic, social and economic challenges. With the current state as well as the projected changes in this regard in view, the new trend of the process of demographic transformation has been described by a small number of scholars as the ‘post-demographic transition’ (Wilson C., 2013, Hara T., 2015, Sato R., Kaneko R., 2015). Its consequences are said to be create a new demographic regime, determined by socio-economic, cultural and political transformations that are currently in progress and are expected to develop in the second half of 21st century. It may thus be inferred that, in the case of Japan, the execution of the already-mentioned, governmental program called ‘leading elderly society model’, may be regarded as a herald of taking real action in this regard. This scheme involves increasing economic activity of women, remodeling the pension and medical care system as well as re-working the social benefits. It will also account for the consequences of the collapse (at the turn of 70s and 80s of 20th century) of the multigenerational model of family in which children living in two- and three-gen-

eration households, took care of their parents. It, therefore, necessitates a transition from a model of care for seniors in which assistance is provided by families to that supported by the government (Masuda M., Kojima K., 2001, Ogawa N., Matsukura R., 2005, Coulmas F., 2007, Hamada K., Kato H., 2007, Nagano A., Mori T., 2010, Social Security in Japan 2014).

The constant evolution of new trends of natural movement of population, fertility, increasing longevity, resulting, in the case of Japan, in high growth dynamics of the evolution of the population ageing process as well as the awareness of a wide array of the resultant repercussions, constitute the rationale for the search of their roots in the civilization and cultural transformations of the Japanese society at the turn of 20th and 21st century. However, having regard to the fact that the subsequent effect of the development of the process in question will be a drop in the number of citizens (from 128,1 mn in 2010 to 97,1 mn people in 2050, i.e. by as much as 24.2%), researchers defined this situation as the period of the ‘post-demographic transition’ – also known as the ‘new demographic transition’.

It must, however, be firmly stressed that this process constitutes an integral part of the ‘second demographic transition’, representing a more advanced phase of transformations. The said ‘post-demographic transition’ is highlighted owing to the fact that it is related to the time variability of classic demographic indices in combination with social and cultural factors (including the collapse of the traditional model of family and a constant decline of multigenerational households, coupled with an increasing number of single-person households, a dynamically growing share of senior households, increased economic activity of women with full-time employment, heightened activity of people in the post-retirement age).

Research of this type is conducted in the context of the existing legal acts on the family and elderly policy, the healthcare and welfare system as well as immigration policy. *A Shrinking Society: Post-Demographic*

Transition in Japan by Hara T. is a novel research account (Hara T., 2015). The majority of scientific analyses (supplemented with statistical materials) concern the variability of classic demographic indices employed in research of the first and second demographic transition (included over the period of 1891–2050).

Nevertheless, the vast, well-documented descriptive and statistical analysis lacks multifactorial synthetic accounts, including the theoretical modeling as well as new terminology for the processes. A small dose of innovativeness present in rare attempts at synthesizing certain phenomena occurring in the process of population ageing is contained within the article by Sato R., Kaneko R., (2015). Having analyzed the transformations over the period of 1945–2100 in terms of the measure of pressure on productive population (population aged 15–64) by parts of the population aged 0–14 (Child Dependency Ratio – ChDR and 65+ (Elderly Dependency Ratio – EDR), the authors distinguished two characteristic types of relation. The former, whose characteristic feature is a higher value of ChDR over EDR over the period 1945–2005, is referred to as the ‘demographic bonus’. The latter, spanning the period 2010–2100 (based on projections, is characterized by a dynamic growth of the EDR ratio (until 2060) and surpassing the ChDR, which is expected to stagnate at the value of 180.0. This situation in the relation between these two indices was described as the ‘demographic onus’. It clearly indicates the scale of the problems resulting from the need for maintaining a high standard and quality of life, as part of the idea of sustainable socio-demographic development of Japan in the 21st century, as well as building a strong, innovative and competitive economy.

This work is revised and an extended version the author’s book published in Polish entitled “Japonia w procesie przejścia od demograficznej dojrzałości do demograficznego schyłku” (*Japan in the Process of Transition from Demographic Maturity to Demographic Decay, Cracow 2016*).

1.

OUTLINE OF THE AGEING SOCIETY PROCESS AGAINST THE BACKGROUND OF THE POST-WAR SOCIO-DEMOGRAPHIC CHANGES OF JAPAN



The unprecedented development and modernization of the Japanese economy after World War II, triggered the process of profound demographic and social change. As a result, modern Japan records the world's highest rate and scale of ageing process. Since 2007 it has entered the hyper aged society phase and conversion stage in the birth rate versus death rate arrangement.



The group of distinctive phenomena that are of the global character, typical for the most developed economically countries includes a transition of their societies from the demographic maturity stage into the demographic old age. They are characterized by an accelerating process of population ageing, in many cases, gaining momentum and dynamism since the turn of the 20th/21st century. This causes serious concerns in these countries over their further demographic growth, as well as creates anxiety resulting from a threat of decelerating economic development, in turn, leading to a long-term decline of the standards and quality of living of their citizens. Therefore, this demographic challenge, of sorts, as well as its origins and aftermath, constitutes a subject matter of numerous scientific research papers and practical expert evaluations authored by demographers, geographers as well as economists.

As indicated in the Introduction of the present paper, in the existing large body of research work on the subject, conducted around the world, the contemporary Japan constitutes one of the most researched areas with regard to the process of ageing. This is a consequence of the country's being at the most advanced stage of the most dynamically progressing process of population ageing, which, starting from the first decade of the 21st century,

entered the third transitional stage called the “hyper-aged society phase”. Since 1996, this ongoing process has been in its “conversion stage” and the “demographic decay stage” (author’s own terminology).

This is reflected in a great number of research papers, which, in recent years, have taken the form of monographs dedicated exclusively to Japan, published in prestigious publishing houses (e.g. Hamada K., Kato H., (eds.), 2007; Coulmas F., 2007; Hara T., 2015). It can, however, be noted that the frequently in-depth scientific analyses, covering a large spectrum of demographic, socio-economic, social and cultural aspects of demographic transformations in the world, including Japan, include a limited number (or even lack) of syntheses, including those based on theoretical modeling. The notable exception in this regard is the already cited “theory of demographic transition”, which, invariably since the end the 90s of the 21st century, has been regarded as a reference point in terms of defining the scale and character of demographic transformations taking place, also nowadays, in various countries. This theory has been verified and complemented only to a limited extent. The current research proves that transformations of the demographic picture of many industrialized countries call for verifying this theory in terms of changing relations between birth and death rates. Furthermore, in many cases, it is arguable whether treating the (positive) net migration rate in the revised model (theory) as a remedy for stabilizing the negative birth rate and mitigating the rate of depopulation of a given country is justified. This model assumes that the migration influx achieved by means of implementing immigration policy by countries characterized by an advanced stage of the process of population ageing, will constitute a very significant factor in their “demographic revitalization”. It is expected to bring benefits in the form of inhibiting the process of population ageing, a positive change in the age structure as well as (what is crucial from the economic perspective) increasing the workforce. This kind of situation

applies to the majority of countries of Western Europe, which are generally “open” to the influx of foreign immigrants. It is reflected in e.g. the strong presence of foreigners on their labor markets as well as the population of “allochthons” (naturalized foreigners) in the demographic structure of particular countries. For instance, (in the light of demographic data for EU countries) foreign population of this group of countries constitutes 7.0% of the total population. The highest share of foreigners, in 2015, was recorded in: Belgium (11.2% of the entire population), Spain (10.9%), Germany (10.5%) and Great Britain (7.7%) (Table 1). Whereas allochthons had the largest representation in the Netherlands, making up over 20.0% of this country’s total population.

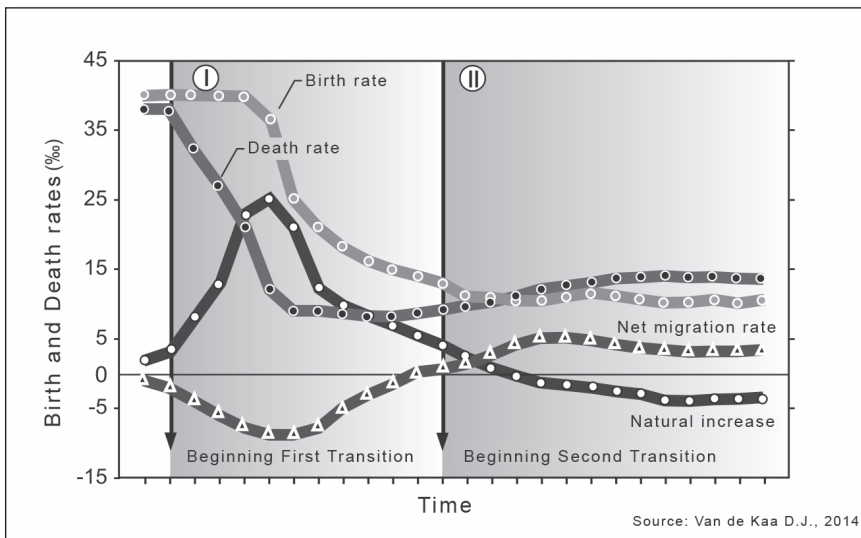


Figure 1. Model of first and second demographic transition.

In the case of Japan, a country that is historically and culturally prejudiced against foreigners and disapproving of their presence within its territory (and also creating legal, formal and administrative barriers to their naturalization, even with regard to those in “mixed” marriages with Japanese citizens), the share of foreigners in the total population stands at

a mere 1.5–1.7% (e.g. Mydel R., 2004, 2009, Mydel R., Takahashi D., 2013, Takahashi D., 2014). The analysis of the latest report on ageing of population of the European Union over the years 2013–2060 (*The 2015 Ageing Report. Economic and Budgetary Projections for the 28 EU Members States: 2013–2060*), compiled the European Commission, demonstrates that even under the conditions of the most numerous population of foreigners in any EU country, i.e. Germany (7,5 mn people) and the current positive net migration rate, over the period 2013–2060, this country will experience a downward trend of its population growth dynamics (by 12.9%).

Table 1. Registered foreigners in Japan and Germany and their percentage share in total population (1950–2015)

Year	JAPAN		GERMANY *	
	Number of foreigners (1000)	Percentage of total population	Number of foreigners (1000)	Percentage of total population
1950	598,7	0.76	-	-
1955	641,5	0.71	-	-
1960	650,6	0.69	686,0	0.94
1965	666,0	0.67	1 105,1	1.45
1970	708,5	0.68	2 738,3	3.52
1975	751,8	0.67	3 900,0	4.95
1980	782,9	0.67	4 565,9	5.84
1985	850,6	0.70	4 482,1	5.77
1990	1 075,3	0.87	5 582,2	7.03
1995	1 362,4	1.08	7 343,0	8.99
2000	1 686,4	1.33	7 268,0	8.84
2005	2 011,6	1.57	7 289,1	8.84
2010	2 134,2	1.67	7 199,2	8.81
2015	2 232,2	1.76	8 652,3	10.53

Notice: * to 1985 data concern the German Federal Republic

Source: enumerated by the author on base *Population Statistics of Japan 2008; Population Census of Japan 2010; Japan Statistical Yearbook 2017; State and Society, Population- Federal Statistical Office (Destatis); Migration and Migrant Population Statistics 2017, Eurostat.*

A conclusion may, thus, be drawn that the theory of demographic transition, formulated on the basis of variability of birth and death rates, in its modified form, is not a universal model in the context of the projected positive net migration rate. This necessitates finding other determinants for improving the demographic situation, including those of the demographic, socio-economic as well as political nature. Under these circumstances, there is an urgent need for formulating “revolutionary” pro-natalist and pro-family policies in the context of a very real, looming situation in which there might be countries whose share of persons aged 65 and over, will exceed the population of citizens aged 0–14 several times over. This relation of age structure in population has already been recorded in Japan, where, in 2015, persons aged 0–14 constituted merely 12.5% of all citizens, whereas those aged 65+ represented as much as 26.8%, i.e. 2.1 times more. In the 2050 perspective, these indicators are projected to reach 9.7% and 38.8%, respectively. This means that in the perspective of the year 2050, the population of seniors in Japan may be four times larger than that of people aged 0–14 (Table 2).

In light of the discussed, downright alarmist trends of the current and prospective direction of transformations of the demographic picture of the economically developed world (with a particular intensity of the process of population ageing), there have been undertaken numerous comprehensive research studies on the time variability and correlation between various occurrences and demographic phenomena.

This knowledge base is in need for organizing and systematizing as well as generalizing and periodizing, taking into account their most characteristic properties. Unequivocal identification of different progress levels of processes, their structural image and quantitative relations within ongoing processes (within the distinguished stages, phases and even periods), calls for introducing new terminology. This need stems from the fact that within the next few years societies of an increasing number of countries will reach

advanced stages of the population ageing process as well as be subject to newly initiated and continually deepening processes. Those were the guiding principles for the author of the present research paper. This approach originated from inadequate scientific accounts of the synthetic character in the relatively vast subject literature as well as the fact that the demographic transformations that started in post-war Japan have presently reached the worldwide highest level of transformation, dynamics and maturity. Japan's primacy in this regard is substantiated by short- and long-term demographic projections, and the author's focus on the broadly defined process of population ageing lies well within the current scientific trends of demographic studies.

Table 2. Total population number and age structure population of Japan, in 2010 and 2050 against selected countries

Country	Number of population (mn)		Changes 2010–2050 (%)	Population structure by major age groups (% of total population)					
	2010	2050		0–14 years		15–64 years		65 years and over	
				2010	2050	2010	2050	2010	2050
JAPAN	128,1	97,1	-24.2	13.2	9.7	63.8	51.5	23.0	38.8
France	63,0	74,4	18.1	18.4	17.4	64.8	57.5	16.8	25.1
Spain	46,5	45,6	-1.9	15.1	13.3	67.6	53.4	17.3	33.3
Germany	81,6	74,5	-8.7	13.4	12.7	65.8	55.5	20.8	31.8
Poland	38,2	33,9	-11.3	14.9	13.2	71.5	56.9	13.6	29.9
Sweden	9,4	12,5	33.0	16.5	17.6	64.5	59.9	19.0	22.5
UK	62,2	77,3	24.3	17.6	17.3	65.8	58.8	16.6	23.9
Italy	60,5	67,0	10.7	14.0	13.6	65.7	56.5	20.3	29.9
USA	309,3	398,3	28.9	19.8	18.2	67.1	60.4	13.1	21.4
China	1 338,0	1 348,1	0.8	18.1	14.8	73.5	61.3	8.4	23.9
India	1 205,6	1 620,1	34.4	30.2	19.5	64.8	67.8	5.0	12.7

Source: enumerated by the author on base: *Population Projections for Japan (January 2012): 2011 to 2060, Appendix: Auxiliary Projections 2061 to 2110; Japan Statistical Yearbook 2017; The 2015 Ageing Report, Economic and Budgetary Projections for the 28 EU Member States (2013–2060); US. Census Bureau International Data Base, World Population to 2300, UN Department of Economic and Social Affairs.*

Since 2007 Japan has been the first, and so far the only, country in the world to enter the most advanced stage of population ageing, called the “hyper-aged society phase”. This means that the percentage of its inhabitants aged 65 and over has reached the value of 21.0% of the total population of the country (in 2015, it stood at 26.8%). Within the next few years, this group of countries will be joined by Germany and Italy, where in 2010, this indicator registered the value of 20.8% and 20.4%, respectively. By comparison, in Poland, persons aged 65+ represented 13.6% of the entire population. Therefore, with the year 2050 in view, when the majority of current strong economies enter the hyper-aged society phase due to the ongoing demographic transformations, Japan will still hold its first place on the list of the demographically eldest countries of the world (Table 2). The current and the projected trend of age structure transformation is a consequence of a decline in the birth rate and an increase in the death rate, accompanied by a sustained, low fertility rate (on average, 1.40) as well as the extending life expectancy. Also in this case, Japan is characterized by the longest lifespan, equal to 80.2 years for men and 87.1 for women (2015). In effect, since 2007, this country has exhibited a negative value of the rate of natural increase (standing at -1.0‰), which, by 2050, will decline to the level of -11.6‰. Under these circumstances, Japan will also become the world leader in terms of the negative rate of natural increase (RNI), lowest fertility rate (1.35) as well as the largest proportion of people aged 65+ in the total population (38.8%). It will bring about a record-breaking (in the group of countries that are currently strong demographically) decrease in the size of population of the country, by a staggering 24.2% (from 128,1 mn in 2010 to 97,1 mn persons in 2050 – Table 2). Therefore, in accordance with the newest demographic projections, the size of the population of Japan by 2060 will fall to the level recorded in 1964. The long-term projections in this regard seem incredible, heralding a catastrophic demographic breakdown of Japan. They assume that by 2100 the population will diminish to the value of 49,6 mn (by 61.3% over the period 2010–2100),

which, by the end of the 21st century will be made up in 41.1% of persons aged 65 and over (Population Projections for Japan – January 2012: 2011 to 2060. Appendix: Auxiliary Projections 2016 to 2010).

In the perspective of the year 2050, a large group of countries that are currently strong economically, will experience this character of demographic transformations, however, with significantly lower values of the considered indicators. The most characteristic, and at the same time, universal properties of these prospective transformations include the sustaining sub-replacement fertility rates as well as the extending life expectancy. Some of these countries, being subject to advanced stages of the population ageing process, will register negative rates of natural increase. It will also include Poland, which, along with Germany, Italy and Spain, will exhibit the lowest negative values of this indicator (Table 3).

The frequently emphasized high growth dynamics and specificity of the examined demographic transformation of Japan derives from fundamental socio-economic transformations, originally related to the unprecedented, rapid economic growth of the country after World War II. Presently, they are determined by the forming of the information society with its characteristic redefinition in the realm of culture (including e.g. a change of the family model as well as increased professional independence and social status of women).

In combination with the high standards and living conditions as well as the governmental policy of particular care for the elderly, it results in the most mature stage of the process of population ageing worldwide. Taking into account the aforementioned reasons as well as the bearing in mind the necessity for an innovative research approach to the subject of population and a possibility of formulating syntheses of a high degree of universality, the author has undertaken to examine the research problem contained

within the title of the present paper. In order to define the character, scale and pace of the process of demographic transformations as well to perform its time and substantive periodization, the timeframe covering the entire 100 years, i.e. 1950–2050, has been selected. It contains the last two, out of possible three, stages in the evolution of age structure of a population (demographic youth, maturity and old age), reflecting the advancing process of ageing of societies (in terms of the proportion of persons aged 65 and over in the total population size).

Table 3. Natural increase rate, total fertility rate and life expectancy at birth in Japan in 2010 and 2050 against selected countries

Country	Natural increase		Total fertility rate		Life expectancy at birth (years)			
	(%o)				2010		2050	
	2010	2050	2010	2050	Male	Female	Male	Female
JAPAN	-1.0	-11,6	1.39	1.35	79.6	86.3	83.6	90.3
France	4.0	0.3	1.99	2.00	78.2	85.3	84.0	89.1
Spain	2.3	-4.5	1.29	1.49	79.1	85.3	84.4	89.1
Germany	-2.2	-5.9	1.39	1.60	78.0	83.0	83.9	87.9
Poland	0.9	-6.3	1.29	1.60	72.1	80.6	80.8	86.8
Sweden	2.7	2.1	1.85	1.91	79.6	83.6	84.5	88.1
UK	3.9	1.0	1.83	1.90	78.5	82.8	84.2	87.8
Italy	-0.4	-4.8	1.38	1.61	79.5	84.6	84.4	88.7
USA	5.4	1.2	1.89	1.92	76.1	81.0	82.7	85.5
China	4.9	-3,9	1.55	1.73	72.4	77.4	81.7	83.4
India	14.9	4,6	2.72	1.85	67.5	72.6	73.1	76.9

Source: enumerated by the author on base: *Japan Statistical Yearbook 2015*; *Population Projection for Japan (January 2012): 2011 to 2060, Appendix: Auxiliary Projections 2061 to 2110*; *The 2015 Ageing Report, Economic and Budgetary Projections for the 28 EU Member States (2013–2060)*; *The 2015 Revision of World Population, UN, World Population to 2300, UN, Department of Economic and Social Affairs*.

In the case of Japan, this analysis generally concerned the stages of “demographic maturity” and “demographic old age”. This kind of categorization of the process of the age structure transformations (globally as well as accounting for particular countries and regions) has been introduced by the United Nations, in line with the division (generally accepted in the academic circles), which is founded on the principle of variability of the percentage of population aged 65+ in the total number of inhabitants. Thus, if the proportion falls within the range of 0–4.0%, it is defined as the “demographic youth”. The subsequent stage, referred to as the “demographic maturity”, occurs when the applied indicator oscillates between 4.1 and 7 percentage points. The last and final stage, called the “demographic old age”, takes place when the share of persons aged 65 and over exceeds the 7.0% threshold.

The socio-economic development and the progress of civilization, expressed in improved living standards and quality of life of an ever-increasing number of countries, also entail new quantitative and qualitative changes affecting their demographic picture and structure. One of the most characteristic, even unique, features of the ongoing transformations is the sustained downward trend of the birth rate and the rate of natural increase as well as the increase in the death rate and life expectancy. Taking into consideration the socio-demographic and economic consequences of the examined trend, resulting in a quantitative and structural (percentage) increase of the number of inhabitants aged 65+, an urgent need arose to internally diversify the “demographic old age stage”. It is manifested in the fact that three characteristic phases may be distinguished within it, while maintaining the threshold level of the index of 7.0%. Conversely, the process of demographic transformation under the conditions of first, achieving and then, exceeding the threshold value of 7.1% share of this age group in the population, is commonly referred to as the process of population ageing.

The process of population ageing is initiated during its youngest phase, i.e. the “ageing society phase” within which the proportion of persons aged 65 and over rises within the 7.1–14.0% range. The second, more advanced, phase of the process of population ageing is called the “aged society phase”. In this case, the index is contained within the range between 14.1 and 21.0 pp. The most advanced phase of this process, i.e. the “hyper-aged society phase”, is initiated under the conditions of exceeding the value of 21% of the country’s total population by the group of persons aged 65+.

Japan was the first country in the world (in 2007) where the process of population ageing entered the phase of the hyper-aged society. According to the latest extrapolations, this process is estimated to develop dynamically, making this country, by the year 2050, the world leader with the share of population aged 65+ peaking at 38.8%! By comparison, close, yet lower percentages of people in this age group in the same timeframe will also be recorded in countries such as Spain (33.3%), Germany (31.8%), Poland (29.9%), Great Britain (23.9%) and the USA (21.4% – Table 2). As for the last case, it must be noted that the United States, as a classic representative of a nation of immigrants, will enter the “hyper-aged society phase” by the end of the first half of the 21st century.

Thus, the extremely high stage of the process of ageing of Japanese citizens as compared to other countries, affected by both, factors specific for this country as well as universal determinants, offers an opportunity to identify new aspects pertaining to this process that are of the pioneering character. It was one of the primary reasons for attempting to account for the phenomenon presented in the title of the present paper. This challenge brought novel conclusions in terms of the scale, temporal variability and correlation between the considered demographic indices, periodization of population ageing and new terminology.

In the wide array of research challenges presented to the author, one of importance that is worth noting is the periodization of the demographic development of Japan starting from the period after the Second World War, through the present day (2010–2015) and ending with the year 2050 (the so-called closer perspective) in terms of differences in proportions of population aged 65+ in the total population. The research was generally conducted by taking into consideration the evolution of the natural movement, fertility rate, life expectancy as well as quantitative and structural relations between the three primary age categories, namely: 0–14, 15–64 and 65+ years of age. In principle, it is a consequence of the aim to recognize the scale and pace of the development of the process of population ageing as well as the character of evolution of the selected group of demographic indicators in the subsequent phases of this process. It is represented in the form of stages and phases of the process of population ageing, delineated by the author, which, aside from being defined in terms of the beginning and end of their development, are also accompanied by a statistical-descriptive analysis and graphical-modeling syntheses. In practice, it will entail setting accurate timeframes for particular stages and phases, which is accompanied by a novel formula for statistical and cartographical presentation of variability of selected demographic indices.

The research findings allowed for confrontation and constructive verification of the theory of demographic transitions. This concerns both the transformations as well as the scale of dichotomy between the birth and death rate within the second demographic transition as well as an assessment of the role of the migration rate in terms of the development of the demographic process and shifts the total population size.

The periodization carried out within the distinguished stages may be regarded as an innovative approach to the widely-defined process of demographic transformations (a real increase or decrease of the number

of inhabitants). While analyzing the process of real value changes to the population size and time variability of the dynamics of the growth/decline of the total population as well as in the three age categories (0–14, 15–64, 65 years and over) over the period of 1950–2050, the author distinguishes the “demographic growth stage” and the “demographic decay stage”. Having regard to the fundamental shifts both in terms of the age structure as well as the dynamics of its growth/decline, occurring as a consequence of Japan’s entering the most advanced phase of the population ageing process within the demographic decay stage, the author distinguished two characteristic, consecutive phases, i.e. the earlier “demographic anxiety phase” and the “depopulation phase”. The formulated syntheses, accompanied by a select group of demographic indicators and simple diagrams, document and illustrate in a clear, unambiguous way, the particular stages and phases of the demographic transformations in Japan. The presented statistical materials, as well as reports compiled on their basis, constitute valuable material that may be used in both, discussion on the subject within the academic circles, as well as in comparative studies.

The research timeframe, covering the 1950–2050 period, is, in most cases, divided into 5-year ranges. This period must definitely be regarded as a unique period in the history of Japan. It’s a reflection of extremely dynamic, and yet fundamental, transformations of the socio-economic structure of this country as well as the extraordinary progress of civilization. Despite the terrible aftermath of the Second World War defeat as well as the American occupation of the country (until 1952), the years 1960–1980 were a period of unprecedented growth of the national economy (the so-called economic miracle) and its international expansion, making it the third global economic superpower. In only 20 years after the end of American occupation, Japan transformed from a country where 48.9% of working population was employed in Sector I (1950) into a country with the predominant Sector III (46.7%) with a very high level of Sector II

(34.0% of all economically active inhabitants – 1980), dominated by modern industry based on newest technological advances. The reshaping of the economic structure was accompanied by great migration flows of the countryside population to cities, which manifested itself in a rapid increase of the urbanization rate, from 37.3% (1950) to 72.1% (1970). In the final phase of the “economic miracle” (1980), only 10.9% of working people were employed in Sector I, whereas Sector III became the driving force of the economic growth, giving employment to 55.5% of the total number of people belonging to this category.

A dramatic decline in significance of Sector I in the national economy, in favor of the remaining two, as well as their unparalleled expansion on the global market, brought, along with a rising urbanization rate and formation of vast metropolitan areas (including the Nippon Megalopolis), important changes to socio-economic structure of population. It was manifested in a drop of the number of representatives of “blue-collar workers” (from 73.4% to 47.4%), with a simultaneous increase of the number of the higher socio-economic class, i.e. “white-collar workers” (from 14.1% to 29.8%) over the period 1950–1980.

In the following years, Japan could experience a typical, for countries at the highest level of economic growth, character of structural transformations. It was reflected in the robust development of Sector III, in which as much as 71.9% of all economically active persons are currently employed (2015). A relatively high position was maintained by Sector II, which, despite a decline in the number of Japanese citizens employed in it to the level of 24.3%, is still identified as being at the highest level of technological advancement and innovativeness. Under these circumstances, Sector I functions on the basis of strategic security, employing merely 3.6% of all working people (Table 4).

Table 4. Japan. Changes of employment structure by sectors of economy and urbanization index over the 1950–2015 period

Year	Percentage distribution of employed persons by industry			Urbanization index (%)
	Primary industry	Secondary industry	Tertiary industry	
1950	48.5	21.8	29.7	37.3
1955	41.1	23.4	35.5	56.1
1960	32.7	29.1	38.2	63.3
1965	24.7	31.5	43.8	67.9
1970	19.3	34.0	46.7	72.1
1975	13.8	34.1	52.1	75.9
1980	10.9	33.6	55.5	76.2
1985	9.3	33.1	57.6	76.7
1990	7.1	33.3	59.6	77.4
1995	6.0	31.6	62.4	78.1
2000	5.0	28.5	65.5	78.7
2005	4.9	26.4	68.7	86.3
2010	4.2	25.2	70.6	90.7
2015	3.6	24.5	71.9	90.9

Source: enumerated by the author on base *Japan Statistical Yearbook 1960, 2000, 2017*.

As a result of the described above shifts, Japan had experienced substantial changes in terms of the degree of urbanization, sub-urbanization – metropolization. It manifested itself in a further increase of the urbanization rate, from 37.3% (1950) to 90.9% (2015) and a rapid growth of the number of cities (from 254 cities with populations of 30 thousand and over – the so-called shi, to 787). Simultaneously, demographically extensive and economically strong metropolitan areas developed, which also constituted centers of economic regions of the country (e.g. Keihin with the center represented by Tokyo, Hanshin with the central city of Osaka as well as Chukyo, whose capital city was Nagoya). It must be stressed that as a result of the incredible speed of the demographic and economic development of the metropolitan area of Tokyo as well as the unprecedented advancement of the metropolization process, during this period, the largest megalopolis in the world formed (a type of a global megacity), i.e. Tokyo Megalopolis.

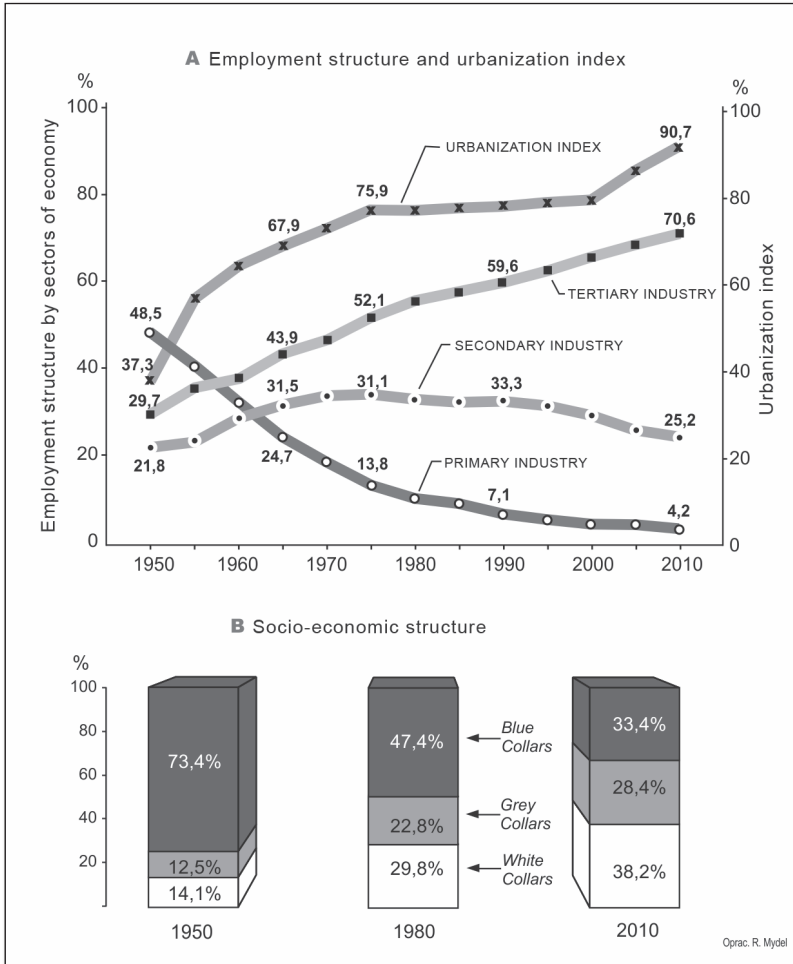


Figure 2. Japan. Changes of employment by sectors of economy and urbanization index (A) and socio-economic structure of population (B) over the 1950–2010 period.

Over the period of 1950–2010, it experienced an increase in the number of its dwellers, from 13,4 mn to 36,9 mn, which constituted 28.8% of the total Japanese population (Mydel R., 2014). It was accompanied by the process of creating the largest settlement formation within the megalopolis

category – Nippon Megalopolis, which is currently inhabited by approximately 75 mn people. As a consequence of these rapidly progressing processes, other changes had taken place, e.g. further transformations of the socio-economic structure of the population. It is evidenced by the present domination of the class of the “white collar workers” (38.2%) with a relatively high proportion of the “gray collar workers” (28.4% of all working people – Figure 2).

Modernization of the economic structures of Japan, accompanied by a highly advanced process of urbanization-metropolitization, resulted in fundamental changes of the social picture of its citizens. The rising prosperity, living standards and quality of life of the population, in combination with “westernization” of life, typical for Japan (particularly for the post-war generation) as well as the improved access to higher education for women and a rise of their socio-economic status, contributed to a thorough re-evaluation of attitudes in such aspects as family planning, its size as well as its widely defined – traditional, multigenerational model. This caused adverse changes in terms of natural movement, fertility, models of family and household, which, taking into account the rising life expectancy, caused a surge in the progress of the population ageing process. As regards the natural movement of population, just after the end of World War II (over the period 1947–1949), its characteristic feature was the “first baby boom”. The average birth rate during that period was 33.7‰, which, combined with the death rate of 12.8‰ at that time, resulted in the record-breaking rate of natural increase (28.9‰).

Beginning in the 1950s, all natural movement indicators exhibited downward trends, including the total fertility rate (TFR), which, since 1974, has been at the sub-replacement level, i.e. (Figure 3). It is appropriate here to remind that this indicator informs of the numbers of births over a given year per woman in her reproductive (childbearing) age, i.e. 15–49.

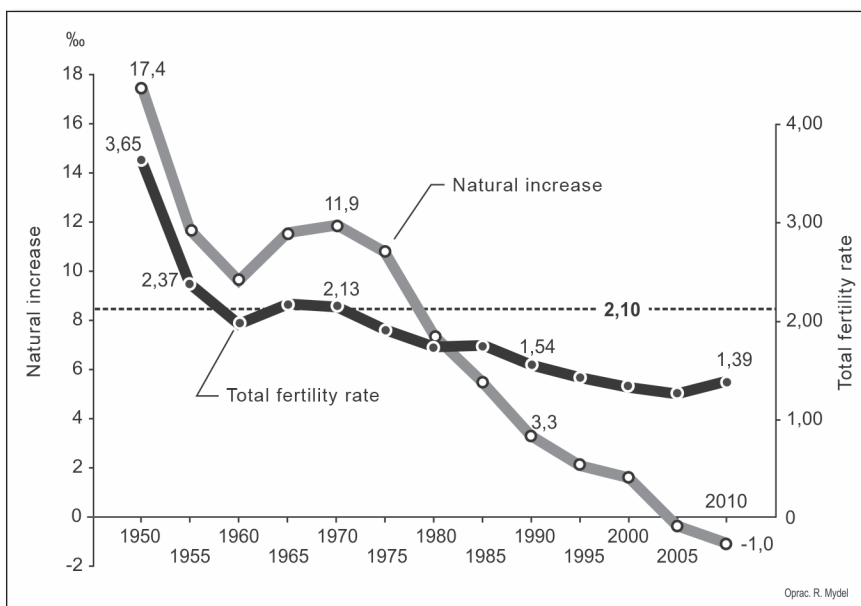


Figure 3. Japan. Changes of the rate of natural increase of population and the total fertility rate over the 1950–2010 period.

A marginal increase of the birth and natural increase rates over the period 1965–1975 with the simultaneous rise of the fertility rate, securing the replacement level fertility, was related to entering into marriage of people of the post-war baby boom of 1947–1949. Thus, the generation of the “first baby boomers” determined that period’s revival of natural movement of population, referred to as the “second baby boom”. Its height occurred over the period of 1971–1974 and was characterized by exhibiting the birth rate of 19.3‰ and the rate of natural increase at the level of 12.7‰. The two baby booms registered during the period of the post-war transformations of the natural movement of the population were the source of substantial changes to the age structure, accelerating the population ageing rate in later years. Taking into account the extending lifespans, echoes of the two booms had started to be felt massively since

the beginning of 2012, when the population of the first baby boom (1947–1949) entered the post-productive age (65 years old and over).

Since the end of the second baby boom (1971–1974), the birth and natural increase rates have sustained a continued downward trend. Under the conditions of stagnation of death rates, during the period of 1960–1980, the value of which fell between 6.0–7.0‰, and later, their consistent, slow increase, caused by the increasingly growing population of aged people, the country recorded a negative value of the rate of natural increase at the beginning of the 21st century. In 2010, the RNI stood at the level of -1.0‰, accompanied by the birth rate of 8.5‰ and the death rate of 9.5‰ (Figure 4). As a consequence of the aforementioned trend of changes to the natural movement of the population, over the period of 1950–2015, profound age structure transformations had taken place. The most notable aspect was the rapid rate of decline of inhabitants aged 0–14 in the total population, with the share of 35.4% in 1950, 23.9% in 1970 r., to 12.7 percentage points in 2015. Based on the present statistical data, it may be inferred that, in the case of Japan, the year 1970 marks the end of the “demographic maturity stage” and initiates the following one: “the demographic old age” as well as the process of population ageing. Since that moment, the country has been experiencing the unparalleled, in scale and dynamics, real and structural rise of the number of people aged 65+ (Table 5).

The phase of the ageing society, started in 1970, ended in 1994, i.e. after 24 years. The incredibly fast progress of the process of ageing of the Japanese population is evidenced by the fact that the subsequent phase of transformations, called the “aged society phase”, characterized by the percentage of persons aged 65 and over in the total population falling between the value of 14.1–21.0%, lasted only 13 years (1994–2007). It means that, in 2007, Japan entered the most advanced phase of the ageing process, i.e. the “hyper-aged society phase”.

Table 5. Japan. Changes of the total population number, age structure of population, natural movement rates and total fertility rate over the 1950–2015 period

Year	Total population (mn)	Percentage of total population			Vital rates (‰)			Total fertility rate
		0–14 years	15–64 years	65 and over	Live birth rate	Death rate	Natural increase rate	
1950	84,1	35.4	59.7	4.9	28.3	10.9	17.4	3.65
1960	94,3	30.2	64.1	5.7	17.3	7.6	9.7	2.00
1970	104,7	23.9	69.0	7.1	18.8	6.9	11.9	2.13
1980	117,1	23.5	67.4	9.1	13.5	6.2	7.3	1.75
1990	123,6	18.2	69.7	12,1	10.0	6.7	3.3	1.54
2000	126,9	14.6	68.0	17.4	9.5	7.7	1.8	1.36
2010	128,1	13.2	63.8	23.0	8.5	9.5	-1.0	1.39
2015	127,1	12.7	60.5	26.8	8.0	10.3	-2.3	1.46

Source: enumerated by the author on base *Japan Statistical Yearbook 1960, 2010, 2017*.

According to the newest demographic projections, not only will this process continue but it will also gain momentum. The population of persons aged 65 and over will increase its share in the total population of Japan by an additional 7.0% (to the level of 28.0%) within just 10 years (until 2017). In the shorter term – until 2050, this indicator is estimated to reach the value of 38.8%, whereas in the year 2100, Japanese seniors will make up as much as 41.1% of the entire population of this country. In effect, in 2050, the population of the aged will be four times larger than the group consisting of the youngest inhabitants (0–14), which will constitute 9.7% of the total population of Japan.

Another consequence of this character of transformations of the natural movement of people and age structure of this country will be a substantive drop of the number of its citizens. This process commenced in 2010, when Japan achieved the maximum (the all-time high) number of citizens in its demographic history at 128,1 mn persons. It is worth mentioning that the projected population size for the year 2050, estimated

at 97,1 mn persons, will correspond to the population level recorded in 1964. According to the long-term projections by the Japanese National Institute of Population and Social Security Research, in 2100, Japan will be home to 49,6 mn citizens, which indicates its continued decline over the period 2050–2100 by as much as 48.9% (Figure 5). In this case, the size of population will correspond to the level registered in 1910–1911. If these demographic projections for Japan are fulfilled, it will result in the most dramatic decline of population as compared to other countries that are strong demographically and well developed economically.

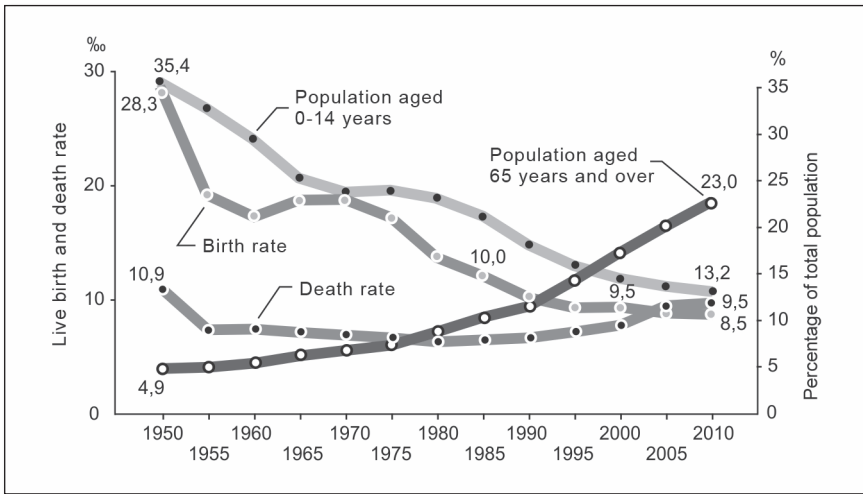


Figure 4. Japan. Changes of birth rate and death rate against the background of share of the young population (0–14 years old) and seniors (65+) in the total population over the 1950–2010 period.

Under these circumstances, the research problem undertaken by the author seems to be very interesting from a scientific and cognitive perspective and not only in the context of the Japanese demographic problems. The findings of this research, combined with a range of select, ample demographic statistics, containing latest projections, compiled and published by the National Institute of Population and Security Research, may constitute a basis for discussion on a variety of socio-demographic and economic issues,

characteristic for an ageing society (e.g. verification of the upper productive-age threshold, retirement age, professional activity of the elderly, welfare and medical care or the widely-defined urban planning that takes into consideration diverse needs of the numerous and rapidly growing population of aged inhabitants of metropolitan areas and cities). Furthermore, owing to the ongoing process of extending life expectancy (over the period of 1950–2015, it increased, on average, by 22,4 years), accompanied by a rise of the number and structural share of population aged 75+ (in 2015, this group outnumbered the population aged 0–14, constituting 13.0% and 12.5% of the total population, respectively), it became necessary to carry out a new, internal division and categorization of the entire population of post-productive age, i.e. those aged 65 and over. The Japanese National Institute of Population and Social Security Research has already made some attempts to take steps in this regard.

They mainly include actions aimed at extending economic/professional activity of persons aged 65+, within which specialist courses, funded by private or state companies, intended to enhance professional skills or prepare them for taking up new jobs are being organized. Aside from the already mentioned project of raising the retirement age threshold, the eldest category of seniors is to be provided complete free medical care and welfare (*Changes in an Ageing Society*, vol. 4, Japan Ageing Research Center, Tokyo – <http://www.jarc.net/int.>). This may serve as yet another example of the fact that the very advanced stage of the process of population ageing in Japan generates many, various, new challenges of the scientific-research nature as well as practical actions in the realm of socio-demographic and economic policymaking.

With this in view, the extended timeframe of the present study, from the post-war period of demographic maturity, through the consecutive phases of the demographic old age stage (including the demographic extrapolations up to 2050), will enable a very thorough examination of the

character, range and pace of the considered transformations, both taking into account the real indicators (for the period of 1950–2015) as well as the projections (mainly with regard to the period of 2015–2050).

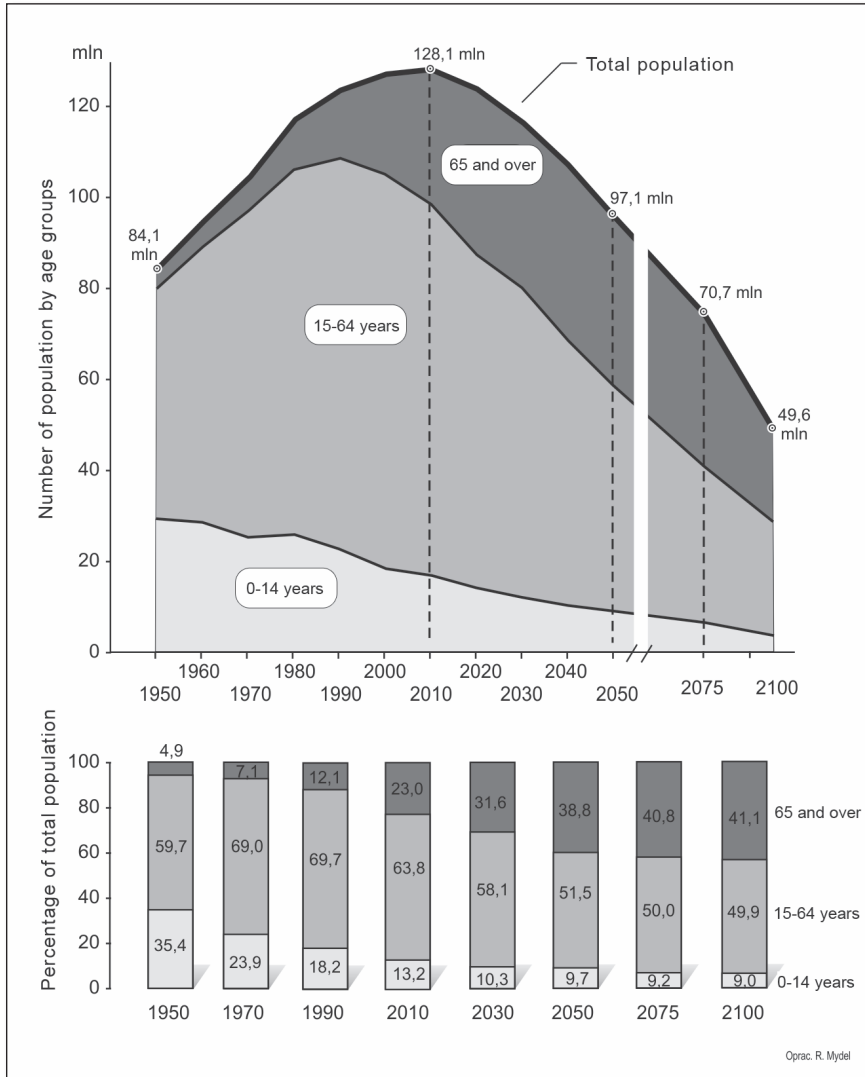


Figure 5. Japan. Changes of the number and age structure of the population over the 1950–2100 period.

The principal idea and objective of the author's research was to periodize the process of evolution of the age structure of Japan in terms of the widely-defined phenomenon of population ageing, against the background of the natural population movement transformations. The point of reference on the subject of age differences in societies, has been the idea of the structural proportion of persons aged 65+ in the total population, which was introduced by the UN and has been widely used by researchers. Based on the methodology of periodization, presented previously, the author characterized the consecutive stages with phases and periods within them, by means of a wide array of select demographic factors. The initial and final moment (year) of each distinguished stage and phase, in effect – their duration, has been indicated and documented. It enabled the investigation of qualitative and quantitative transformations of the selected indicators at certain points, within the distinguished stages and phases. Another novel aspect of the process of transformations, has also been taken into account, i.e. the change (growth/decline) dynamics of the number of persons in the selected age categories, with a particular focus on population groups aged 0–14, 15–64 as well as 65 and over. Having regard to the great scale and growth dynamics of the elderly (65+ years) as well as the relatively high level of economic activity of some, within the considered population group, the author has distinguished two age sub-groups: persons aged 65–74 (the so-called young seniors) and older, aged 75+ (the so-called old seniors). It was intended to draw attention to real and potential labor force within this large group of the Japanese society. This kind of information will enable understanding and realizing the issue of the rising popularity of voluntary work in the ageing society (aimed at maintaining the all-round physical and mental fitness of seniors, which is evidenced by their growing participation in the domestic and foreign tourist attendance).

At this point, it is worth pointing out a culture-based fact that the large numbers of the Japanese aged 65–74 are characterized by the attitude called *otoshiyori*, i.e. a high level of economic activity, both with regard

to the extended employment period in their original companies, as well as in new posts. For instance, in 2012, as much as 51.0% of all men aged 65–69 remained professionally active, whereas for women, this indicator stood at 26.0%. As for citizens aged 70–74, the proportion of working men reached the value of 27.7 pp, whereas for women it was 16.0% (*Population Statistics of Japan 2015*). As a side note, a fact worthy of remark is that in Japan, in 2005, the average age for retiring men was 68.7, whilst for women it stood at 64.9. It may, thus, be concluded the Japanese seniors (those aged 65+, Japanese: *koureisha*) form a group that can be described as the “active ageing citizens” of the country.

An integral, and the same time, innovative research achievement of the author was distinguishing two new stages, i.e. the “demographic decay stage” and the “conversion stage” in the century-long process of demographic transformation in Japan (1950–2050). The stage of demographic decay was based on the analysis of fluctuations of the number of people in the total population and within the three principal age groups as well as the dynamics and structure of its transformation.

The time variability of the scale and dynamics of the recorded shifts, in particular with regard to the three basic age groups (0–14, 15–64, 65 and over), results in an initial slow rate of growth of the population in total. Over the following years of transformations, it will cause a sluggish growth of the number of people until reaching the maximum – peak (the all-time high number of citizens) after which a sustained, downward trend of the population size may be observed. Having regard to time variability of value of the total population growth/decline rate, in combination with the fact of commencement of the process of the real drop of the number of citizens, the author distinguished two consecutive phases within the demographic decay stage: the “demographic anxiety phase” and the “depopulation phase”. In the case of Japan, the time boundary between the phases is the year 2010, when the total population peak was registered (128,1 mn

inhabitants) and the process of population size decline was initiated. The projected decrease of the number of Japanese citizens over the period of 2010–2050 is estimated at -24.2% (from 128,1 mn to 97,1 mn persons), and over the next 50 years 2050–2100, is expected to reach the value of -48.9% (a fall from 97,1 mn to 49,6 mn persons). It should be stressed that this process will be taking place simultaneously with the multi-pronged activities of the government aimed at demographic revitalization.

The “conversion stage” is ,on the other hand, based on the time variability of the structural relation between persons aged 0–14 and seniors (those aged 65+) as well as the distribution of the birth and death rates. In the former case, the conversion stage is characterized by a rising numeric advantage and domination of seniors over people aged 0–14, while in the latter, it is identified by a consistently growing dominance of the death rate over the birth rate. A consequence of entering the demographic conversion stage is, predominantly, a surge in the speed of progress of the population ageing process.

Both of the distinguished and defined processes may be regarded as synonymous with achieving the highest level of advancement in the process of ageing of the contemporary society.

In view of the above considerations, the research problem undertaken by the author, contained within the paper’s title, as well as the analysis of specific issues by means of a new, substantive and methodological approach, seem to be extremely valid and interesting from a scientific and cognitive as well as methodological perspective.

Japan’s exceptional scale and state of progress of the process of demographic transformations, including the population ageing process, make the findings of the research very valuable as far as the cognitive and theoretical-modeling aspects are concerned. They may be applied to verify,

evaluate and constructively develop the classic theory of demographic transition, particularly the part concerning the so-called second demographic transition.

The findings have been complemented with selectively chosen and processed, various statistical materials in tables and figures. They are predominantly based on statistical yearbooks: Population Statistics of Japan, Social Security in Japan, The Financial Statistics of Social Security in Japan, compiled and published by the National Institute of Population and Social Security Research (NIPSSR), as well as on the Japan Statistical Yearbook, published by the Statistics Bureau (a government agency operating within the Ministry of Internal Affairs and Communications). Information regarding demographic projections for Japan comes from the latest NIPSSR publication titled *Population Projections for Japan (January 2012): 2011 to 2060, Appendix: Auxiliary Projections 2061 to 2110*.

For the sake of clarity as well as defining and organizing data that allows distinguishing particular stages, phases and periods of the process of demographic transformation unambiguously, the author placed it in the clear tabular and graphical form. At the same time, they constitute the graphical and descriptive synthesis of issues under consideration with a large dose of innovative interpretation and a proposal for new terminology, definitions and concepts.

2.

**TRANSFORMATION AND PERIODIZATION
OF THE CHANGING NATURAL MOVEMENT
AND THE AGE STRUCTURE OF POPULATION
IN THE CONTEXT OF AGEING PROCESS**



Contemporary Japan is demographically the oldest country in the world, since 1977, setting the stage of conversion in the children population (aged 0–14 years) versus 65 years and older percentage share arrangement. Seniors are the only group in the country with a real increase in numbers.



In line with the aforementioned research aims and assumptions of the study, the scope of detailed factual analyses has been predominantly based on the transformations of the age structure of Japan's population in three main categories (citizens aged 0–14, 15–64, and 65 and over). So as to enrich the factual content and take into account the possibility of identifying new relations occurring in the process of transformation of age structure mentioned above, a comparative research on the scale and increase-decrease dynamics of the respective population groups was conducted. This type of scientific approach enabled the author to outline and evaluate precisely what type of structural relations, in connection with the size dynamics of examined populations, determines forming the relationships underlying the differentiation in the process of demographic changes of particular stages, phases, and periods. With reference to the traditional formula of this type of studies, additional, universal indices such as the “ageing index” ($\text{population aged } 65+ / \text{population aged } 0-14 \times 100$), the “old age dependency ratio” or the “elderly dependency ratio” ($\text{population aged } 65+ / \text{population aged } 15-64 \times 100$), and the “total dependency ratio” ($\text{population aged } 0-14 + \text{population aged } 65+ / \text{population aged } 15-64 \times 100$) were also found useful in the course of the research.

While implementing one of the core research objectives, namely that of detailed interpretation of the development of the population ageing process, the analysis of change in variability of elderly population in reference to Japan's overall population was of fundamental significance. This particular aspect of methodological approach was described in detail in *Chapter 1*. At this point, it is worth noting that a population's ageing process is initiated when the percentage of its citizens aged 65 and over reaches the value of 7.0%. Under such circumstances, the "demographic old age stage" begins. Bearing in mind the necessity to differentiate, in detail, how advanced the level of population ageing really is and taking into consideration the relatively substantial number of citizens aged 65 and over (widely regarded as the population in the post-productive age group) on the labor market, three distinctive quantitative ranges pertaining to their significance in Japan's total population were distinguished and defined. Within the "old age stage" they form three phases, which are marked by the rising percentages within this age group. When the percentage of citizens from this category falls within the range of 7.1–14.0%, we refer to the population as an "ageing society", whereas when it remains between 14.1 and 21.0%, it is regarded as an "aged society". Exceeding the ratio over 21.0% proves the highest level of population ageing. Under such circumstances, citizens of a given country are regarded as a "hyper-aged society". The abovementioned limit values from the "demographic old age stage", thus, mark three other phases differentiating the level of population ageing, namely the "ageing society phase", the "aged society phase", and the "hyper-aged society phase".

Actual and hypothetical character in the evolution of changes in the age structure, resulting in the constantly growing level of society ageing, is generally a derivative of the natural population movement's transformation which, as it is known, is based on the "first and second demographic transition" theory. Undoubtedly, it seems necessary to interpret the variability of respective indices in the natural movement in this type of

study. To gain a deeper understanding of the scale and character of the discussed changes, the author expanded the “total fertility rate” to a time parameter, describing the total number of children born per one woman in her “child-bearing years”, which in conventional international statistical usage is ages 15–49. TFR determines how natural movement rates are developed and, consequently, influences the population age structure.

While analyzing changes of the birth and death rate in Japan from the mid – 1940s up until now, it should be stated that the high birth rate (an average of 25.0‰) from the period of 1947 to 1950 along with the death rate of 10.0‰ at that time has to be identified with the first demographic baby boom. Its transition was marked by a systematic fall in birth rates and its distinctive drop in the 1970s, along with a relative stagnation at death rates. Such statistics prove that Japan entered the stage of changes characteristic to the so-called “first demographic transition”. At the end of this stage, which falls between 1985 and 1995, a new trend connected with increasing death rates along with a systematic drop in birth rates has occurred. The changes described above were the typical phenomena in the natural population movement in the aspect of the theory of demographic transition, which helped to finish the first and initiated the “second demographic transition” (SDT). Taking into account the character of the age structure changes, including the increasing number of citizens aged 65+ in the Japan’s population, it can be clearly stated that **the end of the first and the beginning of the second demographic transition took place in 1994**. From a scientific and cognitive perspective, **the fact that this transition in Japan occurred from the “ageing society phase” to the “aged society phase”** seems to be of utmost importance in this context (Figure 6).

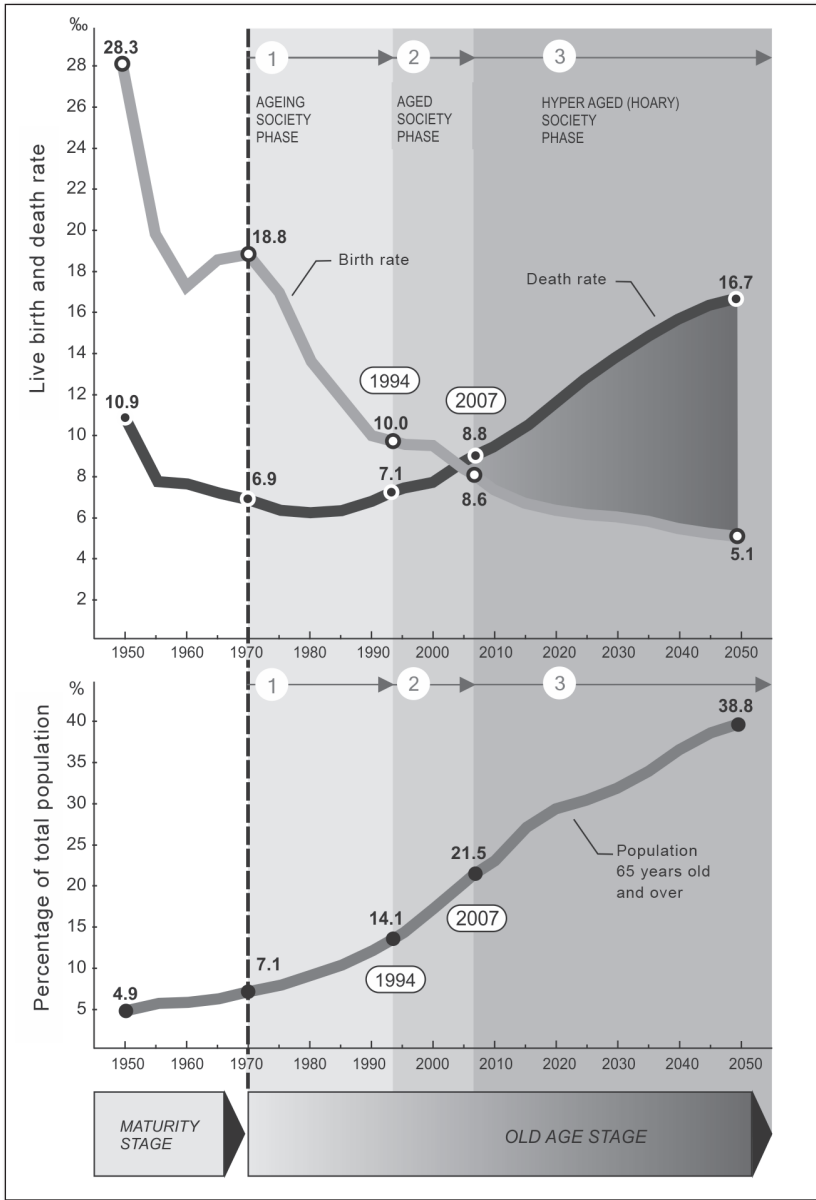


Figure 6. Japan. Changes of birth rate and death rate (A) and percentage share of the elderly population (65 years old and over) in the total population (B) in the process of transition from the demographic maturity stage to the hyper-aged society phase (1950–2050).

As for the time span of this stage, it has to be said that **population changes in post-war Japan were taking place within the theory of the first demographic transition from the demographic maturity phase (from 1970) to the ageing society phase (between 1970 and 1994)**. This type of relation shows signs of a pattern, which enables establishing the exact boundary between the end of the first and the beginning of the second demographic transition.

In the context of implementing one of the core research tasks aiming at recognizing the complexity of the process of population ageing, it has to be stated, without any doubts, that **the boundary between the first and the second demographic transition is marked by the moment when demographic changes enter the stage of population ageing (in other words, the initiation of the aged society phase)**. It takes place when the population share of people aged 65+ reaches the level of 14.0% of the overall country's population. In the case of Japan, the group of selected demographic indices characteristic for this moment of changes includes reaching the birth rate of 10.0‰, the death rate of 7.1‰ (as a result, obtaining positive value of natural growth rate at the level of 2.9‰) and the fertility rate of 1.50. Characteristically for Japan, the high aged dependency ratio of 86.0 occurs along with the extremely low percentage of the youngest age group (0–14) at the level of 16.3%, which outnumbers the population of people aged 65+ only by 2.2 percentage points as the elderly constitute as much as 16.3% of the country's population.

The further process of changes, namely within the second demographic transition, is characterized by a significant fall in the fertility rate (from 1.50 to 1.30), accompanied by a considerable growth and a structural share of population aged 65+ as well as an increase in the death rate. This tendency was followed by a constant drop in the birth rate (exhibiting ever-increasing negative values!). A situation of this type took place as early as 13 years after Japan's second demographic transition

initiated. In the case of an evolution of natural population movement in Japan, the period from 1994 and 2007 marked the transition to the “aged society phase”. Beginning in 2007, Japan enters the most advanced phase of the demographic old age stage, namely the hyper-aged society phase. It is characterized predominantly by an exponential growth in the death rate. Under conditions of a slow and systematic drop in the birth rate, a permanent decline in the population growth began to reach ever-increasing negative index values: from -3.5% (2015) to projected for the year 2035 -9.0% and -11.6% in 2050 (Figure 7). Fertility Rate on the persistent level of 1.34 and prolonging average life expectancy determine a systematic growth in the death rate and a strong trend in the growing share of citizens aged 65 and over in the Japan’s population (from 26.8% in 2015 to 38.8% in 2050). The final result of the abovementioned trend of changing natural population movement and population age structure was the beginning (in 2015), and a continued decrease in the number of citizens in Japan, of the country’s depopulation. In accordance with the latest projections, between 2015 and 2050, this drop will reach a record-breaking number of -24.0%.

Paraphrasing the “theory of demographic transitions”, one may formulate a thesis that the most advanced phase of the second demographic transition can be regarded as the “demographic decay stage”. It is characterized by a increasing tendency of negative population growth index, leading to the process of a systematic population decline, which is regarded as depopulation. The pace and scale of depopulation can be reduced by a long-term and effective pro-natalist and pro-family government policies and an adequate immigration policy. In the case of Japan, the existing and multiannual efforts made by the government in this respect have not brought the expected results. The following pro-family actions do not encourage even a slight dose of optimism. Extremely pessimistic demographic projections, which are systematically updated, reflect this trend strongly.

That is why, the potential possibility of recognizing and interpreting in an innovative way (using the example of Japan) the process of demographic changes in the world's eldest society (today and in the end of the 21st century) seems to be highly interesting and valuable. Thus, in line with the research assumptions, the author was focused predominantly on the analysis and periodization of these changes and on a synthetic characterization of specified stages and phases. Apart from being identified and defined, stages and phases are illustrated graphically by means of employing universal demographic indices. Moreover, distinctive relations in time variability of selected rates indicate trends of a new quality in terms of relations between them (for instance, birth rate vs. death rate or fertility rate and percentage of people aged 0–14 vs. the percentage of citizens aged 65 and over). At the same time, the obtained research results, documented in a statistical and cartographical form, enable carrying out comparative studies pertaining to multiple aspects of the population ageing process, especially among economically developed countries. Importantly, these results enable differentiating the current level of demographic changes and possible projections of their transformations in the conditions of permanent interventions implemented by the Japan's government. They also illustrate the kind of challenges Japan is facing and on what scale, as the country is entering the hyper-aged society phase, in which the number of people aged 65+ almost triples the population of the youngest, i.e. those aged 0–14.

3.

**DEMOGRAPHIC MATURITY STAGE (1947–1969)
DEMOGRAPHIC TRANSFORMATIONS
FROM THE FIRST BABY BOOM (1947–1949)
TO THE DEMOGRAPHIC OLD AGE STAGE**



In the demographic maturity stage (1947–1969), which was characterized by a very high total fertility rate value (average 3.31), there were typically three children in the family.



The end of the World War II is marked as the period of population growth in the process of demographic transformations in Japan. The “baby boom” occurred over the years 1947–1949, and is regarded as a typical phenomenon related to the so called compensation of the natural population movement. It is identified by an extremely high birth rate (34.3‰ in 1947, 33.8‰ in 1948 and 32.9‰ in 1949), which made the population growth index oscillate between 19.7–21.4‰. In Japanese literature on the subject, the years 1947–1949 are defined as the “first baby boom” (the first rapid demographic growth), which was accompanied by the highest fertility rates in the demographic history of Japan, oscillating between 4.54 in 1947 and 4.39 in 1949. Under such circumstances, in 1950 as much as 35.4% of the total population of Japan (83.2 million at that time) was included in the age group of 0–14. The proportion of the eldest citizens, those aged 65 and over, constituted only 4.9%.

In the context of research tasks formulated by the author, the exhibited share of people aged 65+ proves that Japan, soon after the end of the Second World War, found itself in the “**demographic maturity stage**”. With the end of the “first baby boom,” a rapid decline in the birth rate occurred

(from 28.1‰ in 1950 to 17.2‰ in 1960), which contributed to a decline of natural increase (from 17.2‰ to 9.6‰, respectively). Those years were, at the same time, a period of reconstruction and modernization of Japanese economy, which, in the demographic context, was accompanied by large-scale internal migrations, from the countryside to cities. Recorded at that time, the unprecedented urbanization growth – from 37.3% (1950) to 63.3% (1960), was the main factor that contributed to the changes in the scale and the character of natural population movement in this country.

The revival of natural population movement, characteristic for the demographic maturity stage, is defined by a renewed increase in the birth rate (up to 18.5‰ in 1969), which was accompanied by the death rate at 7.0‰. The revival contributed to a significant increase in the population growth (up to 11.7‰ in 1969). The recorded character of relations in population growth indices was a result of entering the so-called “marriage years” by the “first baby boomers”. However, a direct consequence of a drop in population growth was the significant decrease of the population aged 0–14 (down to 23.9%) and the structural population growth of persons aged 65+ (up to 6.9%) in Japan. This marked the conclusion of the demographic maturity stage for Japan.

Table 6. Japan. Selected demographic indices noted in the advanced (1947) and final (1969) phase of the Demographic Maturity Stage

Specification	Maturity Stage			
	Advanced phase (1947)		Final phase (1969)	
Total population (mn)	78,1		102,6	
Age structure of population (% of total)				
0-14 years	35.3		23.9	
15-64	59.9		69.2	
65 and over	4.8		6.9	
65-74 years	3.7		4.9	
75 and over	1.1		2.0	
Ageing index (65 and over/0-14 years x 100)	13.6		28.9	
Elderly Dependency Ratio (65 and over/15-64 years x 100)	8.0		10.0	
Vital rates (‰)				
Live birth rate	34.3		18.5	
Death rate	14.6		6.8	
Natural increase	19.7		11.7	
Total Fertility Rate	4.54		2.13	
Life expectancy (years)	Male	Female	Male	Female
at birth (0 years)	50.1	50.4	67.7	72.9
at age 65	10.2	12.2	12.0	14.9
at age 75	6.1	7.0	6.9	8.5
Growth/decline rate of population over 1947-1969 period (in%)				
Total population	31.3			
0-14 years	-10.8			
15-64	51.6			
65 and over	89.8			
65-74 years	72.7			
75-79 years	122.2			
80 and over	190.4			

Source: enumerated by the author.

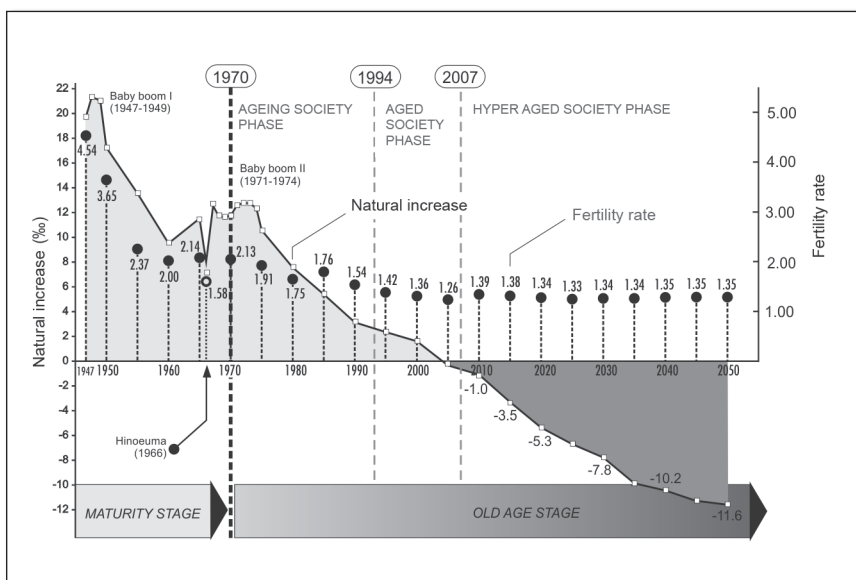


Figure 7. Japan. Changes of the rate of natural increase and the total fertility rate against the background of stages and phases of the demographic transformation process over the 1947–2050 period.

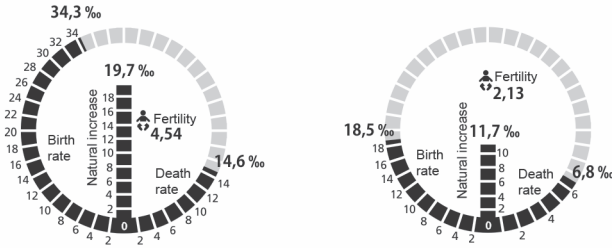
Over the 22-year period of post-war economic and demographic changes in Japan, which lasted between 1947 and 1969, one of the characteristic phenomena is the highest dynamics of population growth of citizens aged 65 and over (up to 89.8%) along with a concurrent decrease in the value of the indicator for those aged 0–14 (a fall by 10.8%). In this period, marking the post-war demographic maturity stage, life expectancy extended significantly: for about 18.3 years (from 52.1 to 70.3) on average, along with a concurrent drop in the fertility rate – from 4.54 (1947) to 2.13 (1969). It was a period (stage) in the post-war demographic changes of Japan in which the value of this index not only guaranteed the sufficient replacement rate but also brought the population growth. Selected demographic indices characteristic for the advanced (in 1947) and late (1969) phase of demographic maturity stage are included in the Table 6 and Figure 8.

DEMOGRAPHIC MATURITY STAGE

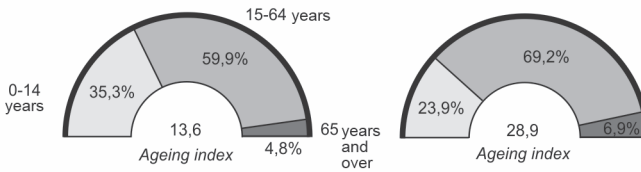
A Natural movement of population

Advanced phase (1947)

Final phase (1969)



B Age structure of population



C Change rate of population by age groups: 1947-1969

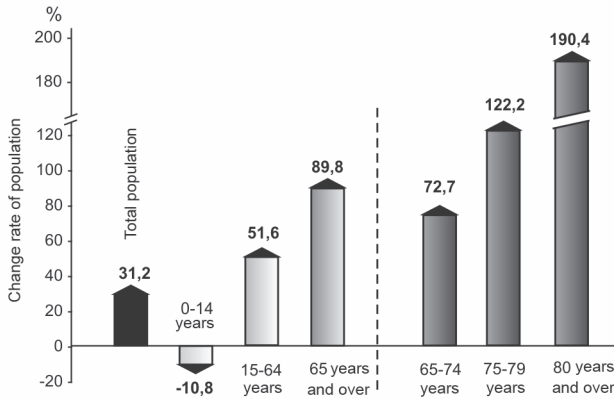


Figure 8. Japan. Demographic Maturity Stage (1947–1969). Natural movement indices, fertility rate (A) and age structure of the population (B) in the advanced (1947) and final (1969) phase of the demographic maturity stage and changing population growth/decline rate in selected age categories over the 1947–1969 period (C).

From a cognitive perspective, within the late phase of the demographic maturity stage, the rapid fall in birth rates from 18.6‰ in 1965 to 13.7‰ in 1966 and its following growth up to 19.4‰ in 1967 deserve close attention. The drop was accompanied by a decrease in the population growth from 11.5% in 1965 to as little as 6.9% in 1966 and its subsequent increase up to 12.6% in 1967, which in the following few years (1967–1974) was at the average level of 12.0% (Figure 7). This situation, observed near the end of the demographic maturity stage, had a cultural and historical foundation. According to the lunar calendar, the year 1966 was the year of *Hinoeuma* (“fire horse”), which, from the beginning of the 17th century until now, was associated with a superstition that people born in this year are hot-tempered and difficult to coexist with. As a result, the Japanese refrain from entering relationships with people born in the year of the fire horse or avoid employing them in high-level positions.

To sum up, it has to be emphasized that the post-war demographic maturity stage should be regarded as extraordinary in terms of demographic changes in Japan in this period. Undoubtedly, the three-year period of the first baby boom or the year of *Hinoeuma* (1966) mentioned above, influenced the specificity of the natural population movement process to a great extent (especially regarding birth rates and population growth). The consequences of both demographic events will make a lasting impact in the following phases of transformations taking place in the demographic old age stage. In particular, they will be visible in the picture of population age structure as well as in the birth and death rates, determined by the large population of the “first baby boomers” who, in the years 2012–2014 will be 65 and older.

4.

**DEMOGRAPHIC OLD AGE STAGE (1970–2050)
THE DEVELOPMENT OF THE AGEING PROCESS
IN DIFFERENT PHASES
OF THE DEMOGRAPHIC OLD AGE STAGE**



The increase professional activity of women, accompanied by a decline in the share of the total population of women aged 15–49 years (25.5% in 1970 to 20.2% in 2015), is one of the most important factors in reducing the fertility rate and an increase in the number of childless married couples and elderly households.



In line with theoretical and methodological assumptions of the research on the process of population ageing, the primary indices differentiating the level of its advancement are the limit values of the share of citizens aged 65+ in the total population of Japan. As it has been presented in the *Introduction* of this study, three structural ranges of this index value of increasing shares of elderly citizens distinguish further, more advanced phases of the population ageing process, defined by the author the “ageing society phase” (7.0–14.0%), the “aged society phase” (14.1–21.0%), and the “hyper-aged society phase” (when the percentage of population aged 65 and over exceeds the value of 21.0%).

It should also be recalled that Japan, against the background of the remaining countries in the world, can be characterized by the highest level of society ageing process. This process initiated in 1970 and beginning from the year 2007, which is 37 years after the country entered the “aged society phase,” up until now it has developed within the most advanced phase, namely “hyper-aged society phase.” The current, real scope of change within the population age structure, from its initiation (1970) to the recent years (2015), designating the early period of the “aged society phase,” was

marked by the presence of several groundbreaking events. One of them includes a persistent trend of population decline within the age group of 15–64, which initiated in 1997. At this point, it is worth noting that a similar process of decline in the real population was noted earlier (in 1980) and it pertained to the Japan's youngest population – citizens aged 0–14. This indicates that **during the “aged society phase,” lasting between 1994 and 2006, the real population growth can be attributed only to the category of the oldest citizens (aged 65 and over). The year 1997 also initiated the moment of structural shift as the population aged 65 and over (15.7%) outnumbered the population of citizens aged 0–14 (they constituted 15.3% of the total population). From that point on, the population of the senior citizens is the only group within which population growth can be observed.**

The persistent trend connected with the extended life expectancy in all age groups accelerates the ageing process of population in Japan. The significant moment proving the existence of this trend occurred in 2015 (which falls on the “hyper-aged society phase”), when the majority of population in Japan was of notably old age (75 and over) and constituted 13.0% of total population. Thus, the elderly outnumbered the population of citizens aged 0–14 as the proportion of the youngest constitutes as little as 12.5% of the overall population. A feature, which is no less important for the initiation of this kind of demographic changes including changes of Japan's age structures, is that Japan, in 2010, entered the “depopulation phase,” which means a decline in its total population.

According to the most recent projections, the further course of demographic changes process resulting in the country's entering a more advanced “hyper-aged society phase” (initiated in 2007) will make Japan observe, in 2025, the predominance of population aged 80+ (11.4%) over the population of the youngest citizens (0–14), which will represent as little as 11.0% of the total population of this depopulating country (Figure 9).

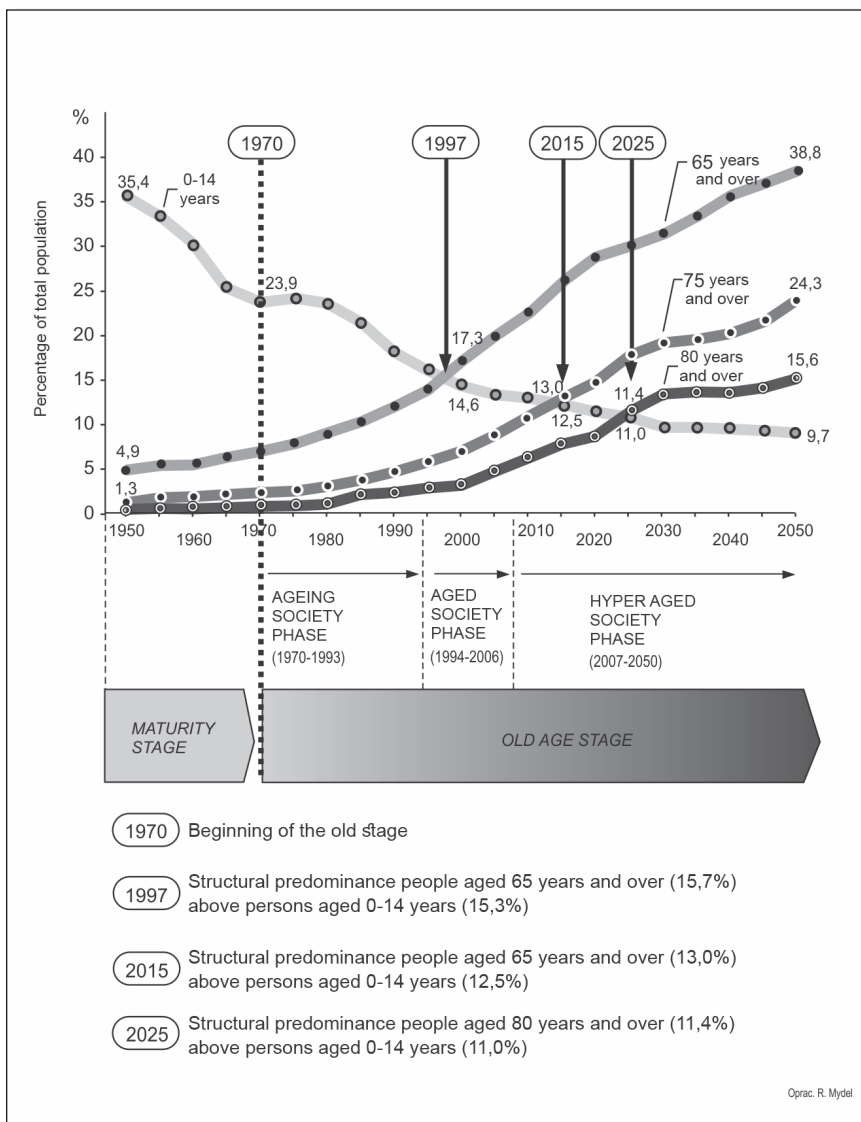


Figure 9. Japan. Changes of age structure of the population against the background of stages and phases of the ageing population process with the indication of the year of structural predominance selected age groups of seniors over the younger age population (0–14 years) over the 1950–2050 period.

4.1.

AGEING SOCIETY PHASE (1970–1993)



A preschooler on a morning walk: a statistical representative of Japan's dwindling population and a member of a predominant family model (2+1). It is him and his peers who between the years 2020 and 2060 will be facing multiple challenges stemming from functioning within the aged society as well as exponential population decay in Japan.

4.1.



Japan's post-war history of the unprecedented economic growth, which reached its peak over the years 1960–1980, was accompanied by considerable demographic and social changes. In this period, the demographic picture of Japan's society was created by the grown-up generation of the “first baby boomers” from the years 1947–1949. Their presence underpinned the following vivification of the natural population movement, which took place between 1971 and 1974 and was regarded as the “second baby boom.” The significant growth in the standards and quality of living and gradual “westernization” of lifestyles reflected, for instance, in the growing population of women with higher education or being professionally active, the shift of the family structure or the widespread use of different birth control methods (including abortion being legal in Japan and without any religious barriers) were the fundamental factors related to the major transformation of the natural population movement, fertility, and population age structure.

A breakthrough in the process of changes in the Japan's age structures occurred in the year 1970. It was the moment when the percentage of people aged 65 and over attained the level of 7.1%, proving Japanese society's entering the “demographic old age phase.” It initiated the “ageing

society phase,” covering the 23-year period between 1970 and 1993. The early period of this phase fell on the “second baby boom” period. It was reflected in high birth rates (18.0–19.0‰) and population growth rates (11.9–12.8%). That moment was also the last period in Japan’s post-war demographic development marked by high fertility rates, at the replacement level (2.13–2.14 between 1970 and 1974). Along with the end of the second baby boom (1974), Japan began to experience a gradual decay in the rates mentioned above, which bears resemblance to the trend preceding the second baby boom. The scope and pace of the decline, both in birth and population growth rates, turned out to be much higher, though. For instance, between 1975 and 1990 the birth rate declined from 17.1‰ to 10.0‰, while natural increase dropped from 10.8‰ to 5.6‰, respectively. At the same time, it was a period of a sustained increase in death rates, determined by the growth of population aged 65+. One of the most significant factors related to the developing trend concerning changes in natural population movement was a relatively low fertility rate, ranging from 1.90 to 1.54 between the years 1975 and 1990.

It was during the “ageing society phase” when Japan experienced the so-called “1.57 shock” from 1989. It was related to the drop in the value of the total fertility rate to the level of 1.57, which was even lower than that from *Hinoeuma* year from 1966 (during which it reached the value of 1.58). Under conditions of considerably extended life expectancy (from 72.0 to 78.1 years), an accelerated growth of the share of elderly citizens (aged 65 and over) occurred, which exhibited the value of 12.1% in total population of Japan.

The phenomena described above caused the government’s serious concern about the problem of exponential growth in the number of seniors in Japan, mostly due to the ever-growing expenses related to sustaining their retirement security and supporting cost-intensive health and social care.

This was reflected in developing the “Golden Plan” by the Japanese government in 1990, which contained a 10-year strategy aimed at seniors and their access to medical and social services. It was a derivative of the conclusions stemming from the permanent decrease in population of the youngest citizens (aged 0–14), which started between 1979 and 1980 and reached the value of 13.6% in the following 5 years with concurrent population growth (of 19.5%) of citizens aged 65+. The sustained process of decline in the population aged 0–14 from 1979, which is when their share in total population was still on the level of 23.8%, turns out to be extremely adverse for further demographic development of the country. The government’s report titled “*2000 men no Nihon*” (Japan in 2000), according to which the problem of ageing was regarded as one of the three main challenges (along with building information society and the issue of globalization understood in a broad sense) that Japan will be facing in the near future (Nagano A., Mori T., 2010). One of the practical solutions concerning this problem was to develop and deploy a new retirement system in 1985, called “National Basic Pension System.” According to its innovative assumptions, citizens who have never been employed were to receive the minimal pension from then on.

Moreover, economically active people, aged 20 and over, were obliged to pay pension contributions. Japan’s entering the “ageing society phase” and demographic tendency projections concerning the dynamic growth in the population of seniors have resulted in launching numerous government programs to meet the challenges in the aspect of economic, health, and social security as well as to organize various forms of active leisure and professional activation dedicated to this age group.

The year 1993 marks the final period of the “ageing society phase,” which initiated, as it has already been said, in 1970. Throughout this 23-year period, the percentage of citizens aged 65 and over had almost

Table 7. Japan. Ageing Society Phase (1970–1993). Selected demographic indices noted in the initial (1970) and final (1993) period of the Ageing Society Phase

Specification	Ageing Society Phase			
	Initial period (1970)		Final period (1993)	
Total population (mn)	103,7		124,8	
Age structure of population (% of total)				
0–14 years	23.9		16.7	
15–64	69.0		69.7	
65 and over	7.1		13.6	
65–74 years	4.9		8.2	
75 and over	2.2		5,4	
Ageing Index (65 and over/0–14 years x 100)	29.4		81.1	
Elderly Dependency Ratio (65 and over/15–64 years x 100)	10.2		19.4	
Vital rates (‰)				
Live birth rate	18.8		10.6	
Death rate	6.9		7.1	
Natural increase	11.9		2.5	
Total Fertility Rate	2.13		1.46	
Life expectancy (years)	Male	Female	Male	Female
at birth (0 years)	69.3	74.7	76.3	82.5
at age 65 years	12.5	15.3	16.4	20.6
at age 75 years	7.1	8.7	9.7	12.6
Growth/decline rate of population over 1970–1993 period (in%)				
Total population	19.5			
0–14 years	-16.0			
15–64	21.6			
65 and over	130.6			
65–74 years	99.7			
75–79 years	149.3			
80 and over	271.9			

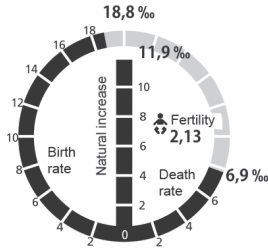
Source: enumerated by the author.

doubled (from 7.1% to 13.6%), mainly because of the fall in the share of the youngest citizens (aged 0–14) in the total population from 23.9% to 16.7%. The escalating pace of the structural changes during the “ageing society phase” (1970–1993) presented above is visible even more strikingly when realizing that the registered growth of population aged 65+ reached the value of 130.6%, while the youngest population (0–14) recorded the decline of 16.0%. During this period the total fertility rate decreased substantially, which had a negative impact on the population growth rates (from 2.13 to 1.46). A significant increase in life expectancy rates was also recorded: in the group of men, the value increased by 5.4 years (from 69.3 to 74.7 years), while in the group of women the growth reached the value of 6.2 (from 76.3 to 82.5 years). Under such circumstances, despite the positive natural growth (which exhibited a dramatic decline, from 11.9‰ in 1970 to 2.25‰ in 1993), the population from the oldest age groups experienced the highest rates in population growth. For instance, the group of citizens aged 80 and over almost doubled as it increased to the value of 271.9% (Table 7 and Figure 10).

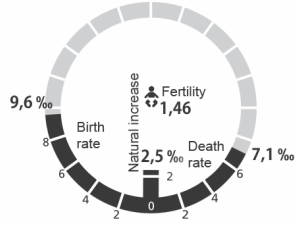
AGEING SOCIETY PHASE (1970-1993)

A Natural movement of population

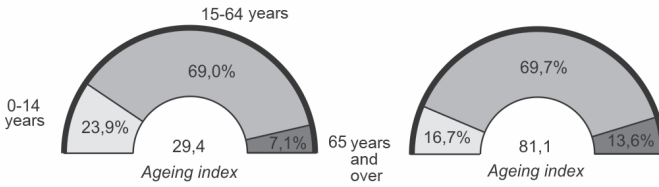
Initial period (1970)



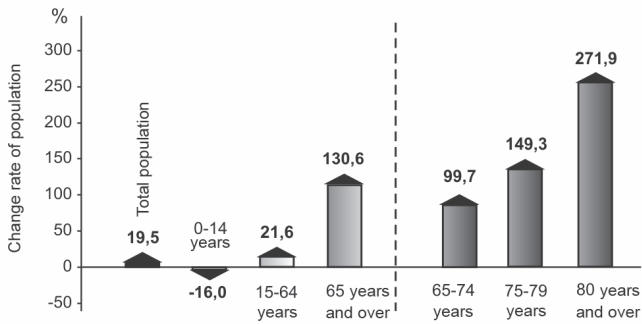
Final period (1993)



B Age structure of population



C Change rate of population by age groups: 1970-1993



◀ Figure 10. Japan. Ageing society phase (1970–1993). Natural movement indices, fertility rate (A) and age structure of the population (B) in the initial (1970) and final (1993) period of the ageing society phase and changing population growth/decline rate in selected age categories over the 1970–1993 period (C).

4.2.

AGED SOCIETY PHASE (1994–2006)



In the old age demographic stage, a sustained process of decline in the population aged 15–64 and the increasing prevalence of seniors over the population 0–14 years old was triggered. The changing of the natural movement and the age structure of population has made Japan simultaneously enter the demographic decay stage since 1996.

4.2.



Beginning from the year 1994, the population ageing process in Japan entered the “aged society phase.” Under conditions of structural share of the population aged 65+ in the total population at the value of 14.1%, the decline in population growth under 3.0% was one of the most characteristic features of this period. The growing population of elderly citizens was also accompanied by an increase at death rate, which, at the early stage, exceeded the value of 7.0‰. Apart from typical factors determining the deepening of the society ageing process, other trends began to be widespread such as the persistent tendency of the decrease of the population aged 0–14 and the extending life expectancy, including those of the most advanced age.

So as to understand the causes of the accelerated pace of society ageing process in this phase of demographic transformation in Japan, it is relevant to present features characteristic to Japan, its demographic and cultural phenomena as well as actions of organizational nature.

A factor that was characteristic for multidimensional demographic shifts in Japan during the “aged society phase,” having no direct equivalent in other countries in the world, was the emergence of a peculiar community

of young people, referred to as “freeters” (Japanese: *furiita*). This term, based on the transformation and linkage of English word “free”(uncontrolled, independent) and German *arbeiter* (laborer), applies to people aged 15–34 who lack full-time employment (or are often unemployed) or earn money from low-paid jobs (temporary and low-skilled type of jobs). Freeters, who live for free with their parents, spend their entire money on covering personal and ad hoc expenses. Problems such as low income along with the lack of prospects, or even chances for one’s professional success become

a fundamental obstacle for them, not only in terms of inability to establish one’s household but also to raise a family. Other constraints connected to the potential demographic development of this group of people are also caused by the relatively high costs of education for children, which are traditionally regarded as parents’ investment for the future, of sorts (not only taking into account the future professional career of the offspring but also as children’s support in taking care of elderly parents). According to the findings by Japan Institute for Labour Policy and Training, the population of “freeters” in the year 2000 was estimated to be over 4.0 million and their average monthly earnings amount to approximately USD 1300. A typical “freeter,” male in particular, due to his low income constraining him from ensuring family’s economic safety, faces major difficulties in finding a candidate for a wife. At the same time, marriages and families of this kind postpone the decision of having offspring or even entirely resign from producing children. This brief presentation of “freeters” phenomenon seems to be essential also to those demographers and economists who believe that the growing population of “freeters” is one of the main causes of the decline in birth rates and the decreasing fertility rate.

What seems to be significant for the demographic changes in Japan is also **the emergence of the new trend during the initial stage of the “aged society phase,” related to a sustained decline in the population aged 15–64 (since 1997). In practical terms, this means that from**

then on, the only age group with registered real population growth is the population aged 65 and over. As a consequence, a steady growth and structural predominance of the elderly population over citizens aged 0–14 began to be visible. The most telling indices in this context were the dynamic changes in population increase/decrease rates over the years 1994–2000. In the age group 0–14, this indicator exhibited the negative value of -9.3%, while in the age group 15–64 it reached the value of -0.8%. With the overall growth of population aged 65 and over (the growth of 25.3%), it is the population of citizens aged 75+ who show the most considerable changes in this respect. In their case, the growth index reached the value of 31.2%, which resulted in the fact that the representatives of this group constituted 40.9% of the overall number of people aged 65 and over. Moreover, for the very first time in the history of demographic changes in Japan, the ageing index exceeded the level of 100.0, while the elderly dependency ratio reached the level of 25.0.

The deteriorating demographic situation in Japan has led to expressions of serious concern by the government thinking about the demographic and economic future of this country. The government's efforts to improve the situation of Japan include creating such policies that, on the one hand, will ensure the social and health safety of the ever-growing group of eldest citizens, and, on the other, will create appropriate conditions to sustain the professional development of this age group. At this point, a wide range of actions aimed at raising the retirement age, determined by the highest level of life expectancy in the world and the possibility to continue further professional activity (both in public and private sector) after attaining the retirement age, are also worth mentioning.

So as to identify, in detail, the character and scope of the problem, which seemed to be a strategic challenge of sorts, and to determine unequivocally the relationship between the demographic changes and sustaining economic growth and ensuring appropriate level of health and

social safety, governmental institutions tasked with monitoring and examining abovementioned aspects were established. Under such conditions, two agencies, namely the Institute of Population Problems and the Social Development Research Institute were merged and created National Institute of Population and Social Security Research in 1996. Another fusion took place in 2001, when the Ministry of Health, Labour and Welfare joined the Ministry of Labour and created the Ministry of Health, Labour and Welfare. From then on, the bodies examine the relationships between population, economy, and welfare as well as provide specialized degree programs in the field of ensuring long-term social security with particular reference to human resources and labor market.

The character and scope of demographic transformations definitively proved the validity of the undertaken steps of the institutional character. The most telling, in this respect, is the fact that the “aged society phase” initiated in 1994 and lasted for only 12 years (1994–2006). Thus, this period was twice shorter than the “ageing society phase” (1970–1993), proving the globally unprecedented high rate of the society ageing process in Japan.

Under conditions of rapid decrease in the birth rate (to as little as 0.1‰ in 2006) and fertility rate to 1.32, the further growth in the proportion of people aged 65+ in the total population up to the level of 20.8% occurred. This age group was the only one which in a short, 12-year period of the “aged society phase” recorded an increase in the population growth rate and reached the value of 51.3%.

Table 8. Japan. Aged Society Phase (1994–2006). Selected demographic indices noted in the initial (1994) and final (2006) period of the Aged Society Phase

Specification	Aged Society Phase			
	Initial period (1994)		Final period (2006)	
Total population (mn)	125,0		127,8	
Age structure of population (% of total)				
0–14 years	16.3		13.6	
15–64	69.6		65.6	
65 and over	14.1		20.8	
65–74 years	8.6		11.3	
75 and over	5.5		9.5	
Ageing Index (65 and over/0–14 years x 100)	86.1		152.6	
Elderly Dependency Ratio (65 and over/15–64 years x 100)	20.2		31.8	
Vital rates (‰)				
Live birth rate	10.0		8.7	
Death rate	7.1		8.6	
Natural increase	2.9		0.1	
Total Fertility Rate	1.50		1.32	
Life expectancy (years)				
	Male	Female	Male	Female
at birth (0 years)	76.6	83.0	78.9	85.8
at 65 years	16.7	21.0	18.5	23.4
at 75 years	10.0	12.9	11.3	15.0
Growth/decline rate of population over 1994–2006 period (in%)				
Total population	2.2			
0–14 years	-14.6			
15–64	-3.8			
65 and over	51.3			
65–74 years	34.7			
75–79 years	77.2			
80 and over	81.5			

Source: enumerated by the author.

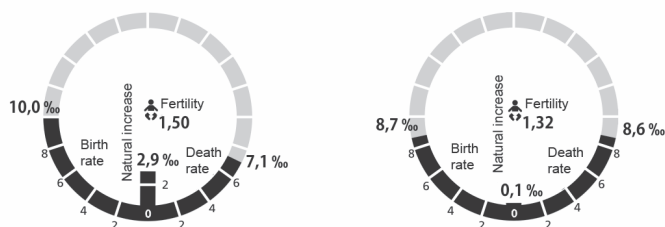
The following sharp decrease of the share of the youngest age group (0–14) to 13.6% in the total population of Japan, closely related to the significantly lowered birth rate and accompanied by the growth in death rate, made natural population growth rates achieve the value of as little as 0.1% in the final period of its development. During this phase, as a result of gains in life expectancy and high dynamics in the growth of population aged 65+, the ageing index exceeded the further threshold and registered in its final stage the value of 152.6. The highest growth dynamics in this phase is shown by the members of the oldest citizens, i.e. those aged 75–79 (growth of 77.2%) and aged 80 and over (growth of 81.5%). Against the background of the decrease in population aged 0–14 of 14.6% and citizens aged 15–64 of 3.8%, the projected demographic picture of Japan is a cause of growing concern. At the same time, a rapid decline in the population growth dynamics (up to the point of 2.2%) occurs, which is nine times lower in comparison to the “ageing society phase” (19.5%). The situation above can be regarded as a prelude to the culminating moment concerning the total population in Japan, which was approaching inevitably. Under conditions of the evolving process of society ageing, the decrease will undoubtedly contribute to the initiation and development of the further, new demographic phenomenon – a steady decline in population growth, namely the depopulation of Japan (Table 8 and Figure 11).

The pace, scope, and character of the demographic transformations within the “aged society phase” created an urgent need for expanding the range of actions aimed at the rapidly growing community of seniors. As part of the government’s *New Gold Plan*, which came into being in the year 2000, new and free daycare centers were established to cater for the needs of this group of citizens, while those in poor health condition were covered by individual, home nursing. Considering the historically long life expectancy mentioned earlier and relatively high level of elderly citizens being economically active (on average, 25.0% of the population aged 65 and over remained economically active, including *ikigai*), a new law from the year 2013

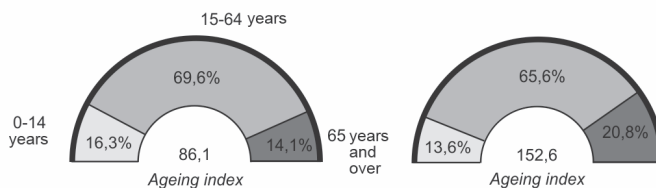
AGED SOCIETY PHASE (1994-2006)

A Natural movement of population

Initial period (1994) Final period (2006)



B Age structure of population



C Change rate of population by age groups: 1994-2006

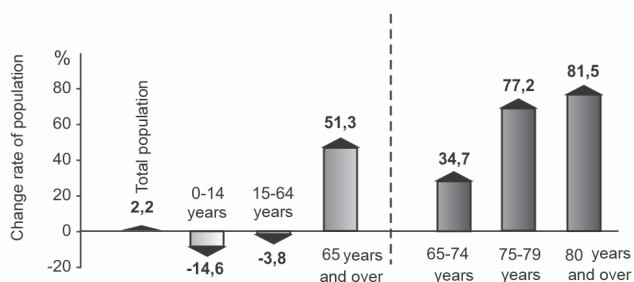


Figure 11. Japan. Aged society phase (1994–2006). Natural movement indices, fertility rate (A) and age structure of the population (B) in the initial and final period of the aged society phase and changing population growth/decline rate in selected age categories over the 1994–2006 period (C).

was introduced, which raised the retirement age from 62 to 65 (*Law Concerning Stabilization of Employment of Older Persons* – Nagano A., 2010, Hara T., 2014). Furthermore, during this phase of the society ageing process, Japanese government continued its actions aimed at increasing population growth. In the initial period of this phase (in 1994), the document titled *Basic Directions of Measures in Support of Future Child Rearing* was published, commonly known as the “Angel Plan.”

Under the new legislation, parents were receiving financial support per each child. Moreover, a specialized infrastructure ensuring free daycare for preschool-age children was granted to those parents who remain economically active. A wide range of pro-natalist actions of different kind as well as multidimensional operations aimed at supporting families with children were expanded under the “New Angel Plan”, which came into force in accordance with the government decision in 1999. Besides the further development of free daycare centers and the increase in the amount of financial support per each child in the family (up to USD 280 a month), other revolutionary changes were implemented, such as those concerning the maternity leave system, which enabled mothers to return to work after the child achieved the school-age or gave an opportunity to shorten the working week for both parents.

Ultimately, the assumptions behind plans mentioned above (namely the *Angel Plan* and the *New Angel Plan*) proved to be of little efficiency, which was represented by the further decrease in the fertility rate during the “aged society phase”: from 1.50 in 1994 to 1.32 in 2006). Lower dynamics of the downward trend of this indicator as well as its symbolic growth and stabilization on the level of 1.37–1.38 in the following, most advanced stage of society ageing, namely during the “hyper-aged society phase,” can be regarded only as a qualified success.

The failure behind the assumptions of both plans was even more striking in the case of the gradual decrease in the natural population growth rate, which (as it was emphasized above) in the final period of the “aged society phase” dropped down to 0.1%. At the same time, it was the last positive value of this indicator in the process of Japan’s natural population movement from the end of the WWII. Another aspect proving the failure in the field of developing pro-natalist and pro-family policies was the significantly short duration of the “aged society phase,” which lasted only 12 years.

Unlike the government’s failure in the field of increasing the birth and fertility rates, the seniors policy (in particular the *Gold Plan* of 1989 and the *New Gold Plan* of 1994) produced positive results. For instance, a wide range of social and health services (including daycare and individual, home nursing) determined the process of prolonging life expectancy to a large extent, which over the period of 1970 (the year of initiation of the ageing society process) to the year 2000 increased in length by 8.4 years in the case of men and by 9.9 for women. A significant growth in the population aged 65 and over (from 7.1% in 1970 to 20.8% of the total population in 2006), which had taken place between 1970 and 2000, occurred as a consequence of the diminishing birth rate and a drop in fertility rate. It must also be mentioned that meeting the objectives contained in the *Gold Plan* and the *New Gold Plan* turned out to be very costly. For example, within the field of medical care, the expenses to cover the costs of healthcare for seniors were almost five times higher than those for the rest of the country’s population. In other words, 50.2% of the overall expenditure for that purpose was allotted to provide healthcare for as little as 23.6% population of Japan (Nagano A., Mori T., 2010). It proves a particular attention and respect towards the elderly, resulting also from Japan’s historical and cultural circumstances.

A symbolic expression of this concern about the eldest citizens was establishing a new public holiday in Japan, named *Keiro-no-Hi*, which can be translated as “Respect for the Aged Day.”

4.3.

HYPER-AGED SOCIETY PHASE (2007–2050)



Currently, in initial period of the hyper aged society phase (2007–2015), an elderly population (aged 65 and over) is over double the size of the youngest group (0–14 years). Since 2015, also the old seniors group (population aged 75 and over) with 13.0% of the total number population, surpasses people aged 0–14 years (12.5% total population).

4.3.



Beginning from the year 2007, which is as early as 37 years after the initiation of the process of society ageing within the “aged society phase” (from 1970), Japan entered the most advanced phase of the demographic development – the “hyper-aged society phase.”

Apart from exceedances of the limit value of the structural share of the people aged 65+ in the total population at the level of 21.0% (which reaches the actual value of 21.5%), the initial period of this phase of changes is characterized by the recorded a negative population growth value on the level of -0.2%. This value is a result of a steady trend of the decrease in birth rate, achieving the value of 8.6‰ along with the sustained growth in the death rate of 8.8‰. It is the dynamic increase in the death rate accompanied by relatively low values in the birth rate, what was typical for the initial period of the “hyper-aged society phase.” The character of relations in the distribution of both indices mentioned above at this stage of transformations is typical for the “second demographic transition.” Taking into account the most recent, both short- and long-term demographic projections concerning Japan, it should be noted that the scope of the increase in the death rate in the more advanced periods of the “hyper-aged society phase” will be growing dynamically (from

10.3‰ in 2015 to 16.7‰ in 2050) along with a relatively low level of the birth rate variability (the drop from 6.8‰ to 5.1‰, respectively). It will contribute to maintaining a sharp contrast between the birth and death rates, mainly due to the dynamic growth of the latter. It will result in a historical decrease in population growth, with progressively more negative values (from -3.5% in 2015, through -7.8% in 2030 to -11.6% in the year 2050). Thus, it has to be strongly emphasized that this character of transformations and the accelerating trend with regard to the developing relations between the natural population movement rates will develop under the conditions of a steady and strong growth in the death rate.

The registered in the initial period of the “hyper-aged society phase” and the projected trend of the evolution of natural population movement in Japan will differ substantially from the assumptions set in the model of the “second demographic transition” (Table 9). In the case of theories concerning the second demographic transition, a relative stagnation in birth rates at the level of 11.0–12.0‰ with the death rate fluctuating between 11.0 to 12.0‰ is assumed to occur. It implies a relative stagnation, with a registered negative value of population growth between -1.0% to -3.0% (see Figure 1). **According to the author, this entirely new tendency in the birth and death rate distribution in Japan indicates that the country’s demographic transformations enter the “conversion stage”.**

In view of this data, a certain group of demographers defines the trend of the evolution of Japan’s population movement exhibited today and projected for the year 2050 as the “post-demographic transition” or the “new demographic transition” (Hara T., 2014 and Sato R., Kaneko R., 2015). **In the case of Japan, the character and scope of demographic transformations, initiated in 2010 and developing in the first half of the 21st century, resulting in a sustained decline in the total population (or its decrement) proves that the country entered the “depopulation stage.”**

Table 9. Japan. Changes of demographic indices in selected years of the Hyper Aged Society Phase (2007–2050)

Specification/Years	2007	2010	2020	2030	2040	2050
Total population (mn)	127,8	128,1	124,1	116,6	107,3	97,1
Age structure of population (% of total)						
0–14 years	13.5	13.2	11.7	10.3	10.0	9.7
15–64	65.0	63.8	59.2	58.1	53.9	51.5
65 and over	21.5	23.0	29.1	31.6	36.1	38.8
Ageing Index (65 and over/0–14 x100)	158.8	174.1	248.0	303.1	360.4	401.4
Elderly Dependency Ratio (65 and over/15–64x100)	33.1	35.6	49.2	54.4	66.8	75.3
Child Dependency Ratio (0–14 years/15–64 x 100)	20.8	20.7	19.8	17.8	18.5	18.8
Vital rates (‰)						
Live birth rate	8.6	8.5	6.3	6.0	5.5	5.1
Death rate	8.8	9.5	11.6	13.9	15.7	16.7
Natural increase	-0.2	-1.0	-5.3	-7.8	-10.2	-11.6
Total Fertility Rate	1.34	1.39	1.34	1.34	1.35	1.35
Life expectancy at birth (years)						
Male	79.2	79.5	80.8	81.9	82.7	83.6
Female	86.0	86.4	87.7	88.7	89.4	90.3

Source: enumerated by the author on base *Japan Statistical Yearbook 2017; Population Projections for Japan (January 2012): 2011 to 2060, Appendix: Auxiliary Projections 2061 to 2110.*

The shifts are taking place within the “conversion stage”, distinguished by the author in the birth rate vs. death rate distribution, and the “demographic decay stage”. The stages have been described in detail in the final part of this study.

In the early period of the “hyper-aged society phase,” a persistent and unprecedented in the history of demographic transformations in Japan tendency in the decrease of population (depopulation) occurred. The trend initiated at the turn of 2010 and 2011, which is after the country achieved its peak population size in 2010, which totaled 128,1 mn. From the point of view of changes in the population age structure, the following strong decline in the number of citizens aged 0–14 in favor of the population of the eldest seems to be of great significance. A unique phenomenon in the initial stage of demographic shifts in this phase was the predominance of the population aged 65–74 (13.4%) over the citizens aged 0–14, constituting only 12.8% of the country’s total population at that time. It indicates that the population of the eldest doubled the population of members of the youngest age group. As a result, the age dependency ratio exceeded the value of 200.0.

A group of entirely new phenomena developed over the following years of the “hyper-aged society phase” includes also the vivification when it comes to the pace of growth within the eldest group of citizens (aged 75 and over) as well as the real and percentage decline in the share of the people aged 65+. Beginning from the year 2020, it will initiate a sustained process of decline in the population aged 65–74 (the so-called young seniors), which, along with maintaining the structural dominance of 14.2% over the population aged 0–14 (11.7%) will lose their leading position in favor of the group aged 75+ (“old seniors”), which will make up 14.9% of the overall population over the timeframe delineated above. **At the same time, it indicates that beginning from the year 2020 the population of old seniors will remain the only age group registering real and structural growth within the total population of Japan.** Furthermore, by the year 2050 the group of citizens aged 65 and over, whose share in the total population, estimated at 97,1 mn, will reach the value of 38.8%. Hence, their size will be thus four times larger than the population of the youngest citizens (0–14), which, over the “hyper-aged society phase (2007–2050) will

register the most substantial decrement (by 45.7%). The only age group that will experience both the real and structural growth will be the citizens aged 65 and over (an increase by 37.2%). Even when taking into account the possible margin of error within the projected assumptions, it should be noted that statistical indices mentioned above prove a complete failure as far as the government's family-oriented policies are concerned and a remarkable success in such actions that were geared towards seniors. This failure can be exemplified by the fact that the fertility and birth rate will remain at a very low level (1.35 and 5.1‰, respectively). Moreover, the projected further development of the standards and quality of living as well as implementing the plans in the field of social- and health-care aimed at fulfilling the needs of seniors will all result in extending life expectancy, making Japanese people the eldest population in the world and their country the "Land of Seniors." Under these circumstances, the growing population of citizens aged 65+ will result in a sudden increase in the death rate (from 8.8‰ in 2007 to 16.7‰ in 2050), which by the year 2050, will be as much as three times higher than the birth rate (5.1‰).

As a consequence of the tendency of transformations shown above, which are characteristic for the "conversion stage", in the most advanced period of the "hyper-aged society phase" (2050) the natural growth rate will register the historically lowest, negative value of -11.6‰ (Table 10, Figure 12).

The developed within the conversion and demographic decay stage, current and projected trend in demographic transformations of Japan will result in a significant decrease in the population size and will create a society in which seniors constitute an extremely high percentage of the population. As early as in 2015, the population aged 65+ represented 26.8% of the total population and their eldest age categories (65-74 and 75+) outnumbered the population of the youngest in Japan. By the year 2050, the situation in this area is said to be dramatic. This is confirmed by the

fact that in the strongly depopulated and hyper-aged Japan, the population of people aged 75 and over (old seniors) will be 2.6-time larger than that of the youngest (aged 0–14). In 2050, the population of seniors will constitute 24.3% of Japan's total population (Table 12). Even though the demographic projections are updated regularly, any positive changes in this respect are highly unlikely. On the basis of demographic extrapolations, opinions about the “demographic bomb” are articulated, which is said to inhibit the country's economic growth and, as a result, negatively affect the standards and quality of living in Japan.

Concerns of this kind are mainly economically motivated and, among other things, are connected with the expected workforce deficiency as well as the ever-growing expenses to cover the costs of social and medical care for seniors. The latter constituted as much as 25.0% of the national income in 2013, being four times higher than in the year 1970, marking the moment in which Japan entered the “aged society phase.” It was the seniors who were the main beneficiary of the social- and health-care expenditure as they were dedicated approximately 70.0% of the total amount of national income spent on the abovementioned purposes (*The Financial Statistics of Social Security in Japan, Fiscal Year 2013*).

Starting from the beginning of the 21st century, Japan has undertaken multidimensional actions aimed at building a society model in which seniors will play a fundamental role (also in the economic sense). It must be stressed that in this model, known as the “leading elderly society model” (Nagano A., Mori T., 2010), the main emphasis will not be placed on the problem of ever-growing burden on the state budget, generated by the growing population of seniors.

Table 10. Japan. Hyper Aged Society Phase (2007–2050). Selected demographic indices in the initial (2007) and advanced (2050) period of the Hyper Aged Society Phase

Specification	Hyper Aged Society Phase			
	Initial period (2007)		Advanced period (2050)	
Total population (mn)	127,8		97,1	
Age structure of population (% of total)				
0–14 years	13.5		9.7	
15–64	65.0		51.5	
65 and over	21.5		38.8	
65–74 years	11.6		14.5	
75 and over	9.9		24.3	
Ageing Index (65 and over/0–14 years x 100)	158.8		401.4	
Elderly Dependency Ratio (65 and over/15–64 years x 100)	33.1		75.3	
Vital rates (‰)				
Live birth rate	8.6		5.1	
Death rate	8.8		16.7	
Natural increase	-0.2		-11.6	
Total Fertility Rate	1.34		1.35	
Life expectancy (years)	Male	Female	Male	Female
at birth (0 years)	79.2	86.0	83.6	90.3
at 65 years	18.7	23.7	-	-
at 75 years	11.4	15.5	-	-
Growth/decline rate of population over 2007–2050 period (%)				
Total population	-24.0			
0–14 years	-45.7			
15–64	-39.8			
65 and over	37.2			
65–74 years	-4.6			
75–79 years	43.4			
80 and over	122.2			

Source: enumerated by the author.

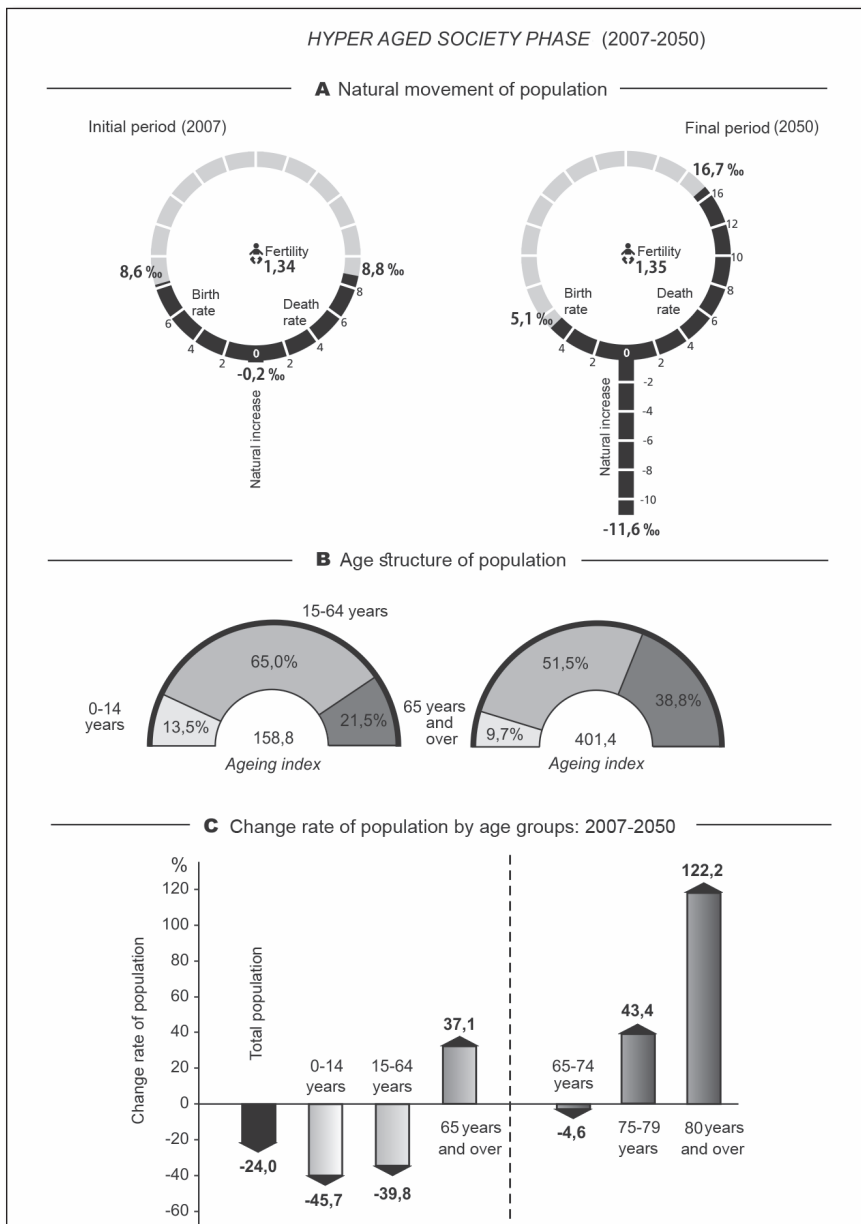


Figure 12. Japan. Hyper-aged society phase (2007–2050). Natural movement indices, fertility rate (A) and age structure of the population (B) in the initial (2007) and advanced (2050) period of the hyper-aged society phase and changing population growth/decline rate in selected age categories over the 2007–2050 period (C).

Above all, the new model aims at undertaking such actions that would transform the highly advanced process of society ageing into a new source of economic growth and a potential possibility to elevate the standards and quality of living among all citizens of Japan. For instance, one should mention actions aimed at creating specific types of economic activity geared towards satisfying the needs of this age group. This is reflected in numerous projects of innovative character (beginning from food and textile industry, through electro-technical industry and the production of medical equipment to pharmaceutical industry). They will constitute a major element in the structure of country's future economy, the effects of which will be of the pioneering character on a global scale and will ensure Japan's leading position in the market of producing goods aimed at satisfying the need of the demographically ageing world. Moreover, one of the objectives within this model is to create such conditions that will help seniors remain economically active or even raise their professional competencies. This assumption is related not only to the symbolic "longevity" associated with the Japanese, who, statistically, live longer than any other nationality, but also to the *ikigai* spirit among some of the citizens aged 65–74 (young seniors). The fact that work ethos is of great significance for *ikigai* (it is even connected with a feeling of one's fulfillment), also due to the fact that work is crucial in maintaining physical and psychological health, makes them play an important role in the future work market.

According to the projections by the National Institute of Population and Social Security Research, in the year 2030 as much as 63.9% of all men and 30.8% of women aged 65–69 will be professionally active, whereas among citizens aged 70–74 this proportion will reach the value of 35.2% and 18.9%, respectively (*Population Statistics of Japan 2008*). Bearing in mind this character of a "national challenge" of sorts and the need to support the government's undertakings within this field, at this moment more than 70.0% of Japanese companies have enabled the continuation of employment to a group of employees who attained the retirement age.

One of the common practices, widely accepted among pensioners, is to grant re-employment opportunities for older workers, even several years after the end of employment (Table.11).

Table 11. Japan. Evolution of labour participation rates by age and sex: 1980, 2000, 2015 and 2030

Age	Male				Female			
	1980	2000	2015	2030	1980	2000	2015	2030
Total	79.8	74.8	70.3	71.4	46.9	48.2	49.6	48.6
15-19	17.6	17.4	16.0	20.0	18.8	15.4	16.8	21.4
20-24	74.7	70.2	68.8	81.3	71.1	70.5	68.5	74.2
25-29	97.6	92.1	92.9	96.6	49.4	69.6	80.3	84.5
30-34	98.6	94.5	95.7	97.5	46.5	57.0	71.2	78.7
35-39	98.7	95.5	96.2	98.9	55.5	60.0	71.8	76.6
40-44	98.4	95.9	96.2	98.4	61.8	68.2	74.8	78.8
45-49	98.0	95.5	95.9	98.4	62.3	70.3	77.3	84.8
50-54	97.3	95.0	95.2	98.2	58.7	66.2	76.3	84.1
55-59	94.0	92.6	93.1	97.9	50.7	57.1	69.0	71.1
60-64	81.5	71.6	78.9	96.6	38.8	38.6	50.6	47.9
65 and over	41.0	34.1	31.1	31.0	15.5	14.4	15.3	16.0
65-69	65.2	50.9	54.1	63.9	26.7	24.7	32.0	30.8
70-74	45.0	34.6	32.9	35.2	15.5	16.5	18.8	18.9

Source: enumerated by the author on base *Population Statistics of Japan 2006 and 2008*; *Japan Statistical Yearbook 2000, 2017*.

However, the offered positions are, most of the time, less demanding and, as a result, low-paid. For instance, a man taking up employment five years after he attained the retirement age receives the salary which is about 20.0% to 40.0% lower than in the past, according to this system.

In light of the above, what is relatively more optimistic from an economic perspective is the problem of the “demographically hyper-aged Japan”, in which every fourth citizen will be 65 and over (Ageing Index = 401,4), while almost 25.0% of the total population will be people aged 75 and over (2050).

Table 12. Japan. Hyper Aged Society Phase (2007–2050). Changing total population number and transformations of the population age structure in selected age categories in the Hyper Aged Society Phase

Year	Total population (mn)	Percentage of total population				
		0–14 years	15–64 years	65 and over	65–74 years	75 and over
2007	127,8	13.5	65.0	21.5	11.6	9.9
2010	128,1	13.2	63.8	23.0	11.8	11.0
2015	127,1	12.7	60.5	26.8	13.6	13.2
2020	124,1	11.7	59.2	29.1	14.2	14.9
2025	120,7	11.0	58.7	30.3	12.3	18.0
2030	116,6	10.3	58.1	31.6	12.2	19.4
2035	112,1	10.1	56.6	33.3	13.5	19.8
2040	107,3	10.0	53.9	36.1	15.5	20.6
2045	102,2	9.9	52.4	37.7	15.9	21.8
2050	97,1	9.7	51.5	38.8	14.5	24.3

Source: enumerated by the author on base *Japan Statistical Yearbook 2017; Population Projection for Japan (January 2012): 2011 to 2060, Appendix: Auxiliary Projections 2061 to 2110*.

Such an advanced process of society ageing, marked by a swelling population of the elderly, brings to mind the issue of creating “friendly” organization of urban spaces, which are, at the same time, the areas of the greatest concentration of people at this age. This is also important due to their relatively high mobility and activity of different kinds – starting with taking care of one’s daily duties, through active participation in various social organizations and voluntary work or professional activity outside their place of residence, and ending with leisure and active recreation. A typical procedure includes large-scale elimination of different types of architectural and construction obstacles and creating open public spaces tailored to the seniors’ needs. The promoted idea of “ageing in place” consists in creating within urban spaces (also during the processes of revitalizing and restructuring as well as gentrification in the field of infrastructure) such units that are adjusted, both architecturally and functionally, to various

and specific needs of the residing seniors (starting with the housing complexes, work and leisure spaces and ending with a wide range of retail and service units).

This type of planning and urban solutions facilitates seniors' self-sufficiency and helps them stay active as well as maintain personal contacts within the whole community (for instance, with other residents or guests of urban units of this type). The idea of "ageing in place" is implemented mainly in the largest cities – metropolitan areas, where the percentage of seniors in the total population reaches the value of 20.0–25.0%. For instance, in the case of Tokyo, with its 9.1 million dwellers, the population of seniors is estimated at 2.0 million.

5.

DEMOGRAPHIC DECAY STAGE (1996–2050)



One of the successes of the senior citizen support policy of the government, is the significant increase of the life expectancy of the Japanese. Since the onset of the aging society phase (1970) to the early period of the hyper aged society phase (2015), life expectancy of males have increased from 69.3 to 80.9 years and females from 74.7 to 86.8 years. Females living more then seven years longer than males, account for almost 60.0% of the total population age 65 and over. At the same time, they are characterized by an increased level of professional activity, which in the age group 65–69 accounted for 32.0% (e.g. in Germany 11.2% and in France only 4.9%).



The findings of the present research, concentrated of the multifaceted analysis of the widely-defined process of population ageing in Japan and reflected in the carried out periodization and expanded terminology (within the “demographic maturity stage” and “demographic old age” with its three characteristic phases: the ageing, aged and hyper-aged society, as well as the “conversion stage”) prove an extremely high rate, scale and progress state of this process. They also indicate the general failure of the government’s activities intended to revive the natural movement of population, including attempts at increasing the number of children in families. It is worth mentioning such measures as the *Child Care Act* of 1991, aimed at providing organizational-financial support for working mothers as well as the well-known, pro-natalist governmental schemes: the *Angel Plan* (of 1994) and the *New Angel Plan* of 1999 (revised every few years). Under the conditions of high standards and quality of life of the Japanese society as well as positive consequences of policies aimed at seniors (mainly through the *Gold Plan* of 1989 and the *New Gold Plan* of 1994 with numerous amendments after the year 2000), a very substantial increase of life expectancy was observed in Japan. For instance, over the period of 1970–2007, i.e. from this country’s entering the ageing society

phase until the start of the hyper-aged society phase, the average life expectancy of men extended by 9.9 years, whereas for women by 11.3 years. Under the conditions of a sustained drop in the birth rate and rate of natural increase, as well as a low value of the fertility rate, fundamental shifts of the age structure as well as the rate, scale and dynamics of demographic development had taken place in terms of the total number of citizens of this country.

Table 13. Japan. Changes of the total population number, live birth rate and death rate, natural increase, total fertility rate and life expectancy at birth over the 1950–2050 period

Year	Total population (mn)	Live birth rate (‰)	Death rate (‰)	Natural increase (‰)	Total fertility rate	Life expectancy at birth (years)	
						Male	Female
1950	84,1	28.3	10.9	17.4	3.65	59.6	63.0
1960	94,3	17.3	7.6	9.7	2.00	65.3	70.2
1970	103,7	18.8	6.9	11.9	2.13	69.3	74.7
1980	117,1	13.5	6.2	7.3	1.75	73.4	78.8
1990	123,6	10.0	6.7	3.3	1.54	75.9	81.9
2000	126,9	9.5	7.7	1.8	1.36	77.7	84.6
2010	128,1	8.5	9.5	-1.0	1.39	79.6	86.3
2015	127,1	8.0	10.3	-2.3	1.46	80.5	86.8
2020	124,1	6.3	11.6	-5.3	1.34	80.9	87.7
2030	116,6	6.0	13.9	-7.9	1.34	81.9	88.7
2040	107,3	5.5	15.7	-10.2	1.35	82.7	89.4
2050	97,1	5.1	16.7	-11.6	1.35	83.6	90.3

Source: enumerated by the author on base *Population Statistics of Japan 2008*; *Japan Statistical Yearbook 2017*; *Population Projections for Japan (January 2012): 2011 to 2060, Appendix: Auxiliary Projections 2061 to 2110*.

The greatest and extremely adverse changes in this regard occurred in the most advanced phases of the demographic decay stage. Having regard to Japan's demographic transformation from the moment of entering the "aged society stage" in 1970 until 2010 (marking the initial period of the "hyper-aged society phase" and registering the peak level of population

in the process of demographic growth), it is worth pointing out the fact of achieving a real increase in the number of inhabitants by 23.5% (from 103,7 mn to 128,1 mn). This rise was accompanied by a consistent decrease of its dynamics, with the value of 6.9% over the period 1970–1975, 2.1% over the years 1985–1990, to only 0.2% over the 5-year period of 2005–2010. The final period was, at the same time, the last one with the recorded positive value (of the real population growth rate in Japan).

One of the characteristic qualities of the 1970–2010 period, encompassing the “ageing” and “aged society”, was the extended longevity of men by 10.3 years (from 69.3 to 79.6), while for women by 11.6 years (from 74.7 to 86.3) and a dramatic drop of the fertility rate – from the replacement level (from 2.13 in 1970), to only 1.39 (in 2010). It was the predominant reason for the start and sustained development of the downward trend of the rate of the natural increase (RNI), registering negative values at the dawn of the 21st century. In 2010, for the first time in the demographic history of the country, the process of consistent decline of the total population size was initiated. According to the latest projections, over the next 40 years of being in the “demographic old age” (including the advanced stage of the “hyper-aged society phase) up until the year 2050, Japan will experience a greater, even dramatic, drop of population by -24.2% (Table 14).

A marked deceleration and weakening of the demographic development dynamics in the 1970s, initiated by the decline of the youngest group of inhabitants (0–14 years), and, from the period 1995–2000, also of the population aged 15–64, resulted in a significant shift of the age structure. It led to the commencement and further development of the process of diminishing of the total number of citizens from 2010, which can be described as sustained depopulation. Over the period of 2010–2050, it will continue, mainly due to the severe decline of the youngest population (a fall by 44.5%) as well as the accompanying, relatively substantial drop of the number of people aged 15–64 (a decrease by 38.3% – Table 14).

Table 14. Japan. Demographic Decay Stage (1995–2050). Changeability dynamics of the total population number growth/decline rate and in selected age categories of population in Demographic Anxiety Phase and Depopulation Phase

Years	Changing dynamics of the population growth/decline (%)			
	Total population	0–14 years	15–64 years	65 and over
Demographic Anxiety Phase				
1995–2000	1.0	-7.7	-1.1	20.5
2000–2005	0.7	-5.1	-2.5	16.7
2005–2010	0.2	-4.1	-3.6	13.9
1995–2010	2.0	-14.6	-7.0	60.2
Depopulation Phase				
2010–2015	-0.7	-5.6	-6.3	14.3
2015–2020	-2.4	-8.2	-3.3	8.1
2020–2025	-2.7	-9.1	-3.5	1.2
2025–2030	-3.4	-9.1	-4.4	-0.2
2030–2035	-3.9	-6.2	-6.3	2.5
2035–2040	-4.3	-4.9	-8.8	3.4
2040–2045	-4.8	-5.7	-7.5	-0.3
2045–2050	-5.0	-7.2	-6.6	-2.3
2010–2050	-24.2	-44.5	-38.3	28.8

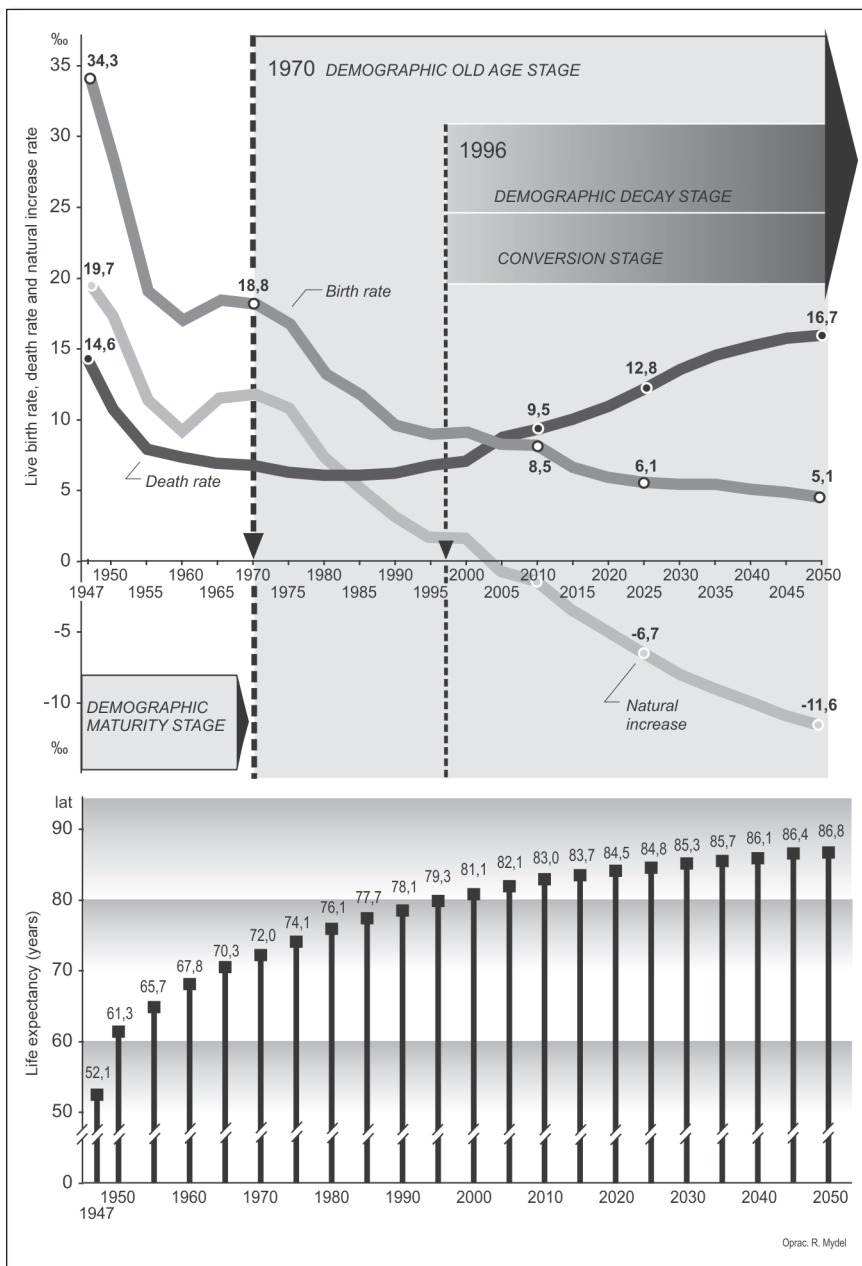
Source: enumerated by the author on base *Population Statistics of Japan 2008*; *Japan Statistical Yearbook 2017*; *Population Projections of Japan (January 2012): 2011 to 2060, Appendix: Auxiliary Projections 2061 to 2110*.

The only age category that will exhibit a real and structural rise in this timeframe (by 28.2%) are seniors. Nevertheless, even this population category in the fourth decade of the 21st century (from 2040) will enter its decline stage (by -2.6% over the period 2040–2050) and, at the same time, will be the only age group to increase its share in the total population (from 36.1% to 38.8%, respectively).

The process of downward trend of demographic growth, initiated in the second half of 1990s (precisely in 1996), currently still ongoing and developing in the year 2050 perspective, has been characterized, since 2010, by a sustained decline of the population size (taking place under the conditions of increased dynamics of negative indices: from -1.2% over the period of 2010–2015, through -3.4% over the years 2025–2030, to -5.0% over the 2045–2050 period). It ultimately results in starting the sustained process of accelerated depopulation. It, thus, provides conclusive evidence of initiation and development of a qualitatively new stage in the history of demographic development of Japan, described by the author as the **“demographic decay stage”**.

The research findings concerning the periodization of the population ageing process (within the “demographic old age”) allowed the author to conclude that the “demographic decay stage” was started in the initial period of the “aged society phase”, i.e. after 23 years from the beginning of the population ageing process. **In reference to the theory of demographic transition (which has been confirmed by the results of the research conducted by the author), the beginning of the “demographic decay stage” generally coincides with the start of the second transition. It must, however, be firmly stressed that its commencement occurred upon Japan’s entering the “conversion stage” of the structural distribution of population aged 0–14 vs. population aged 65+ (Figure 13).**

Prior to discussing the most characteristic consequences of the “demographic decay stage” for the evolution of the selected demographic indices, an occurrence of a unique transformation in terms of quantitative and structural relations between the two principal indicators of natural movement of population (the birth and death rate) as well as the time variability of shares of the youngest (0–14 years) and the oldest (65 and over years) age groups in Japan must be emphasized.



◀ Figure 13. Japan. Changing natural movement indices of population and life expectancy over the 1947–2050 period, against the background of the distinguished stages of the demographic transformations.

In the case of the temporal variability and the course of profiles of the birth and death rates, two models of distribution are of note. The first, typical for the advanced phase of the first demographic transition, registered over the 1950–2005 period, was characterized by the predominance of the birth rate over the death rate. This predominance declines over time, mainly due to a substantial and sustained drop of the birth rate, accompanied by a diminishing (initially slowly) death rate, which began its trend of continued growth over the last two decades of the period. This type of distribution is distinctive for industrialized countries and is regarded as a classic case that ultimately leads to a sustained decline of the rate of natural increase. The actual progress of the natural movement of Japan as well as the year 2050 demographic projections for this country prove the creation and evolution of a different (reversed) distribution of the interrelated factors. The continued and dynamically developing process, initiated in 2007, is characterized by an increasing predominance of the death rate over the birth rate. Its foundation is the very high dynamics of the death rate (from 8.8‰ in 2007 to 16.7‰ in 2050), accompanied by a relatively small, but persistent, downward trend of the birth rate (from 8.6‰ to 5.1‰, respectively). It is also worth mentioning that this character of changes of both indicators had been accompanied, until the turn of the 20th and 21st century, by a marked decline of the total fertility rate, which, from the beginning of the 21st century, can be described as relatively stagnant – at the level of 1.34–1.35, i.e. significantly below the replacement level. No less important element of transformations of the distributions relations between the birth and death rates, is the continuous process of extending life expectancy, achieving record-breaking values in Japan (Figure 14).

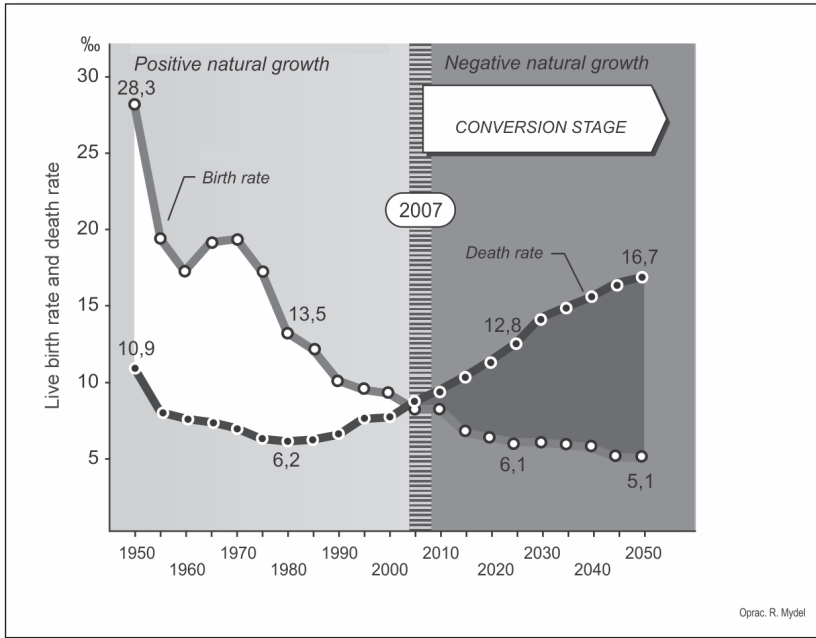


Figure14. Japan. Changes of the birth rate and death rate over the 1950–2050 period, with the indication of the distinguished conversion stage in the birth rate vs. death rate distribution.

The currently observed (since 2007) and the projected (up to 2050) character of transformations in the distribution of the birth and death rates, resulting in the increasingly negative rate of natural increase, indicates that, in terms of the natural movement, the process of demographic transformations has entered the “conversion stage”, distinguished by the author.

In light of the research findings on periodization of the population ageing process (“demographic old age stage”), it needs to be stressed that **the onset of the “conversion stage” in the birth rate vs. death rate distribution completely coincided with the end of the “aged society stage” and the start of the “hyper-aged society stage”.**

Similar variability of character could be observed much earlier within the relations of structural share of the population aged 0–14 and 65+.

In this case, the process of the growing predominance of seniors (persons aged 65 and over) over the group of youngest citizens (the “conversion stage” in the distribution of persons aged 65+ vs. persons aged 0–14) was initiated as early as 1997, i.e. in the initial period of the “aged society phase”. It must be firmly emphasized that the “conversion stage” has developed under the conditions of very high growth dynamics of the population aged 65+ and the sustained, real and structural dwindling of the population aged 0–14. At the onset of the conversion stage in the structural distribution of the population aged 0–14 and 65+, the proportion of these age groups in the total population stood at 15.3% and 15.7%, respectively (in 1997). Over time, it could be observed that these relations, driven by the dynamically growing population of seniors, have also developed in a way that favors this demographic group. It is unequivocally evidenced by the indices of growth/decline rates of both group categories over the period of 1997–2050. In this timeframe, the population of people aged 0–14 have achieved a drop of -51.5% , whereas the group of people aged 65 and over has registered an increase of 90.4%. As a consequence, at the advanced phase of the “conversion stage”, i.e. the year 2050, the youngest citizens will make up only 9.7% of the entire population, while the share of seniors (aged 65+) will mount to the record-breaking level of 38.8%. Thus, it will be four times larger than the group of the youngest persons (Figure 15).

The rapid and profound transformations of the age structures within the “conversion stage” are manifested in the fact that since 2015, the process in question has been evolving under the conditions of predominance of persons aged 75+ (with the share of 13.0%), and from the year 2025 – of persons aged 80+ (with the proportion of 11.4%) over the youngest population (0–14).

It ought to be highlighted that **the initiated and developing in the “conversion stage” process of changes in the distribution of the eldest persons (75+ and 80+) in relation to the youngest population, had started in the situation of initiation and progress of the sustained, downward trend of the total population (depopulation).**

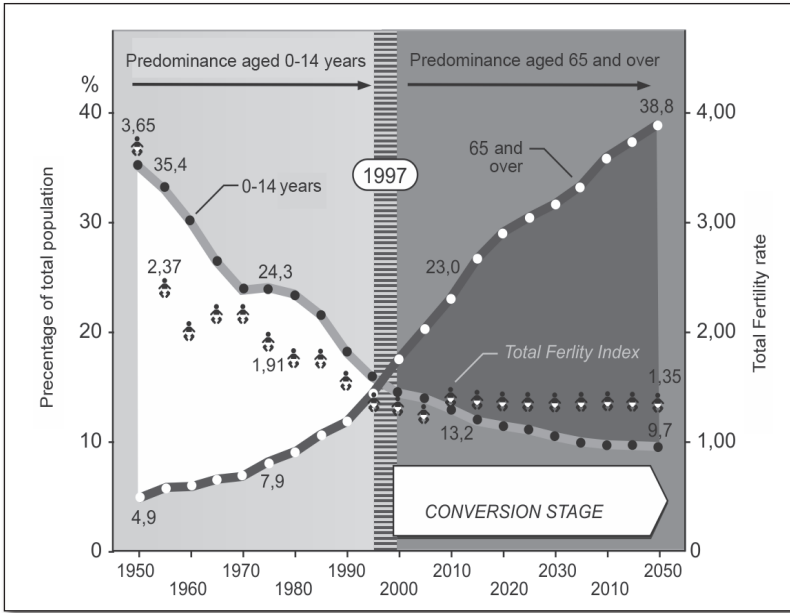


Figure 15. Japan. Changing percentage of the young population (0–14) and the elderly (65+) in the total population and the total fertility rate over the 1950–2050 period, with the indication of the conversion stage in the young vs. elderly population distribution.

In light of the above considerations pertaining to the problem of the current and estimated evolution of the trend of the structural distribution of persons aged 0–14 vs. 65+ as well as variability of the birth vs. death rate, the author argues that this type of relations proves that Japan’s process of demographic transformations has entered a qualitatively new stage referred to as the **“conversion stage”**. It unequivocally defines the

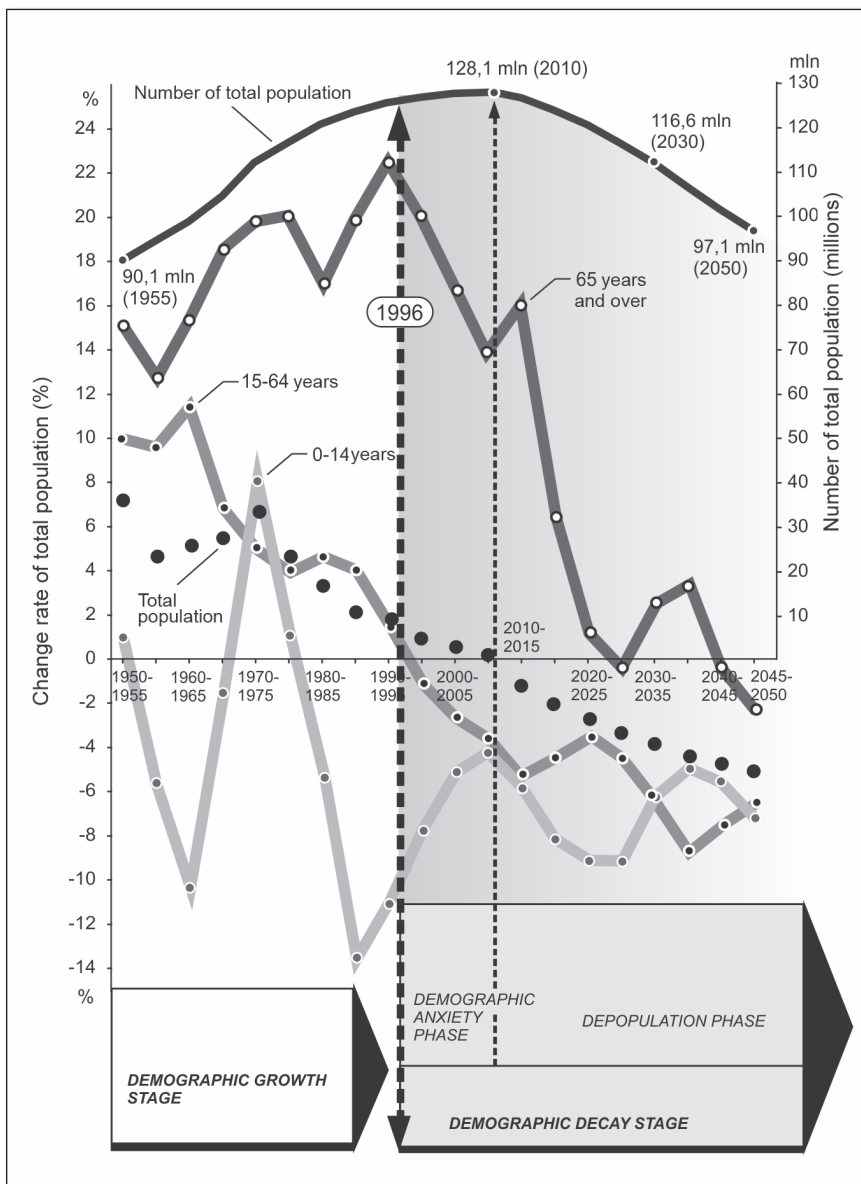


Figure 16. Japan. Changing dynamics of growth/decline of the total population, young age (0–14), working age (15–64) and elderly population (65+) in the demographic growth stage (1950–1996) and the demographic decay stage (1996–2050).

character, type and scope of the new demographic transformations that take place and develop in societies of the highest state of progress of the process of population ageing (hyper-aged societies). It also seems to be the correct answer to the currently undertaken endeavors at providing appropriate terminology for this sort of demographic transformations, which, in light of the latest subject literature, refer directly to the theory of demographic transition (in particular, to the second transition). They are, rather vaguely, defined as the “post-transitional demographic regime” (Vilson C., 2013) or the “post-demographic transition period” (Sato R., Kaeko R., 2015). It needs to be emphasized that these authors, attempting to refer to the theory of demographic transition, draw attention mainly to the problem of evolution of the birth rate-death rate distribution in a classic approach to the interpretation of the developing relations.

It must, thus, be stated that under the conditions of initiation and consistent development of the **conversion phenomenon** in distribution of such demographic factors as births and deaths (**birth rate vs. death rate conversion phenomenon**) as well as relations of the structural share between the youngest population (0–14) and various age categories of persons aged 65 and over (**young population vs. elderly population conversion phenomenon**), Japan is entering the stage of demographic transformations defined by the author as the “**demographic decay stage**”. Having regard to the time variability of the total population growth/decline rate, in particular, the population aged 0–14 and 15–64, registering since 1980/1985 (0–14 lat) and 1990/1995 (15–64 lat) negative values of the indices, it must be stated that the beginning of the “demographic decay stage” falls on the year 1996 (Figure 16). It also marked the end of the post-war (1947–1996), robust demographic growth of Japan (from 1947 to 1996), described by the author of the present paper as the “**demographic growth stage**”. **From the same year, a persistent trend of decreased growth dynamics of inhabitants aged 65+, gaining momentum since the turn of the 20th and 21st century**, could be observed (from the level

20.5% over the period 1990–1995, though 6.4% over the years 2010–2015, to -2,3% in the 2045–2050 perspective). It means that the onset of the “demographic decay stage” coincides Japan’s entering the “conversion stage” in terms of the age structure distributions (0–14 years vs. 65 and over).

Taking into account the changing values of growth/decline of population for the three principal age categories as well as the total population, **within the “demographic decay stage”**, the author distinguished two phases: the **“demographic anxiety phase”** and the **“depopulation phase”**.

5.1.

DEMOGRAPHIC ANXIETY PHASE (1996–2010)



Total fertility rate of less than 2.00 (below replacement level) in the mid-1970s, is at root of the Japanese depopulation process, that has been underway since 2010. In the 2020–2050 prospect, it will range from 1.34 to 1.35, while the share of females at procreation age (15–49) in total population, will drop from 20.0% to only 17.2%.

5.1.



The **demographic anxiety phase** in Japan spanned the 1996–2010 period. It was initiated in 1996, under the conditions of a persistent downward trend of the number of persons aged 0–14 and 15–64. It was accompanied by a real and structural increase of the population aged 65 and over, and the demographic transformations described in Section 4.2 had occurred within the advanced period of the “aged society phase”. That also marked the commencement of the conversion of the structural share of the population aged 0–14 and 65+. The characteristic feature of the onset of the “demographic decay stage”, and consequently, the currently analyzed “anxiety phase”, was the negligible predominance of the share of the youngest population (0–14) over the group of seniors (65+), amounting to 15.6% and 15.1% of the total population of the country, respectively. These shifts had been preceded by a sustained process of the declining total fertility rate, which lasted two decades and remained at the sub-replacement level since 1975 (a fall from 1.91 in 1975 to 1.43 in 1996). Under such circumstances, the Japanese started to look towards the future with apprehension, concerned about the further development of this demographic trend and the resultant adverse quantitative and structural transformations as well as challenges and threats of the social and

economic nature. The situation became increasingly more alarming when the governmental efforts aimed at demographic revival, contained within the aforementioned documents (the *Child Care Act* of 1991 or the *Angel Plan* of 1994) did not bring the expected outcomes. As a result, in 1996, the National Institute of Population and Social Security Research (NIPSSR) – a science and research agency, tasked with monitoring, analyzing, and forecasting issues resulting from the intensifying problem of population ageing, was established.

Various state agencies made use of the multi-topic, statistical materials, reports and expert opinion papers compiled and published by the NIPSSR, while preparing the legislation including: pro-natalist and pro-family policies, multifaceted solutions for the growing population of seniors as well the widely-defined social policies resulting from the dramatically swelling population of persons aged 65 and over (e.g. the *New Angel Plan* of 1999 or the 2004 act intended to slowly raise the retirement age threshold – *Law Concerning Stabilization of Employment of Older Persons*). The persistent downward trend of the birth rate and upward trend of the death rate, starting the conversion phenomenon, resulted in the situation, at the end of the “demographic anxiety phase” (in 2010), in which a negative value of the rate of natural increase (-1,0‰) had been recorded for the first time in the post-war history of demographic evolution of Japan (Table 15, Figure 17). At the same time, the fertility rate with its low value of 1.39 headed towards reaching “relative stagnation”, which is estimated to fluctuate between 1.34 and 1.35 over the period 2020–2050.

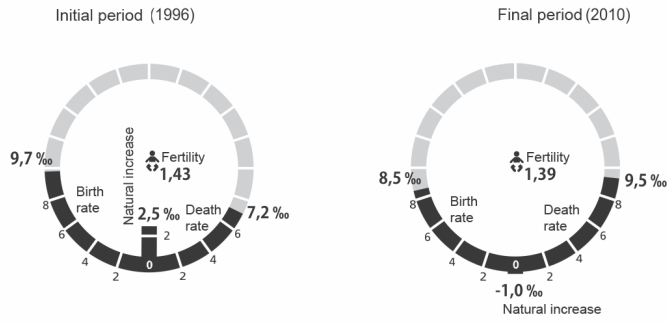
Table 15. Japan. Demographic Decay Stage: Demographic Anxiety Phase (1996–2010). Selected demographic indices noted in the initial (1996) and final (2010) period of the Demographic Anxiety Phase

Specification	Demographic Anxiety Phase			
	Initial period (1996)		Final period (2010)	
Total population (mn)	125,9		128,1	
Age structure of population (% of total)				
0–14 years	15.6		13.2	
15–64	69.3		63.8	
65 and over	15.1		23.0	
65–74 years	9.2		11.9	
75 and over	5.9		11.0	
Ageing Index (65 and over/0–14 years x 100)	96.6		174.2	
Elderly Dependency Ratio (65 and over/15–64 years x 100)	21.8		35.6	
Vital rates (‰)				
Live birth rate	9.7		8.5	
Death rate	7.2		9.5	
Natural increase	2.5		-1.0	
Total Fertility Rate	1.43		1.39	
Life expectancy (years)	Male	Female	Male	Female
at birth (0 years)	77.2	83.8	79.6	86.3
at 65 years	17.0	21.8	18.7	23.8
at 75 years	10.3	13.6	11.5	15.5
Growth/decline rate of population over 1996–2010 period (in%)				
Total population	-1,7			
0–14 years	-14.1			
15–64	-6.3			
65 and over	54.9			
65–74 years	32.3			
75–79 years	75.6			
80 and over	99.0			

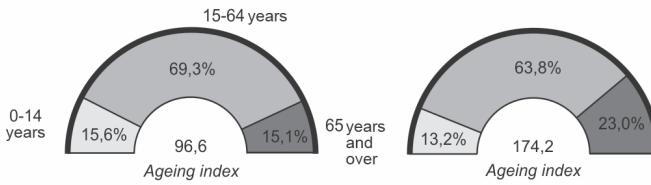
Source: enumerated by the author.

DEMOGRAPHIC ANXIETY PHASE (1996-2010)

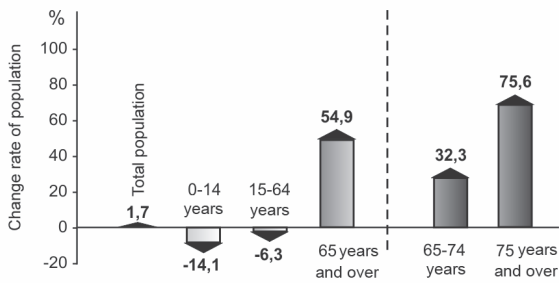
A Natural movement of population



B Age structure of population



C Change rate of population by age groups: 1996-2010



◀ Figure 17. Japan. Demographic anxiety phase (1996–2010). Natural movement indices, fertility rate (A) and age structure of the population (B) in the initial (1996) and final (2010) period of the demographic anxiety phase and changing population growth/ decline rate in selected age categories over the 1996–2010 period (C).

One of the most significant demographic events, ending the “demographic anxiety phase”, was reaching by Japan its historic peak (maximum) size of the total population of the country in 2010 (128,1 mn inhabitants). In that period, when the share of persons aged 65+ at the level of 23.0% (in 2007), the process of population ageing of Japan entered the “hyper-aged society phase”. A fact of no less importance was that already in the initial period of the “demographic anxiety phase” the phenomenon of conversion in the distribution of persons aged 0–14 vs. 65+ was initiated and then, started evolving dynamically. It was caused by very high dynamics of growth of the population of seniors with the concurrent decrease in the number of persons aged 0–14 (by 14.1% over the duration of the anxiety phase) as well as those aged 15–64 (a drop by 6.3%).

5.2.

DEPOPULATION PHASE (2010–2050)



In the prospective model for the Japanese society – “leading elderly society model”, a very crucial role will be played by the economically active seniors. Currently, on average, 25.0% of persons aged 65 and over (including the so-called *ikigai*) is economically active, finding employment in low-paying jobs in their previous workplaces. The photograph shows a retired construction company worker, employed at his original company as a person responsible for the safety of traffic of construction vehicles and pedestrians.

5.2.



The consequence of Japan's entering the "hyper-aged society phase" (since 2007), with its distinctive, extremely adverse transformations in terms of the natural movement and age structures evolving in the "conversion stage", was initiating a sustained downward trend of its population. It began at the turn of 2010 and 2011 and marked the onset of the **"depopulation phase" within the "demographic decay stage"**. **Under the conditions of the ongoing process of conversion in the birth rate-death rate distribution, extending life expectancy and progressively more negative values of the rate of natural increase** (from -1,0‰ in 2010, through -5,6‰ in 2020, to -11,6‰ in 2050), **the process of a persistent decline of the total number of people – depopulation, has commenced. It progresses under the conditions of the exclusive, real drop of the number of citizens aged 0–14 and 15–64.**

A distinctive aspect of this situation is the consistent increase in the scale and pace of the depopulation process. It is clearly documented by indicators of population changes, estimated for consecutive, 5-year ranges. For instance, since the onset of the "depopulation phase" (in 2010) until 2015, the population of Japan diminished by 1.2%. According to the projections on the population size changes in Japan up to 2050 (or even 2100),

over the 2020–2025 period, the indicator will register the value of -2.7%, while for the years 2030–2035 and 2040–2045 it will stand at -3.9% and -4.8%, respectively. In the distinguished “depopulation phase”, covering the years 2010–2050, Japan is expected to record a 24.2% drop in its population size (from 128,1 mn in 2010, through 120,7 mn in 2025, to 97,1 mn persons in the year 2050). This means that in the demographically old Japan, where in the initial period of the “depopulation phase” persons aged 65 and over represented 23.0% of entire population, by the year 2050, this age group will constitute the staggering 38.8% of the total population of the country.

Thus, they will be four times more numerous than the youngest part of the society (aged 0–14), whose projected percentage in the same time-frame is estimated at 9.7% (Table 16 and Figure 18). Another defining characteristic of the “depopulation phase” will be a substantial decrease of the number of citizens aged 0–14 (by 44.5%) and 15–64 (by 28.3%) with the concurrent 28.8% growth of the oldest part of the society (population aged 65 and over).

Taking into account the long-term demographic projections (until 2100), it is clear that the process of depopulation is likely to gain momentum. It will be manifested in the decline of the total population size by 48.9%, i.e. it will be twice as high as that of the 2010–2050 period (-24.2%). Therefore, a notable feature of the advanced period of the depopulation phase (2050–2100) will be a considerable population drop in all four distinguished age groups as well as an overall decrease in this country’s population to the level of only 49.6 million persons.

It is appropriate, at this point, to draw attention to the fact that the decline of the number of citizens in the population of Japan to 97,1 mn in 2050 and 49,6 mn in 2100, will correspond to the population sizes registered in the past, in 1964 and 1911, respectively.

Table 16. Japan. Demographic Decay Stage: Depopulation Phase (2010–2100). Selected demographic indices in the initial (2010) and advanced (projection 2050–2100) period of the Depopulation Phase

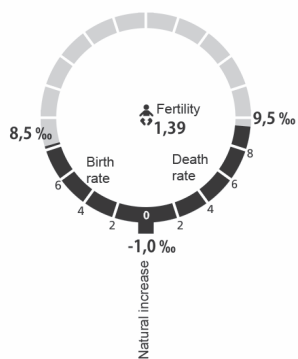
Specification	Depopulation Phase					
	Initial period (2010)		Advanced period (2050) (2100)			
Total population (mn)	128,1		97,1	49,6		
Age structure of population (% of total)						
0–14 years	13.2		9.7	9.0		
15–64	63.8		51.5	49.9		
65 and over	23.0		38.8	41.1		
65–74 years	11.9		14.5	x		
75 and over	11.1		24.3	x		
Ageing Index (65 and over/0–14 years x 100)	174.2		401.4	455.9		
Elderly Dependency Ratio (65 and over/15–64 years x 100)	35.6		75.3	82.4		
Vital rates (‰)						
Live birth rate	8.5		5.1	x		
Death rate	9.5		16.7	x		
Natural increase	-1.0		-11.6	x		
Total Fertility Rate	1.39		1.35	1.35		
Life expectancy (years)	Male	Female	Male	Female	Male	Female
at birth (0 years)	79.6	86.3	83.6	90.3	x	x
at 65 years	18.7	23.8	x	x	x	x
at 75 years	11.5	15.5	x	x	x	x
Growth/Decline rate of population (%)	2010–2050		2050–2100			
Total population	-24.2		-48.9			
0–14 years	-44.5		-52.4			
15–64	-38.3		-50.5			
65 and over	28.8		-45.8			

Source: enumerated by the author.

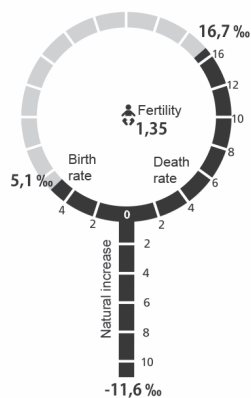
DEPOPULATION PHASE (2010-2050)

A Natural movement of population

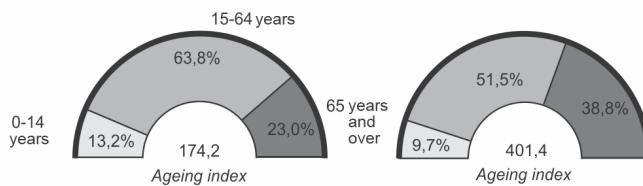
Initial period (2010)



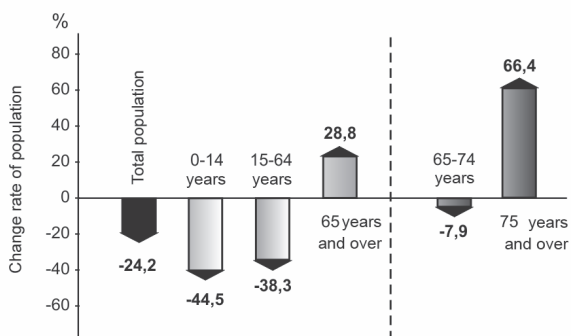
Final period (2050)



B Age structure of population



C Change rate of population by age groups: 2010-2050



◀ Figure 18. Japan. Depopulation phase (2010–2050). Natural movement indices, fertility rate (A) and age structure of the population (B) in the initial (2010) and advanced period (2050) of the depopulation phase and changing population growth/decline rate in selected age categories over the 2010–2050 period (C).

The unparalleled, in terms of scale, decrement of population of Japan in the advanced “depopulation phase”, will pose a large problem and challenge of the socio-economic nature. It will mostly be related to the fact of the extremely advanced state of progress of the process of population ageing, and consequently, the burgeoning population of those aged 65+, as well as the modest working-age population and the almost negligible number of persons aged 0–14. It may, thus, be stated that **the “depopulation phase” initiates the evolution of the multiannual (long-term) “senior boom” with the entirety of its predictable and currently undeterminable consequences and challenges.** It will, without a shadow of a doubt, result in a dramatic increase in the budget expenditure on social security (including pensions), under the conditions of substantially dwindling workforce. It is one of the most commented on and significant threats that the “hyper-aged Japan” will have to face (having regard to maintaining both, the appropriate level of economic development and retaining high standards and quality of living). In order to realize the scale of the problem (the imminent threat), it seems reasonable to point out a few distinctive demographic indicators (natural movement and age structure of population) in the 1964 vs. 2050 and 1911 vs. 2100 distribution, i.e. years with similar population sizes (Table 17).

Table 17. Japan. Differentiation of total population number and selected demographic indices for the 1911, 1964, 2050 and 2100 years

Specification/Years	1911	1964	2050	2100
Total population (mn)	49,8	97,2	97,1	49,6
Age structure of population (% of total)				
0–14 years	34.6	26.3	9.7	9.0
15–64	60.1	55.6	51.5	49.9
65 and over	5.3	18.1	38.8	41.1
Ageing Index (65 and over/0–14 years x 100)	15.9	68.8	401.4	455.9
Elderly Dependency Ratio (65 and over/15–64 years x 100)	8.8	9.1	75.3	82.4
Vital Rates (‰)				
Live birth rate	35.1	17.7	5.1	x
Death rate	20.9	6.9	16.7	x
Natural Increase	14.2	10.8	-11.6	x
Total Fertility Rate	5.15	2.13	1.35	1.35
Life expectancy at birth (years)				
Male	41.3	67.1	83.6	86.5
Female	42.1	71.5	90.3	93.2

Source: enumerated by the author on base *Population Statistics of Japan 2008*; *Japan Statistical Yearbook 2017*; *Population Projections for Japan (January 2012): 2011 to 2060, Appendix: Auxiliary Projections 2061 to 2110*.

In the shorter term (i.e. 2050), the significantly depopulated Japan will have 97,2 mn citizens, which, as mentioned above, will correspond to the population size of 1964. Having performed a simple comparative analysis of the indicators, it is easy to see the true scale of quantitative problems. In 2050, the percentage of elderly inhabitants (aged 65+) will mount up to the value of 38.8%, while in 1964, this population category constituted only

18.1%. Furthermore, the extremely negative value of the rate of natural increase in 2050 (-11.6‰) has to be juxtaposed with a very high value of this index in 1964 (as much as 10.8‰). Another feature of this comparison is the difference in the total fertility rate (1.35 in 2050), which, in 1964, was at the replacement level of fertility (2.13). The most positive indicator in the 1964–2050 timeframe is the life expectancy. In the case of men, it will increase by 16.5 years (from 67.1 to 83.6 years), whereas for women, it will rise by 18.8 years (from 71.5 to 90.3 years).

Significantly greater discrepancy of the indicators may be observed with regard to the 1911–2100 timeframe. Another fact that needs to be mentioned is that, in 1911, persons aged 0–14 constituted a large part of the society (34.6% of the total population), as can be seen in Table 17. This group is estimated to represent only 9.0% of the entire population in 2100. On the other hand, the share of seniors in the total number of citizens, in 2100, is estimated to be nearly eight times larger (41.1%) than that of 1911 (5.3%). The relations in terms of the total fertility rate are of the very adverse character as this indicator is expected to reach the value of 1.35 by the year 2100, while in 1911, it achieved one of the highest values of the 20th century Japan, exceeding the value of 5.00. Positive demographic shifts in this timeframe include the exceptional extension of life expectancy. In 2100, an average man will live, on average, 45.2 years more than his counterpart from 1911 (an increase by 109.4%), for women, this discrepancy is even more substantial with the average lifespan increasing by 51.1 years (a rise by 121.4% – Table 17).

Japan's entering the "demographic old age stage", in 1970, as well as the rising pace of the population ageing process, within which, starting in 1997, this country found itself in the "demographic decay stage" as well as the "conversion stage" in the distribution of age structures, resulted (in the social aspect) in a dramatic rise of expenditure on the social care.

From the onset of the “ageing society phase” (1970) until 2014, i.e. the initial period of the “hyper-aged society phase”, social expenditure in Japan had grown precisely by 3,216.1%. In relation to the national income, it increased fivefold: from 5.8% to 30.8%, respectively (Table 18).

Table 18. Japan. Social security expenditures (in 100 million yen) and their ratio (in%) to the national income by selected categories (1960–2014)

Year	Social security expenditures (100 mn yen)	Ratio to the national income by selected categories (%)			
		Total	Medical care	Pensions	Social welfare
1960	6,533	4.86	2.18	1.36	1.32
1965	16,037	5.98	3.40	1.33	1.25
1970	35,239	5.80	3.41	1.40	0.99
1975	117,693	9.49	4.61	3.13	1.75
1980	247,736	12.15	5.26	5.13	1.76
1985	356,798	13.69	5.48	6.48	1.73
1990	473,796	13.66	5.30	6.93	1.43
1995	649,328	17.51	6.49	9.03	1.99
2000	783,421	20.88	6.93	10.98	2.97
2005	887,970	23.73	7.63	12.52	3.58
2010	1 052,276	29.83	9.33	15.02	5.48
2014	1 168,532	30.76	9.97	14.91	5.88

Source: enumerated by the author on base *The Financial Statistics of Social Security in Japan, Fiscal Year 2014*, IPSS Statistical Report No. 27; *The Cost of Social Security in Japan, Fiscal Year 1995 and 2003*; *Handbook of Health and Welfare Statistics 2015*; *Japan Statistical Yearbook 2017*.

One of the outcomes of the rapidly swelling population of the elderly is the fact that, in 2014, as much as 50.0% of the entire social expenditure was allocated to pensions. Moreover, this public expenditure category had recorded the highest increase, which soared to the value of 6,200.0% for the 1970–2014 period. Since the beginning of the 1980s, pensions expenditure

has consistently exceeded funding allotted to healthcare. It is also a substantial category in the state budget, absorbing 10.0% of the national income, with seniors being over 40% of this category's beneficiaries (Table 19).

From the socio-economic perspective, a symbolic manifestation of the ongoing demographic transformations within the “senior boom”, as the aftermath of the process of population ageing and the “demographic decay”, may be the fact that the social expenditure on the widely-defined healthcare and financial support for seniors is 14 times higher than that on children and families with children (within the *Social Security Expenditure for Child and Family*). This situation is affected increasingly by the dynamically growing number of single-person households of seniors (4,9 mn in 2013), which constituted 25.0% of all households in this population category. This type of household has turned out to be the most expensive one from the social support perspective, predominantly due to the necessity of securing daycare or 24-hour care for the majority of them (in particular, medical and medical and nursing care).

Table 19. Japan. Social security expenditures for the aged (1975–2013)

Year	Expenditures (in 100 million yen)	Growth ratio (%)	Percentage of total social security expenditures
1975	38,788	-	33.0
1980	107,420	176.9	43.4
1985	188,204	75.2	52.8
1990	279,190	48.3	59.1
1995	407,109	45.8	62.9
2000	531,975	30.7	67.9
2005	619,682	16.5	69.8
2010	710,837	14.7	67.6
2013	756,422	6.4	68.4

Source: enumerated by the author on base statistical sources alike in Table 18.

It is a growing problem for Japan, particularly due to the fact that the deeply ingrained care for older persons is historical and cultural in origin. The cultural specificity of Japan in this regard, constitutes one of the major factors impacting the current evolution (decline) of the total fertility rate. The research conducted by the NIPSRR revealed that almost 25% of all young people (including young families) put looking after their elderly parents before having a baby, which is a particular challenge in a Japanese family, owing to the great care-giving and educational (but also very costly) effort: from birth, through all levels of education, to enrolling at a university. In practical terms, this is a sole responsibility of mothers.

Taking into consideration the enormous complexity of factors determining the scale and character of demographic transformations in the most industrialized countries, it must be stated that a classic manifestation of their status is the presently highly-advanced and evolving process of population ageing. It will result, by the mid-21st century, in a decreased number of inhabitants of numerous countries, i.e. entering the “demographic decay stage” and, within it – the “depopulation phase”.

The conducted research, documented with selectively chosen statistics illustrating the complexity, scale, pace and character of the process of population ageing, proves the delineation of the distinguished and defined stages and phases, proposed by the author. In a number of cases, they are of the novel character (including the introduction of new terminology), which should serve as a base for further discussion and scientific debate.

The principal scientific objective of the author was analysis and creative interpretation of one of the currently most crucial socio-demographic issues of the world, namely the dynamically evolving process of population ageing. In light of the subject literature to date as well as the findings of the present research, it must be stated that, in this regard, Japan is the

undeniable leader. As a consequence, it offers an incredible opportunity to observe, analyze and evaluate the completely novel problems and phenomena (including threats and challenges), resulting from the exceedingly high level of advancement of the process of population ageing. A symbolic challenge, in this regard, is the idea of forming a “new society” in which the population of seniors will outnumber young people numerically and structurally by multiple times. Therefore, it is in Japan, the demographically eldest country in the world, referred to as the “long-lived society” or the “land of seniors”, where the efforts of the state aim to build a new (innovative) model, officially called the “leading elderly society model”. It is one of the most significant challenges of the socio-economic nature that will have to be faced by the contemporary and future Japan – the depopulating country of the “hyper-aged society”, where, as soon as in the mid-21st century, every fourth person will be aged 65 and over.

SUMMARY



In the advanced period of the hyper aged society phase (2050), Japan's population as compared to 2010 will decrease by as much as 24.2%. Out of 97,1 million of total population as much as 38.8%, we be represented by people aged 65 and over (2050). This means that for 4 inhabitants aged 65 and over, there will be only 1 person between 0-14 years (Ageing Index = 401.4).

The dynamic economic development of Japan, from the end of the Second World War until today, has been accompanied by profound transformations of the economic structure as well as the unprecedented expansion into the global market, making this country one of the economic superpowers. It also initiated a rapid process of urbanization, suburbanization and metropolization of the country, causing the urbanization rate to grow over the period 1950–2015, from 37.3% to 90.7%. This process had taken place due to large-scale migrations of the rural population to cities, which, under the conditions of consistent growth of the modern labor market, led to the creation of vast urban settlement formations belonging to the group of the world's largest, including the most populous and most industrialized formation – the Nippon Megalopolis. Inhabited by approximately 75 million persons, it encompasses the biggest metropolitan areas of the country (including Tokyo, Osaka, Nagoya, Kitakyushu – Fukuoka) of which, the Tokyo metropolitan area is inhabited by 37 mn persons, which makes it the largest global megalopolis (Mydel R., 2014).

The country's economic growth as well as the concurrent (besides the previously described changes), the continuously rising standards and quality of living as well as the progressing "westernization" of style and (also partially) model of life, also commenced the process of fundamental changes to the demographic and social structure of the Japanese society. They are manifested in extending life expectancy, over the period of 1947–2015, of men by 30.1 years and women by 33.1 years, as well as a high state of progress of the process of ageing of the population of which 26.8% are persons aged 65 and over (2015). Taking the above facts into consideration, in the research accounts regarding current demographic problems of the world, Japan is described as the "long-lived society" or the "hyper-aged society". It is also frequently highlighted that the level of advancement of this process in this country is the highest at the global scale of the most developed countries, both in terms of the present and projected demographic transformations.

Under such circumstances, further demographic shifts in Japan will be characterized by the presence of a new type of qualitative and quantitative changes in terms of shaping and the evolution of the natural movement, fertility, age structure of population or the model of family. This country may, thus, be regarded as an interesting research "testing ground" in this regard, which is manifested in the vast, world literature on the subject. Another contributing factor is that just after World War II this country experienced rapid growth of the natural movement of population (the 1947–1949 baby boom), whereas after the year 1970, it entered the "demographic old age stage". Presently, the evolution of the demographic picture of Japan is taking place with the "hyper-aged society phase" (in which persons aged 65+ represent 26.8% of the all the citizens) as well as the "demographic decay stage" and the "conversion stage". Within these processes, since 2010, this country has been in a phase of sustained decline of the number of its citizens (the "depopulation phase") as a result of which Japan's population is estimated to drop by 24.2% over the period 2010–2050 (from 128,1 mn to 97,1 mn persons).

The research undertaken by the author, predominantly focused on demographic transformations problems related to the process of population ageing (and its periodization), required concentrating on the time and quantitative variability of the natural movement, fertility, age structure and the growth/decline dynamics (principally in the categories: 0–14, 15–64 as well as 65 and over years), life expectancy as well as quantitative and structural relations between selected demographic indicators (birth rate vs. death rate as well as population aged 0–14 vs. persons aged 65+).

The research timeframe, spanning the years 1947–2050, is a period of fundamental quantitative, qualitative and structural transformations in the demographic history of Japan. Treated as a widely-defined process of evolution of the demographic picture of the country, it revealed considerable disparity in terms quality, scale and pace of changes. With this in view, the author carried out its periodization, within the distinguished, defined and described stages, phases and periods of transformations. This necessitated new terminology as well as statistical and graphical documentation of the presentation.

Having synthesized the process of demographic transformations of Japan over the period of 1947–2015 as well as the forecasted shifts contained within the latest demographic projections (until 2050), the author claimed that, as regards evolution of age structures, this country transited from the “maturity stage” to the “demographic old age stage”. In the last case, it is notable that this process has been evolving (since 2007) within the “hyper-aged society phase”, i.e. it represents the most advanced phase of the process of population ageing, globally.

The demographic maturity stage, spanning the years 1947–1969 in Japan, was initiated within the “first baby boom” of 1947–1949, is identified as the period of the demographic history of the country with the highest values of the birth rate (on average, 33.7‰), rate of natural increase

(on average, 20.9‰) as well as the total fertility rate (on average, 4.45). As a consequence, it was a period with the highest share of the youngest population (0–14) in the total population in the history of the country, standing at 35.3% in 1947, accompanied by the lowest proportion of eldest citizens, i.e. those aged 65 and over (4.8%). The passing of the baby boom as well as entering the path of dynamic economic growth and very rapid urbanization, brought marked deceleration of the natural movement, which, under the conditions of the substantially extended life expectancy (on average, by 18.3 years over the period of 1947–1969) resulted in considerable transformations of age structures of the population. The shifts in question consisted in a significant drop of the share of persons aged 0–14 in the total population (to the level of 23.9% in 1969) with the concurrent quantitative and structural increase of the percentage of persons aged 65 and over. The year 1969 marked the conclusion of the “demographic maturity stage”, characterized by its proportion of seniors in the total population at 6.9%.

That was the population category that, within the “demographic maturity stage” (1947–1969), recorded the highest growth dynamics (89.8%), and at the same time, a negative value of this indicator (a drop by 10.8%) in the youngest population (0–14 years). This kind of trend was gaining momentum in the following years of the demographic development of Japan, determining a qualitatively new stage in the evolution called the “demographic old age stage”.

In 1970, the process of demographic transformations in Japan entered the “**demographic old age stage**”. According to the widely accepted threshold values of the share of persons aged 65 and over, which constitute the basis for differentiating advancement levels of the process of population ageing, there have been distinguished three individual phases: the ageing society phase (persons aged 65+ represent 7.1–14.0% of the total population), the aged society phase (14.1–21.0%) as well as the hyper-aged society phase (over 21.0%).

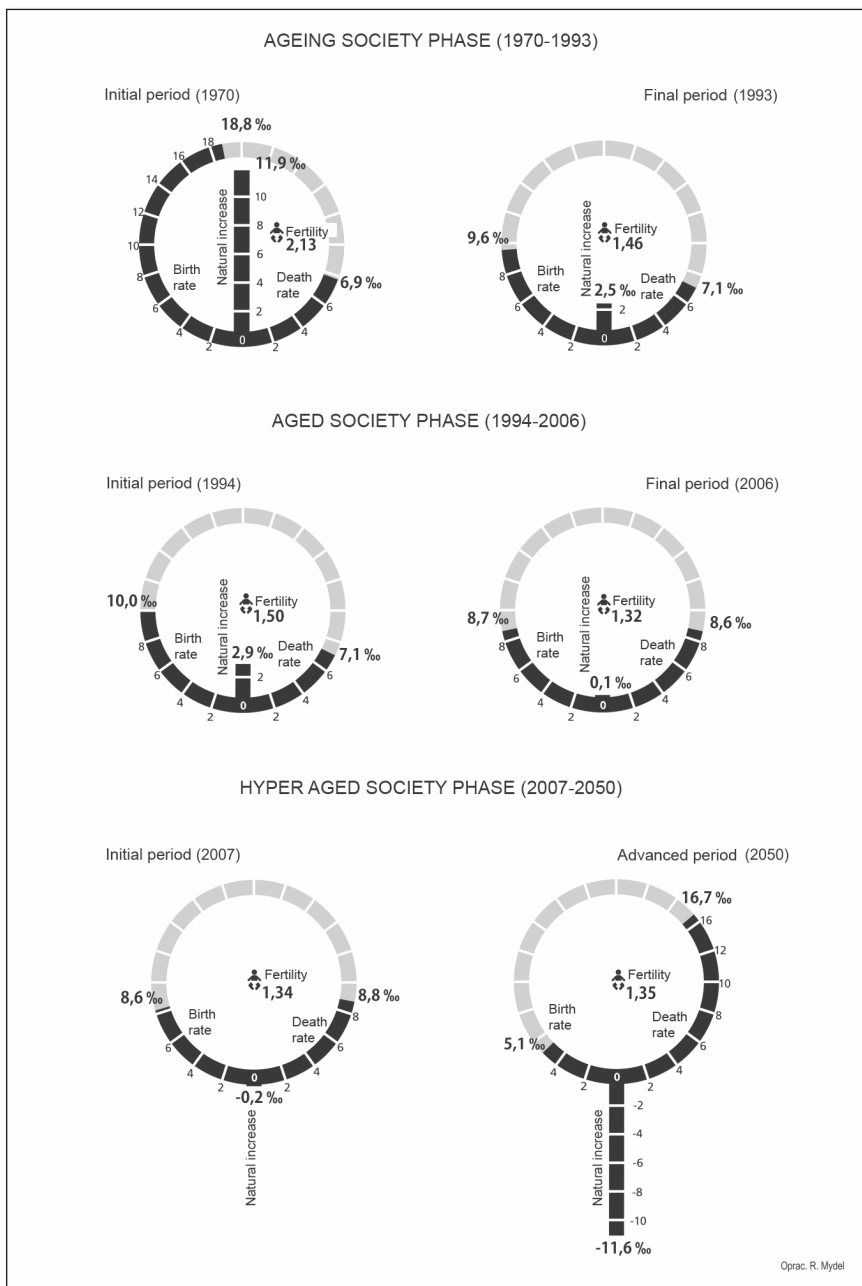


Figure 19. Japan. Natural movement indices and total fertility rate in the distinguished stages of the demographic old age stage.

The ageing society phase, which initiated a new period of demographic shifts, in the case of Japan spans the 23-year period of 1970–1993. Its onset coincided with the “second baby boom” of 1971–1974), which echoed the first baby boom (1947–1949). It resulted in a high value of birth rate (on average, 18.8‰), rate of natural increase (on average, 11.9‰) as well as replacement-level fertility (2.13). The continuous development and modernization of Japanese economy, combined with the growing living standards and “westernization” of life, caused the onset of the persistent downward trend of the natural movement of population and fertility. The defining features of this phase included initiating (at the turn of 1978/1979) a sustained process of decline of the number of the youngest citizens (0–14) as well as a fall of the fertility rate below the replacement level (from 2.13 in 1970 to 1.46 in 1993). Towards the end of the “ageing society phase” they brought a fall of the proportion of citizens aged 0–14 in the total population to the level of 16.7% with a concurrent rise of the percentage of people aged 65+ to 13.6%. The latter age category registered the highest growth rate among all three distinguished age groups (an increase by 130.6%, over the 1970–1993 period). Another fact worth pointing out is the exceptionally short duration of the “ageing society phase” (23 years), proving a rapid pace of evolution of the widely-defined process of ageing of Japanese society.

The research findings demonstrate that this process had been gaining momentum and intensity over time, which was manifested in the fact that the following, more advanced transformations phase, referred to as the “**aged society stage**”, lasted only 12 years. It spanned the years 1994–2006, which was nearly two times shorter than the “ageing society phase”. The developing trend of a drop of the rate of natural increase (to the level of 0,1‰) and the total fertility rate (to 1.32) was accompanied by the dwindling number of persons aged 0–14. Another notable feature of this phase is also the fact of initiation (since 1997) of the process of population decline in the age range 15–64.

It means that in the “aged society phase”, seniors (persons aged 65 and over) remained the only group registering an increase in number. Another distinctive characteristic of the “aged society phase”, being a derivative of the numerical growth of only seniors, was the historical predominance of their share in the total population (since 1997) over the group aged 0–14. Therefore, this process is characterized by a completely novel, unprecedented character of structural relations and transformations, described by the author as the “**conversion stage**” in the distribution of the two age groups, with its distinctive and, over time, growing predominance of the population of seniors. Under the conditions of a considerably low rate of natural increase, substantial extension of life expectancy as well as positive outcomes of the senior-oriented policies of the government (principally based on the so-called Gold Plan and New Gold Plan), Japan has become the country of the eldest and fastest ageing society in the world (in 2006, 20.8% of the entire population were persons aged 65 and over).

The year 2007 marked the beginning of the most advanced phase of the process of population ageing (within the “demographic old age stage”), namely the “**hyper-aged society phase**”. The remarkably short time between its onset after Japan’s entering the “aged society phase” (1994) is the most telling proof of failure of the pro-natalist and pro-family policies of the government, undertaken extensively from the mid-1990s (including the Angel Plan and the New Angel Plan).

A symbolic, and at the same time, characteristic for these failures, was **entering the “conversion stage” by the process of transformations of natural movement**, manifested by a strong growth trend and predominance of the death rate over the birth rate, remaining at a relatively low level. It resulted in progressively more negative values of the rate of natural increase. In combination with the total fertility rate, fluctuating between 1.34 and 1.35 as well as the diminishing number of persons aged 0–14 and 15–64, it led to real and structural growth of population of seniors (65 and over).

This demographic situation contributed to increasing the rate of the “conversion process” in the distribution of population aged 0–14 and 65+, leading to accelerated growth in the proportion of seniors in the total population. Thus, in only 11 years from Japan’s entering the “hyper-aged society phase” (2007), another threshold value of share of this age group will be exceeded in 2018 (by additional 7.0%). In effect, persons aged 65+ are estimated to make up 28.0% of all citizens. The projections clearly indicate further development of this trend (within the “conversion stage”) with regard to the evolution of the age structure of the population of Japan, making it, by 2050, a country of the “hyper-aged society”.

The population of seniors will be four times more numerous than the group consisting of the youngest inhabitants (0–14), constituting 38.8% and 9.7% of the total population, respectively.

Another notable demographic phenomenon commenced during the initial period of the “hyper-aged society phase” (since 2010) is the onset of a persistent process of consistent decrement of the population size of Japan, i.e. the process of depopulation of the country. As part of this process, starting in 2042, a process of a real drop of the number of persons aged 65+ will begin. As noted above, for the category of people aged 0–14, it was initiated in 1979 (in the “ageing society phase”), while for the population of persons aged 15–64 – in 1996 (17 years late, during the initial period of the “aged society phase”). It means that in the demographically “hyper-aged” and continuously depopulating Japan, seniors will remain the only part of the society of that will register a number increase over 46 years (1996–2042).

Therefore, the year 1996 marked a remarkable moment in the history of demographic evolution of Japan. The diminishing number of persons aged 0–15 (from 1979), combined with a decrease of the population aged 15–64 (initiated in 1996), caused a substantial decline of the scale of demographic evolution of the country. Under the conditions of a low value of

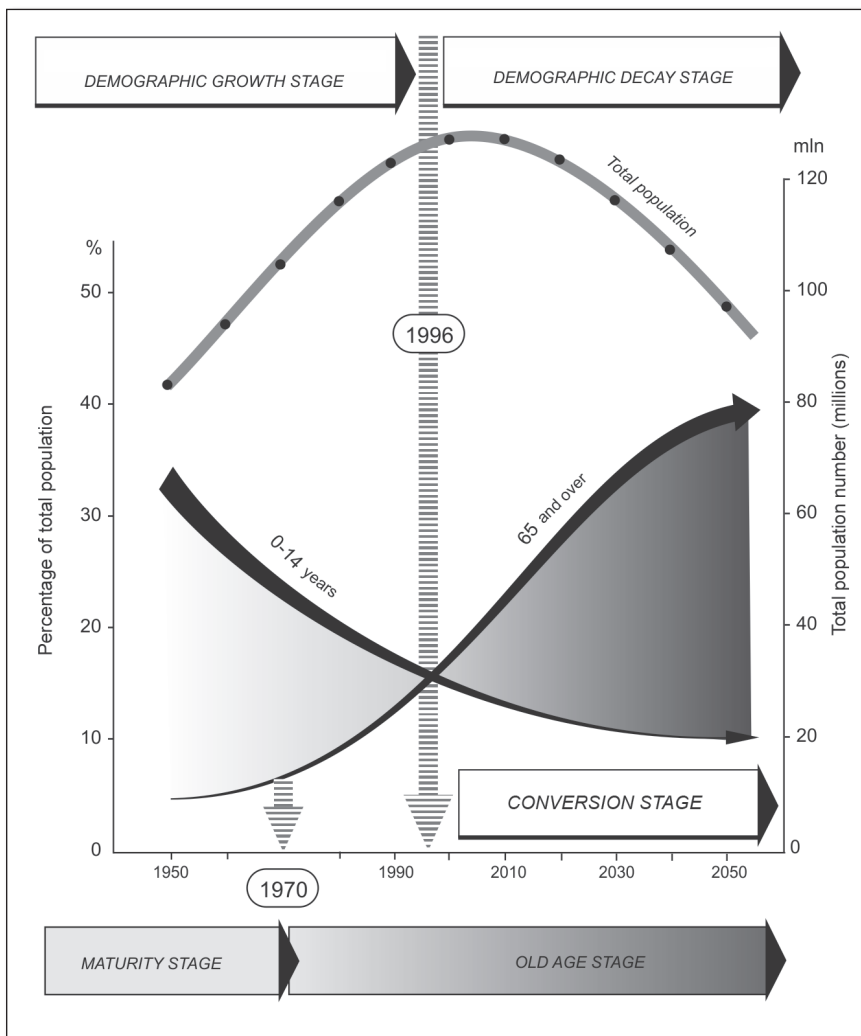


Figure 20. Types of demographic transformation stages of Japan against the background of changes of proportions of the young (0–14) and elderly persons (65+) in the population distribution and the total population size over the 1950–2050 period.

the total fertility rate (1.43) as well as the rate of natural increase (2.5‰), a process of conversion in the distribution of population aged 0–14 vs. 65+ was initiated. The consequence of this situation was a significant decrease

in the dynamics of the demographic development, leading to the onset of the “conversion process” also in the distribution of other indices, i.e. birth rate vs. death rate. The ultimate outcome of the two cases of the conversion phenomenon was, first, suppressing and then, ceasing of the trend of population growth, which, during the “hyper-aged society phase”, transformed into the process of depopulation, gaining in scale and dynamics.

Under these circumstances, the author distinguished the “**demographic decay stage**” in the demographic evolution of Japan. Taking into account the variability of scale, character and consequences with regard to the growth/decline rate of the total population, the author distinguished two phases: the “**demographic anxiety phase**” and the “**demographic depopulation phase**” within this stage.

Japan entered the “demographic decay stage” in 1996. It is worth pointing out that, with reference to the theory of demographic transitions, the onset of the distinguished stage generally coincides with the initiation of the “second demographic transition”. That year marked the beginning of the distinguished “demographic anxiety phase”, whose defining feature was the diminishing dynamics of population growth, under the conditions of population increase only on part of seniors (persons aged 65 and over). This phase, spanning the years 1996–2010, is also characterized by commencing, in 1996, the “process of conversion” in the distribution of persons aged 0–14 vs. 65+, and in a later period (from 2007), conversion in the birth rate vs. birth rate distribution. The “demographic anxiety phase” also marked a historic moment in the demographic evolution of Japan, manifested in achieving the peak level of population as well as initiating a rapidly progressing process of predominance of the death rate over the birth rate (the rising negative rate of natural increase). This situation caused the state authorities considerable concern and fear for the demographic and economic future of the country and the multitude of problems and challenges (including those difficult to anticipate) resulting from it (Figure 21).

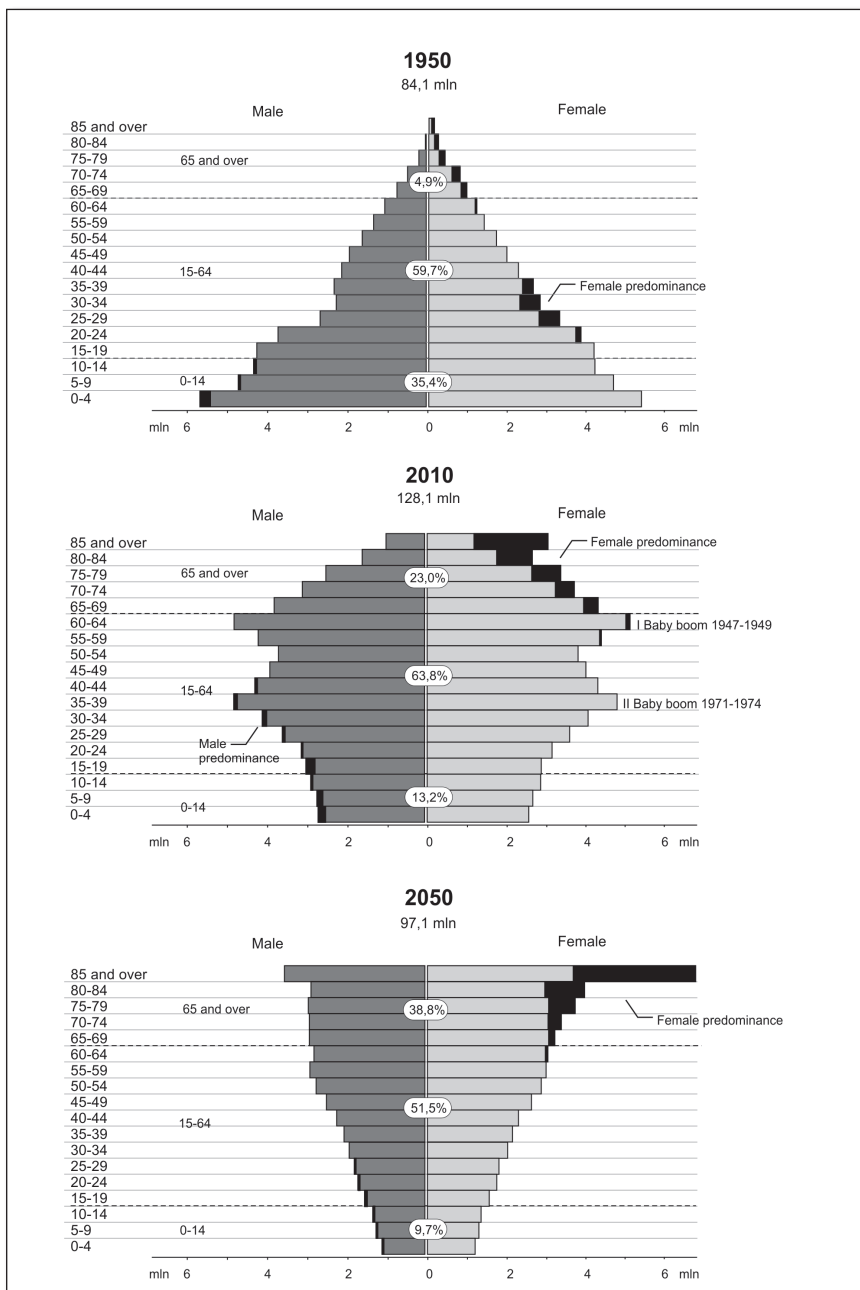


Figure 21. Japan. Population pyramids: 1950, 2010 and 2050.

Under the conditions of evolution of the conversion phenomenon in the birth rate-death rate distribution, the extending life expectancy as well as a sustained decline of the number of persons aged 0–14 and 15–64, a process of persistent decrement of the total population – the process of depopulation, has been initiated. The “depopulation phase”, distinguished within the “demographic decay stage” and started in 2010 (i.e. in the initial period of the “aged society phase”), which was symbolically “closed” with the year 2050, is mainly characterized by a decrease of the total population that gaining momentum and scale. For instance, from its onset (in 2010) to 2015, this decline reached the value of -0.7%, for the years 2030–2035, it is estimated to stand at -3.9%, while for the 2045–2050 period it is expected to climb to -5.0%. It means that during this period of the “depopulation phase” (2010–2050), Japan’s population will drop by a staggering 24.2% (from 128,1 mn to 97,1 mn persons). Under the conditions of the progressively negative value of the rate of natural increase (2010: -1.0‰, 2025: -6.7‰, 2050: -11.6‰) as well as a sustained decline of the number of citizens aged 0–14 and 15–64, the share of the elderly (those aged 65 and over) in the total population is estimated to rise from 23.0% (2010) to 38.8% (in 2050). As a consequence, the population aged 65+ will be four times larger than the youngest age group of the country, which will constitute only 9.7% of the entire population.

In light of the current and projected transformations occurring within the “demographic decay stage” and the “conversion stage” of the demographically “hyper-aged” Japan, where every fourth citizen will be 65 and over, one of the major goals of the government, resulting from the highest state of progress of the population ageing process, will be implementation the visionary model of the society, referred to as the “leading elderly society model”.

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STATISTICAL ANNEX

Table I. JAPAN. Number and age structure of population (1920–2050)

Year	Population (1000)	Percentage by age groups					Elderly Dependency Ratio (C/Bx100)	Ageing Index (C/A x 100)
		0–14 years (A)	15–64 years (B)	65 and over (C)	65–74 years	75 and over		
DEMOGRAPHIC MATURITY STAGE (1947–1969)								
1920	55,963	36.5	58.3	5.2	3.9	1.3	9.0	14.4
1925	59,737	36.7	58.2	5.1	3.7	1.4	8.7	13.8
1930	64,254	36.6	58.6	4.8	3.4	1.4	8.1	13.0
1935	69,254	36.9	58.4	4.7	3.3	1.4	8.0	12.6
1940	73,075	36.1	59.2	4.7	3.5	1.2	8.0	13.1
1945	71,998	36.8	58.1	5.1	3.9	1.2	8.8	14.0
1950	84,115	35.4	59.7	4.9	3.7	1.3	8.3	13.9
1955	90,077	33.4	61.2	5.4	3.7	1.7	8.7	15.9
1960	94,301	30.2	64.1	5.7	4.0	1.7	8.9	19.0
1965	99,209	25.7	68.0	6.3	4.4	1.9	9.2	24.4
DEMOGRAPHIC OLD AGE STAGE (1970–2050)								
1970	104,665	23.9	69.0	7.1	4.9	2.2	10.2	29.4
1975	111,940	24.3	67.7	8.0	5.4	2.6	11.7	32.6
1980	117,060	23.5	67.4	9.1	6.0	3.1	13.5	38.7
1985	121,049	21.5	68.2	10.3	6.4	3.9	15.1	47.9
1990	123,611	18.2	69.7	12.1	7.2	4.9	17.3	66.2
1995	125,570	16.0	69.5	14.6	8.8	5.8	20.9	91.2
DEMOGRAPHIC DECAY STAGE (1996–2050)								
2000	126,926	14.6	68.0	17.4	10.2	7.2	25.5	119.1
2005	127,768	13.7	66.1	20.2	11.0	9.2	30.5	146.5
HYPER AGED SOCIETY PHASE (2007–2050)								
2010	128,057	13.2	63.8	23.0	11.9	11.1	35.6	174.2
Depopulation Phase								
2015	127,110	12.7	60.5	26.8	13.6	13.2	44.0	210.7
2020	124,100	11.7	59.2	29.1	14.2	14.9	49.2	248.0
2025	120,659	11.0	58.7	30.3	12.3	18.0	51.6	276.2
2030	116,618	10.3	58.1	31.6	12.2	19.4	54.4	306.1
2035	112,124	10.1	56.6	33.3	13.5	19.8	59.0	331.4
2040	107,276	10.0	53.9	36.1	15.5	20.6	66.8	360.4
2045	102,210	9.9	52.4	37.7	15.9	21.8	72.0	381.2
2050	97,076	9.7	51.5	38.8	14.5	24.3	75.3	401.4

Source: enumerated by the author on base *Population Statistics of Japan 2008*; *Japan Statistical Yearbook 2017*; *Population Projections for Japan (January 2012): 2011 to 2060, App. ndix: Auxiliary Projections 2061 to 2110*.

Table II. JAPAN. Vital statistics and life expectancy at birth by sex (1947–2050)

Year	Life birth (per 1000)	Death rate (per 1000)	Natural increase (per 1000)	Infant mortality rate (per 1000 live birth)	Total fertility rate	Females aged 15–49 as% total population	Life expectancy at birth	
							Male	Female
DEMOGRAPHIC MATURITY STAGE (1947–1969)								
1947	34.3	14.6	19.7	76.7	4.54	28.6	50.06	53.96
1950	28.3	10.9	17.4	60.1	3.65	25.6	59.58	62.98
1955	19.4	7.8	11.6	39.8	2.37	26.1	63.60	67.75
1960	17.3	7.6	9.7	30.7	2.00	27.1	65.32	70.19
1965	18.6	7.1	11.5	18.5	2.14	28.4	67.74	72.92
DEMOGRAPHIC OLD AGE STAGE (1970–2050)								
1970	18.8	6.9	11.9	13.1	2.13	28.5	69.33	74.71
1975	17.1	6.3	10.0	10.0	1.91	27.2	71.73	76.89
1980	13.5	6.2	7.3	7.5	1.75	26.2	73.35	78.76
1985	11.9	6.3	5.6	5.5	1.76	25.5	74.78	80.48
1990	10.0	6.7	3.3	4.6	1.54	25.4	75.92	81.90
1995	9.6	7.4	2.2	4.3	1.42	24.7	76.38	82.85
DEMOGRAPHIC DECAY STAGE (1996–2050)								
2000	9.5	7.7	1.8	3.2	1.36	23.1	77.72	84.60
2005	8.4	8.6	-0.2	2.8	1.26	21.8	78.53	85.94
HYPER AGED SOCIETY PHASE (2007–2050)								
2010	8.5	9.5	-1.0	2.3	1.39	21.1	79.56	86.31
Depopulation Phase								
2015	8.0	10.3	-2.3	2.1	1.46	20.2	80.50	86.83
2020	6.3	11.6	-5.3	2.0	1.34	20.0	80.85	87.68
2025	6.1	12.8	-6.7	1.9	1.33	19.0	81.39	88.19
2030	6.0	13.9	-7.9	1.8	1.34	18.2	81.88	88.66
2035	5.8	14.9	-9.0	1.7	1.34	17.7	82.31	89.06
2040	5.5	15.7	-10.2	1.6	1.35	17.5	82.71	89.43
2045	5.2	16.3	-11.1	1.4	1.35	17.4	83.05	89.77
2050	5.1	16.7	-11.6	1.3	1.35	17.2	83.57	90.27

Source: enumerated by the author on base *Population Statistics of Japan 2008*; *Japan Statistical Yearbook 2017*; *Population Projections for Japan (January 2012): 2012 to 2060, App. ndix: Auxiliary Projections 2061 to 2110*.

Table III. JAPAN. Trends of life expectancies by age and sex (1950, 1970, 1995, 2010)

Population age	Maturity Stage 1950		Initial Phase of Demographic Old Age Stage 1970		Initial Phase of Demographic Decay Stage 1995		Initial Period of Hyper Aged Society Phase 2010	
	Male	Female	Male	Female	Male	Female	Male	Female
0 years	59.6	63.0	69.3	74.7	76.4	82.9	79.6	86.3
5	60.1	63.3	65.7	70.8	71.9	78.3	74.8	81.6
10	55.7	58.8	60.9	65.9	66.9	73.3	69.9	76.6
15	51.0	54.1	56.0	61.0	62.0	68.4	64.9	71.6
20	46.4	49.6	51.3	56.1	57.2	63.5	60.0	66.7
25	42.2	45.4	46.6	51.3	52.4	58.6	55.2	61.8
30	38.1	41.2	41.9	46.5	47.6	53.7	50.3	56.8
35	33.9	37.0	37.2	41.7	42.7	48.8	45.5	51.9
40	29.7	32.8	32.7	37.0	38.0	43.9	40.7	47.1
45	25.5	28.6	28.2	32.4	33.3	39.1	36.0	42.3
50	21.1	24.5	23.9	27.8	28.8	34.4	31.4	37.5
55	17.8	20.5	19.8	23.5	24.4	29.8	27.0	32.9
60	14.4	16.8	15.9	19.3	20.3	25.3	22.8	28.3
65	11.4	13.4	12.5	15.3	16.5	20.9	18.7	23.8
70	8.8	10.3	9.6	11.8	13.0	16.8	15.0	19.4
75	6.7	7.8	7.1	8.7	9.8	12.9	11.5	15.3
80	5.0	5.6	5.3	6.3	7.1	9.5	8.4	11.5
85	3.7	4.0	3.8	4.5	5.1	6.7	6.0	8.2
90	2.7	2.7	2.8	3.3	3.6	4.6	4.2	5.5
95	2.0	1.8	2.0	2.4	2.6	3.3	2.9	3.7
100	1.4	1.2	1.4	1.8	1.9	2.5	2.0	2.4

Source: enumerated by the author on base *Historical Statistics of Japan. Chapter 2. Population and Household; Japan Statistical Yearbook 2017.*

Table IV. Labour force participation rate (in%) by sex and age in Japan against selected countries in 2015

Sex and age	JAPAN	Germany	France	USA
Male	70.3	65.9	61.0	69.1
15–19 years old	16.0	29.4	16.2	34.2
20–24	68.8	70.3	66.8	73.0
25–29	92.9	86.2	91.2	87.4
30–34	95.7	93.8	93.8	90.3
35–39	96.2	94.7	94.5	90.3
40–44	96.2	94.3	94.2	90.3
45–49	95.9	94.1	92.0	87.9
50–54	95.2	91.6	90.3	84.0
55–59	93.1	86.1	78.7	77.1
60–64	78.9	62.7	30.2	61.5
65 and over	31.1	8.6	3.6	23.4
65–69	54.1	18.5	7.4	36.8
70–74	32.9	8.7	3.1	22.8
75 and over	13.2	2.9	0.8	11.1
Female	49.6	54.7	51.7	56.7
15–19	16.8	25.8	11.0	34.4
20–24	68.5	66.5	58.2	68.3
25–29	80.3	79.4	79.1	73.8
30–34	71.2	79.9	81.1	72.9
35–39	71.8	81.6	83.7	73.6
40–44	74.8	84.0	86.7	75.0
45–49	77.3	75.5	85.5	74.5
50–54	76.3	83.3	81.5	72.4
55–59	69.0	76.2	71.2	66.3
60–64	50.6	50.2	29.0	49.8
65 and over	15.3	4.1	1.9	15.3
65–69	32.0	11.2	4.9	27.9
70–74	18.9	4.0	1.7	15.0
75 and over	5.4	1.0	0.3	5.3

Source: enumerated by the author on base *Labour Force Participation Rate by Sex and Age – Indicators, OECD.Stat.*

Table V. Trends in the proportion of aged population in Japan against selected countries (1950–2050)

Year	Proportion of total population aged 65 years and over (%)					
	JAPAN	Germany	France	Italy	UK	USA
1950	4.9	9.7	11.4	8.1	10.8	8.3
1955	5.4	10.7	11.6	8.8	11.3	8.8
1960	5.7	11.5	11.6	9.5	11.7	9.2
1965	6.3	12.5	12.1	10.1	12.2	9.5
1970	7.1	13.7	12.9	11.1	13.0	9.8
1975	8.0	14.8	13.5	12.2	14.0	10.5
1980	9.1	15.6	13.9	13.4	14.9	11.3
1985	10.3	14.6	12.9	13.1	15.1	11.9
1990	12.1	14.9	14.0	14.9	15.7	12.5
1995	14.6	15.4	15.2	16.7	15.8	12.6
2000	17.4	16.3	16.1	18.3	15.8	12.4
2005	20.2	18.6	16.3	19.5	15.9	12.3
2010	23.0	20.8	16.8	20.3	16.6	13.1
2015	26.8	21.6	18.6	21.6	17.8	15.1
2020	29.1	23.2	20.3	22.4	18.7	16.7
2025	30.3	25.2	21.8	23.5	19.8	18.9
2030	31.6	28.1	23.2	25.3	21.4	20.7
2035	33.3	30.6	24.4	27.3	22.7	21.4
2040	36.1	31.2	25.2	28.9	23.3	21.9
2045	37.7	31.5	25.2	29.7	23.5	21.8
2050	38.8	31.8	25.1	29.9	23.9	22.2

Source: enumerated by the author on base *Population Census of Japan 2010,2015; Population Projections for Japan (January 2012): 2011 to 2060: Auxiliary Projection 2016–2110; The 2016 Ageing Report: Economic and Budgetary Projections for the 28 EU Member States (2013–2060); World Population Prospect: The 2015 Revision.*

Table VI. JAPAN. Changes in registered foreigners by nationality (1975–2015)

Nationality	Number of foreigners (in 1000)					
	1975	1985	1995	2005	2015	
					Number	% total number of foreigners
Total	751.8	850.6	1 362.4	2 011.6	2 232.2	100.0
China*	51.5	74.9	230.0	519.6	665.8	29.8
Korea	614.2	683.3	666.4	598.7	457.8	20.5
Philipp. nes	0.9	12.3	74.3	187.3	229.6	10.3
Brasil	0.9	2.0	176.4	302.1	173.4	7.8
Viet Nam	0.6	4.1	9.1	28.9	147.0	6.6
Nepal	-	-	2.5	7.0	54.8	2.5
USA	19.0	29.0	43.2	49.4	52.3	2.3
Peru	0.1	0.5	32.3	57.7	47.7	2.1
Thailand	0.7	2.6	16.0	37.7	45.4	2.0
Indonesia	1.0	1.7	7.0	25.1	35.9	1.6
India	1.3	0.7	5.5	17.0	26.2	1.2
United Kingdom	3.0	6.8	12.5	17.5	15.8	0.7
Myanmar	0.1	0.8	1.4	2.3	13.7	0.6
Sri Lanka	0.1	0.5	2.8	9.0	13.2	0.6
Pakistan	0.2	1.0	4.8	8.8	12.7	0.6
Bangladesh	0.1	0.7	4.9	11.0	10.8	0.5
France	1.5	2.4	3.8	7.3	10.7	0.5
Australia	0.9	1.8	6.0	11.3	9.8	0.4
Canada	1.5	2.4	7.2	12.0	9.5	0.4
Malaysia	0.7	1.8	5.4	7.9	8.7	0.4
Russia**	0.4	0.5	2.2	7.1	7.8	0.3
Germany***	2.7	3.1	4.0	6.0	6.3	0.3

*including Taiwan, Hong Kong and Macao;

**through 1990,data for U.S.R.R.;

***including former DR

Source: enumerated by the author on base *Japan Statistical Yearbook: 2000, 2013, 2017.*

Table VII. JAPAN. Age and employment structure of foreigners by nationality (2010)

Age/ Years	Age structure of foreigners by nationality (%)							
	Total	China	Korea	Indonesia	Thailand	Philippines	Brazil	USA
0-14 years	9.5	7.2	7.3	7.2	5.1	8.9	19.1	13.0
15-64	83.5	90.6	73.0	92.4	94.3	90.6	79.2	79.6
65 and over	7.0	2.2	19.7	0.4	0.6	0.5	1.7	7.4
Industries	Employed foreigners 15 years of age and over by nationality and industries (%)							
Primary industry	0.8	1.5	0.3	6.1	3.3	1.8	0.4	0.2
Secondary industry	44.5	41.5	29.6	76.7	50.0	38.1	83.8	7.7
Manufacture	36.2	35.6	15.8	65.8	38.1	29.9	80.9	6.2
Tertiary industry	54.7	57.0	70.1	17.2	46.7	60.1	15.8	92.1
Trade	22.6	28.3	31.2	7.7	28.7	38.6	3.3	7.7
Services	25.6	24.8	27.5	9.7	16.6	19.7	10.8	74.9
FIRE	4.3	1.6	6.0	0.3	0.3	0.4	0.1	4.4

Source: enumerated by the author on base *Population Census of Japan 2010*.

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