

Population Increase and Control

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Abstract People are apparently reluctant to have children or more children due to job and financial insecurity, and other reasons, e.g., desire for independence and freedom, women wanting to focus on their jobs and career development instead of giving birth and becoming housewives, etc. Declining birth-rates are apparently now a concern to many countries, e.g., China, Japan, South Korea, Singapore, etc., for the young are needed to replace an aging workforce. This paper takes an analytical look at the declining birth-rates and increasing the birth-rate and population, and offers some suggestions for a solution to this complex problem. Many of the scenarios presented in the paper are derived from the author's work experience in government dealing with labor matters and in the industrial sector dealing with automation and workers. The ideas in the paper should appeal to theorists, practitioners and social activists.

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1. Introduction

The eminent economist Thomas Malthus in his classic treatise **An Essay on the Principle of Population**¹ had pointed out that population growth would outstrip the resources available to support life, resulting in suffering for the people, particularly those from the poorer classes. He predicted that uncontrolled population growth would result in depletion of resources, overcrowding, more pollution and higher unemployment, until famine, disease and war reduce the population. Some economists have criticized Malthus' ideas and thought he had been wrong, e.g., he only thought about agriculture and food supply and had neglected the industrial aspect of the economy.

Other economists have spoken about optimum population, which is the ideal population that together with other available resources or means of production in the country would yield the maximum returns or income per head, i.e., optimum population results in maximum economic benefit.

2. Society: People and Problems

Life today tends to be stressful, with a swelling population of 8.1 billion people inhabiting this planet, which has limited resources for supporting life. Everyone now is apparently in a rat-race, wherein there is very keen competition all round, e.g., competition for good education and good grades which lead to good, well-paying jobs (today, without a good degree it would be difficult to get a fine, well-paying job), competition for customers and business, etc. Competition apparently evokes the worst from people, causing people to be self-centered and lacking in

¹ Malthus (2008)

consideration for others, envious of others who are more successful, suspicious and distrustful of others, etc. With commendable academic and professional qualifications a person could look forward to a comfortable life, whereas for those lacking in such credentials it is likely to be a harder life for them, education now an important, high-stakes, serious undertaking with much parents in the author's country sending their children to many tuition classes to improve their grades. All this leads to great stress and even mental health problems, particularly for those who failed to make the cut.²

This stress, the result of the rat-race, is worsened by other concerns, such as high costs of living, inflation and job and financial insecurity; all this apparently causes many people to be disinclined towards having children or more children, or, getting married with people now apparently getting hitched later. Due to the high costs of living many women have to work to supplement the family income instead of remaining as housewives while their husbands work to support the family, with a number of working women so focused on their career that they have little or no inclination to give birth and raise children, with some single women even preferring to stay unmarried, particularly those single women who treasure their independence and freedom. Also, many jobs are so demanding and taking up so much of workers' time that they have little time or energy for friends, family or anything else outside of work resulting in work-life balance problems, which adds further to the stress workers are experiencing; such demanding jobs could affect workers' physical and mental health and cause burn-out. Due to all this difficulty many are apparently disinclined towards having children or more children, probably feeling it is not justified to have children or more children since they could devote little time to the children who need parental care and attention. It is thus not surprising that birth-rates have declined.

There is now also great concern that artificial intelligence would cause many to lose their jobs, with the impact of artificial intelligence on society even compared to that of the atomic bomb. If artificial intelligence is going to deprive workers of more and more jobs, newly born babies might have a bleak future as in about 20 years' time, after they graduate from college, they may find that much of the jobs have been taken over by artificial intelligence with little left for them. So, is there any point for governments to encourage their people to have children or more children if the children are going to have a bleak future? There could be severe structural unemployment in the future when people are unable to keep up with advanced technologies to be employable, when there is high utilization of automation resulting in many people losing their jobs, when new jobs are scarce, etc., whereby the government might have to introduce a universal basic income³ which would be paid out in the same quantum (for fairness) to every citizen to fully or partially support basic sustenance. Some of them without work might even resort to stealing, robbing, cheating, extorting and cyber-scamming to survive.

As we are going to talk about increasing the birth-rate and population, it should be pointed out that an increase in the population of a country could be achieved in two ways, namely, by getting women in the country to have children or more children, and, by getting foreigners to become

² Wong (2021)

³ Haagh (2019), Wong (2023)

citizens of the country, i.e., getting immigrants, while deaths in the country and people emigrating from the country would decrease the population.

Evidently, the 8.1 billion people now inhabiting this planet are also not all kindly, gentle souls. A look around would tell one that the world is full of hate, discrimination, violence, crimes, conflicts and wars. Increasing the birth-rate and population could possibly cause more of such troubles when miscreants and trouble-makers are found among the new citizens while many stressed by all this would fervently hope there would not be more troubles. The increase in population would make it more difficult for the government to manage its relationships with the people and the relationships between the people, i.e., it would be more difficult to administer or govern the country, with the government likely to face the problem of communication, e.g., how the government could convey messages clearly and unequivocally to the people and how the people could communicate well among themselves and with the government, the larger the group the more challenging this would be, which also constitutes a relationship problem as poor communication leads to delay and confusion, which we will explain. We introduce the “span of control” theory of V. A. Graicunas⁴, who was an engineer, management theorist and management consultant, to explain the fact that the larger the population is the more complex it would be and the more difficult it would be to administer it. Below is Graicunas’ formula for the possible number of relationships in an organization:-

$$R = n \left(\frac{2^n + (n - 1)}{2} \right)$$

where R = no. of relationships, and, n = no. of subordinates

If, e.g., n = 4 subordinates, then $R = 4 \left(\frac{2^4 + (4 - 1)}{2} \right) = 4 \left(\frac{16 + (3)}{2} \right) = 4 (8 + 3) = 4 (11) = 44$ relationships

According to Graicunas, there is a limit to the number of subordinates an executive should try to manage directly, i.e., there is a strict limit to the number of direct subordinates an executive should have. By the above-mentioned formula, Graicunas mathematically proved that a manager should not have more than four to five subordinates, i.e., a manager’s span of control should be limited to four to five subordinates, because when the number of subordinates increases the number of relationships increases exponentially, i.e., the relationships become exponentially more complex, curtailing his effectiveness; the relationships comprise of those of the manager and individual subordinates, those between subordinates and those of the manager and groups of subordinates. Also, if the manager has too many subordinates, i.e., his span of control is too wide, the communication of the manager with his subordinates would be poor resulting in delay and confusion. Table 1 below illustrates this exponential increase in the number of relationships with each increase in the number of subordinates:-

⁴ Graicunas (1933)

<u>No. of Subordinates</u>	<u>No. of Relationships</u>
1	1
2	6
3	18
4	44
5	100
6	222
7	490
8	1,080
9	2,376
10	5,210

Table 1

It could be seen in Table 1 above that the arithmetical increase in the number of subordinates gives rise to an exponential and almost geometrical increase in the number of relationships among them. According to Graicunas, a top-level manager can effectively manage only 222 relationships and therefore should not have more than six subordinates, while a lower-level manager should not have more than 20 subordinates.

Graicunas' theory has similar implications for population increase, namely, with a higher population relationships between people would be more complex and these relationships would also potentially encounter more problems, making it more difficult to administer the population. Though the example Graicunas adopted is that of a corporate organization, his theory of span of control, namely, the greater the number of subordinates reporting to a manager the more complex relationships would be and the poorer the communication of the manager with his subordinates would also be, also applies to a government which is also a very large organization with many rules and regulations and layers of hierarchy, an organization which is evidently more complex and also more powerful than a corporate organization. We will explain why an increase in the number of citizens (citizens here substitute the subordinate workers in Graicunas' theory) would not only give rise to an exponential increase in the number relationships, i.e., the relationships become exponentially more complex, among the citizens but would also possibly result in an exponential increase in relationship problems such as communication problems and conflicts between these citizens depending on the characters of the citizens, how well they are able to communicate among themselves and with the administrators in charge and how well they are able to get along with each other and also with the administrators in charge. We use Table 1 above whose computations are obtained with Graicunas' formula; we replace the heading "No. of Subordinates" in Table 1 with "No. of Citizens" since we now refer to the citizens in the country, i.e., the country's population.

First, we explain how to compute the average number of relationship problems encountered within each relationship. Assume we have 1,000 relationships. We choose a time-frame for the number of relationship problems faced by these 1,000 relationships. Say, we choose the time-frame of one month. If we assume that there are 2,500 relationship problems within these 1,000 relationships in the last month, the Average Number of Relationship Problems for Each of the 1,000 Relationships in the Last Month will be computed as follows:-

$$2,500 \text{ Relationships Problems} \div 1,000 \text{ Relationships} = 2.5 \text{ Relationship Problems per Relationship}$$

For the purpose of illustration, we use Table 1 above but with some modifications to it to produce Table 2 below wherein we assume, e.g., in the last month the Average Number of Relationship Problems for Each of the Relationships in Column 2 below is 1 Relationship Problem per Relationship as is shown in Column 3 below, with the Total Number of Relationship Problems shown in Column 4 below:-

<u>(1) No. of Citizens</u>	<u>(2) No. of Relationships</u>	<u>(3) Average No. of Relationship Problems per Relationship</u>	<u>(4) Total No. of Relationship Problems</u>
1	1	1	1 x 1 = 1
2	6	1	1 x 6 = 6
3	8	1	1 x 8 = 8
4	44	1	1 x 44 = 44
5	100	1	1 x 100 = 100
6	222	1	1 x 222 = 222
7	490	1	1 x 490 = 490
8	1,080	1	1 x 1,080 = 1,080
9	2,376	1	1 x 2,376 = 2,376
10	5,210	1	1 x 5,210 = 5,210

Table 2

It could be seen in Table 2 above that the arithmetical increase in the number of citizens gives rise to an exponential increase in the number of relationships among them and also a corresponding exponential increase in the number of relationship problems between them as is shown in Column 4 above.

We next present Table 3 below, wherein, e.g., in the last month the Average Number of Relationship Problems for Each of the Relationships in Column 2 below is 4.2 Relationship Problems per Relationship as is shown in Column 3 below, with the Total Number of Relationship Problems shown in Column 4 below:-

<u>(1) No. of Citizens</u>	<u>(2) No. of Relationships</u>	<u>(3) Average No. of Relationship Problems per Relationship</u>	<u>(4) Total No. of Relationship Problems</u>
1	1	4.2	4.2 x 1 = 4.2
2	6	4.2	4.2 x 6 = 25.2
3	8	4.2	4.2 x 8 = 33.6
4	44	4.2	4.2 x 44 = 184.8

5	100	4.2	$4.2 \times 100 = 420$
6	222	4.2	$4.2 \times 222 = 932.4$
7	490	4.2	$4.2 \times 490 = 2,058$
8	1,080	4.2	$4.2 \times 1,080 = 4,536$
9	2,376	4.2	$4.2 \times 2,376 = 9,979.2$
10	5,210	4.2	$4.2 \times 5,210 = 21,882$

Table 3

Similar to Table 2, it could be seen in Table 3 above that the arithmetical increase in the number of citizens results in an exponential increase in the number of relationships among them and also a corresponding exponential increase in the number of relationship problems between them as is shown in Column 4 above.

One of the reasons for ineffectiveness in managing too much subordinates given by Graicunas is that there is a limit to a person's span of attention, e.g., a person generally would not be able to recall more than six digits after viewing a number of digits. The other reason is that it would be difficult to communicate with too large a group of people, i.e., difficult to convey clear and unequivocal messages to an overly large group of people resulting in delay and confusion. For example, a supervisor would find it easier to manage six workers than a president managing six vice-presidents, and, a president would find it easier to manage six vice-presidents than a Group CEO managing six CEOs of six subsidiary companies, with the relationships between the Group CEO and the six CEOs being the most complex of the three, and the relationships between the supervisor and the six workers being the least complex. Thus due to the complexity of large size and possibly intractable relationship problems resulting in great difficulty in managing the organization, the population of a country should not be too large and should be at the optimum level so that it could be most effectively administered. Probably an intelligent, capable corporate manager or administrator of a country, particularly one with great span of attention and perhaps also leadership qualities or charisma or is able to communicate well, is capable of managing more people, i.e., more relationships. Such talented managers and administrators are only one side of the picture. On the other side are the people these managers and administrators manage; if the people are generally well-behaved, orderly, cooperative and communicative, i.e., they are generally of good character, there would probably be not much relationship problems to be taken care of by the managers and administrators, and the exponential increases in the number of relationship problems which accompany the increases in the number of citizens and the exponential increases in the number of relationships depicted in Table 2 and Table 3 above might not be applicable, e.g., the Average Number of Relationship Problems per Relationship in the last month could be practically zero which would be most ideal, as is shown in Table 4 below:-

<u>(1) No. of Citizens</u>	<u>(2) No. of Relationships</u>	<u>(3) Average No. of Relationship Problems per Relationship</u>	<u>(4) Total No. of Relationship Problems</u>
1	1	0	$0 \times 1 = 0$
2	6	0	$0 \times 6 = 0$

3	8	0	$0 \times 8 = 0$
4	44	0	$0 \times 44 = 0$
5	100	0	$0 \times 100 = 0$
6	222	0	$0 \times 222 = 0$
7	490	0	$0 \times 490 = 0$
8	1,080	0	$0 \times 1,080 = 0$
9	2,376	0	$0 \times 2,376 = 0$
10	5,210	0	$0 \times 5,210 = 0$

Table 4

It could be seen in Table 4 above that the arithmetical increase in the number of citizens results in an exponential increase in the number of relationships among them but there are zero relationship problems between them as is shown in Column 4 above, which is most ideal.

Planners aiming for an increase in the birth-rate and population should therefore heed Graicunas' theory; as in any effective organization with an optimum work-force, there should be an optimal population size for the purpose of effective administration and control while also taking into consideration the sufficiency of the resources available for supporting the population, not forgetting that with the exponential increase in relationships due to the increase in the birth-rate and population there could also possibly be an exponential increase in relationship issues such as communication problems and conflicts.

Regarding relationship problems in the world now there have been many, e.g., disturbing, wanton acts of violence such as mass shootings, acts of terrorism, conflicts and wars all over the world. There is possibility that with a higher population and thereby more complex relationships all these troubles would worsen; it should be well noted that relationships between people are often challenging as human beings are complex and not easy to deal with.

Therefore, a manager managing subordinates or a government official administering his constituents is not likely to find his job a bed of roses, the more people there are under his charge the exponentially more relationships and also possibly exponentially more relationship problems he has to handle.

Though an increase in the birth-rate and population might be deemed a necessary action for resolving the manpower problems in the economy, such as replacing an aging work-force with younger workers and finding talented or skilled workers, this is not a short-term solution but a long-term one as newly born babies take about 20 years to develop, undergo education and training, and grow up to be adults before they could join the work-force.

In the meantime, while the newly born babies are sucking their mothers' milk, to address pressing labor shortage problems, the government could implement the appropriate quota for the recruitment of talented and skilled workers from other countries. These foreign talents and skilled workers are normally issued professional passes, work passes and work permits which are valid for several years (which could be renewed on expiry) by the government, i.e., these foreigners are permitted by the government to stay and work in the country for several years – since these foreign workers only work for several years in the country they could be regarded as

short term or temporary workers. Some of these foreign workers who wish to stay and work in the country for the longer term could apply to the government to be permanent residents, while some might apply to the government for citizenship of the country. Recruitment of foreign workers by companies, especially for jobs which the locals are interested in having, could be a sensitive, even political, issue. Some locals might resent the foreign workers for stealing their jobs. In the author's country, for jobs which could be done by locals, employers have to advertise the job vacancies in the media and only when they could prove to the authorities that they were not able to find locals to fill the job vacancies would they be allowed to recruit foreigners for the positions. Through foreign recruitment the country could quickly recruit top talents, e.g., top scientists and talented managers from other countries, who could contribute much to the country, if such talents were lacking in the country.

Hence, directly recruiting talents from other countries, and better still if these talents choose to become citizens of the country, is the fastest way to acquire talents and skills for the economy and country and increasing the population. Increasing the work-force and talent pool via increasing the birth-rate would be too slow as newly born babies take about 20 years to become adults, and, there is no guarantee that the next Einstein or next Bill Gates would be among the babies many of whom might turn out to be duds in 20 years' time.

Employers generally favor robots and automatons over human labor for obvious reasons, though the costs of robots and automatons might be high, sometimes even prohibitive, whereby feasibility studies are necessary. We here compare human labor with these mechanical workers. Human labor do suffer from fatigue and need rest, might fall sick and could not work as a result, might have mood swings and emotional or mental problems, might feel bored, might be idle or play truant, need supervision, might be choosy and fussy about work, are demanding and expect allowances, annual salary increments and bonuses as well as promotions, might have great inconsistency in their work, might disobey orders, might disregard safety rules, might have conflicts among themselves or with their supervisors or managers, i.e., have relationship problems, and might misbehave or sabotage their company. On the other hand, artificial labor such as robots and automatons do not bring such problems to the company that engages them and perform their work much more consistently, with much greater speed and accuracy, without the need for tea or toilet breaks or rest, without complaint or fuss, without the need for supervision, without the recruitment problems frequently encountered in engaging workers, and are much more productive. As a result, more and more companies are displacing human labor with artificial intelligence, robots and automatons which might also be more suitable for replacing the aging work-force and it might be unnecessary to increase the birth-rate and population to replace the aging work-force, though workers would fret and cry foul over their jobs being taken over by these artificial beings, i.e., artificial intelligence, robots and automatons are a boon to employers but are a bane to employees and workers.

The activities of the 8.1 billion people living in this planet lead to the generation of much waste which cause environmental pollution and damage, resulting in climate change such as higher temperatures as well as rising sea levels. People have apparently not been caring much

about the environment, with environmentalists and governments now pushing for decarbonization and environmental preservation. The use of chemicals, e.g., freons which are refrigerants, in the industries results in the discharge of waste chlorofluorocarbons which damage the environment by causing the ozone layer, which is a protective barrier against the direct rays of the sun, in the atmosphere to be depleted; exposure to the direct rays of the sun due to the depletion of this ozone layer in the atmosphere may lead to skin cancer, and earth has also become hotter as a result. For many years governments have been limiting the use of freons, e.g., by implementing a quota system whereby companies bid for their freon requirements, with the higher bidders getting a higher allotment of freons by the government. Vehicles running on petrol also pollute the environment with toxic exhaust fumes, with cleaner electric vehicles now being advocated. Waste plastics also clog up water channels such as rivers and seas. All this is the result of the activities of 8.1 billion people living in this planet. An increased population would likely end up with more harm to the environment. Population planners should also consider this factor and consider more environmental awareness campaigns and environmental protection education.⁵

As an increased population leads to exponentially more relationships between people, there are also likely to be more conflicts and wars due to more relationship issues. Conflicts and wars such as the Russia-Ukraine war wherein Russia invaded Ukraine on 24 February 2022 and the recent Israel-Hamas conflict are therefore not unexpected. With the big nuclear powers of US, Russia and China dominating world politics, there is the danger of conflicts escalating to a world war and to the destruction of our civilization if nuclear weapons were used.⁶

3. Possible Solutions and Conclusions

Where population increase is concerned, the quality of the additions to the population should be as important if not more important than the quantity itself. The government evidently aims for these population additions to contribute to the economy, but they could be a burden to the economy instead, e.g., when many of the newly born babies grow up to be adults who have developmental problems who cannot work or refuse to work or who become criminals; no country should create more problems for itself through increasing the birth-rate and population. Ideally parents of babies should have good genes which the babies could inherit. Just coercing any Jane, Joan or Jean to give birth so that an aging work-force could be replaced could be a gamble and mistake, for apart from the issue of good genes the mother and father of the child might not

be capable of raising him up to be a physically and mentally healthy, intelligent and morally upright individual. Perhaps genetic research and engineering could be engaged to ensure that newly born babies would be fine specimen of humanity – if only geneticists and scientists were

⁵ Porter (2018), Titlow & Tinger (2016)

⁶ Niblett (2024), Plokhly (2023), Roubini (2022)

able to invent methods for conceiving babies with good genes who would grow up and become healthy, intelligent and moral adults. Needless to say the education system should also provide good moral education to inculcate good moral values and behavior.

We elaborate more on the quality and potential of newly born babies. Will newly born babies grow up to be morally sound and good citizens which would be a boon to society, and not miscreants which would be a bane? As it is not possible at the moment to ensure that newly born babies would grow up to be good people, getting more people to have children or more children is a risk or gamble for these children or many of these children might grow up to be bad people or duds, regrettably bringing problems to society. It would be good if these babies inherit good genes from their parents. If they have the bad luck to inherit bad genes from their parents, they could suffer from disorders such as Down syndrome, autism, motor neuron disease, etc. At the moment there appears to be no way to induce good genes to be passed to newly born babies. Generally, intelligent parents would pro-create intelligent off-springs; thus when an intelligent man and an intelligent woman marry and have children their children are also likely to be intelligent, though it is not a guarantee as there had been cases of brilliant couples bearing children who were mentally challenged. Many years ago, in the author's country the government had coerced university graduate mothers to have more children in the apparent belief that the university graduate mothers would be likely to bear intelligent children, by providing some incentives to the university graduate mothers. This had been a controversial policy and had received a lot of criticisms and was subsequently scrapped. Though it appears that not much could be done about the genetics of newly born babies, there is much that could be done on the educational and nurturing aspects of the newly born babies' lives. Apparently, a strong moral education program or curriculum and proper upbringing and guidance in the home by the parents could have some impact on the development of the newly born babies for the better. It would be ideal if the quality of newly born babies and future human beings improve much, e.g., having better moral character, higher intelligence and creativity, better health and better physical prowess, wherein perhaps both education and nurture, and, genetic engineering have important parts to play, though for now it appears only a pipe dream, which would lead to a more harmonious, more peaceful, more pleasant and happier society and possibly an utopia. Scientists have been genetically modifying certain foods such as fruits for better quality and yield. Probably the same could be done for human beings.

The gender of newly born babies might also pose some problems. Unless genetic engineering could help to determine their gender, the gender of newly born babies is subject to chance. Having too much male babies or too much female babies could be a problem, and ideally there should be about equal proportions of male and female babies. If there are too much male babies relative to the number of female babies when the male babies become adults they might have difficulty in finding marriage partners as is in the case of China now, while too much female babies might also in future result in them having difficulty in finding husbands, which could end up in social problems such as frustration, loneliness or depression due to failure in finding

marriage partners. Certain jobs requiring physical strength and toughness such as those in the army, police force and building construction industry, etc., are best performed by males, while certain jobs requiring tenderness or the feminine or maternal touch such as kindergarten teaching and child-care are best performed by females. Thus there should be sufficient males and females to fill up these occupations. Also, if there are not enough females around there would be problems in increasing the birth-rate and population as females are needed for giving births; in a situation wherein there is a shortage of females for giving birth, governments might have to encourage or provide incentives for each of the limited number of females to have more births in order to make up for the numbers in the population. The question of sterility and fertility also comes into the picture, e.g., if the husband is sterile his wife who is fertile would be unable to conceive and give birth and if the wife is infertile she is also unable to give birth even if her husband is not sterile. There are also other possible problems, e.g., homosexuality, etc. All such problems would hamper population growth.

As a country has limited resources for supporting life, there should be an optimum population size in any country, which depends on the resources and infra-structure available. If the government plans to increase the population, it should ensure that the resources and infra-structure are sufficient for supporting the higher population, e.g., enough houses, enough means of transport such as buses and trains, enough educational facilities, enough health facilities, enough leisure and sports facilities, importantly also enough jobs and business opportunities, etc., for if the facilities are insufficient there would be problems and inconveniences, e.g., overcrowding on buses and trains if there are not enough buses and trains available for the swelling population as has happened in the author's country.

Encouraging people to have children or more children, e.g., by providing subsidies or grants for bearing children as is happening in the author's country where the scheme does not appear to have much success, might not help to increase the birth-rate and population. If issues such as work stress, work-life balance problems, high costs of living, inflation and job and financial insecurity, etc., responsible for the declining birth-rates were resolved first, the birth-rates could naturally increase after that. Raising children is also not a simple matter. Before starting a family, a married couple might consider many factors concerning raising children. For example, they might look at whether their jobs and incomes are stable and they would not lose their jobs or be retrenched any time soon whereby they would have problem financially supporting the child or children, whether their child or children would face similar difficulties or sufferings experienced by them, whether their child or children would be able to have good jobs and live comfortable lives in the future or whether their future would be bleak due to scarcity of jobs in the future when artificial intelligence takes over many of the jobs done by people, whether the costs of raising the child or children are affordable and within their means, e.g., milk powders for babies are relatively expensive with one actual case known to the author of one unemployed man shoplifting milk powders from the super-mart to feed his baby, whether the wife, or, husband has to stop work and stay at home to take care of the child or children, or, whether they should engage a nanny or child-care center to take care of the child or children while they are at work

which could be costly, whether school and college education for the child or children would be affordable, as children require much attention, parental care and guidance whether they are prepared for the responsibilities of nurturing and bringing up their child or children, how many children to have and how many children they could afford, whether they are prepared to give up their independence and freedom in having children, etc. To encourage more people to have children or more children, the government should successfully address as much of the above-mentioned concerns as possible if not all, e.g., by providing subsidies or grants for giving birth, providing subsidized or free baby foods and other items for babies, providing affordable childcare centers or grants for engaging nannies for children whose parents are working, providing subsidized or free education for children if possible up to college level, providing attractive income tax relief to couples based on the number of children they have, providing subsidized or free medical care for children, providing maternity and/or paternity benefits such as long maternity leave and/or paternity leave to the child's parents, etc. If the government could provide most if not all of the above-mentioned incentives and benefits for having children, it is possible that birth-rate and population would increase.

On the other hand, there might be people who love children, who might be crazy about children, and who would have children regardless of the costs of raising them. The government should be happy with them for helping to increase the birth-rate and population. There are also wealthy or powerful people who want to have children who would later inherit their wealth or legacy and carry on doing things as usual with their inheritance. Also, there are people who have children out of the wedlock, whereby the children are forced upon them through chance, whom they might give away for adoption if they had no wish to keep and raise them.

Artificial intelligence, robots and automatons with their many advantages over workers might be more suitable for replacing the aging work-force and it might be unnecessary to increase the birth-rate and population to replace the aging work-force. Therefore the fear of not being able to replace an aging work-force with younger workers due to declining birth-rates appears a misplaced one. Also, there is perhaps not much point in increasing the birth-rate and population if sooner or later the above-described feared artificial intelligence is going to rob workers of many if not most or all of their jobs, leaving newly born babies with little job prospects and a bleak future, and probably later when they are adults requiring financial support from the government, e.g., financial support in the form of universal basic income; this is indeed a very bleak depiction of the future of human labor, but it is a possibility. However, even if there is little economic incentive in getting women to bear children, giving birth would still have an important role in replacing deaths so that humanity would not become extinct.

Decades ago, governments had been concerned about over-population, and countries, e.g., China which had a "one-child" policy, and, Singapore which had a "two-child" policy, had to pass policies to limit the number of children a family could have. Who could at that time imagine that decades later these countries, including China and Singapore, would strongly encourage their people to have more children the more the better?

The increase in birth-rate and population should be orchestrated with circumspect or cautiousness to prevent or minimize social problems such as conflicts, wars and environmental damage. There is the danger of over-population wherein there might not be enough food, houses, jobs, etc., for the people. If the increase in birth-rate is not properly controlled, over-population could happen. Ideally, as is explained above there is an optimum population in a country based on how much people the available resources in the country such as agricultural land, food production facilities, water, minerals, schools, health facilities, etc., could support, also taking into consideration the government's ability and effectiveness in administering a population of such size and complexity, wherein administering a country is not likely to be easy, as relationships between people are often challenging, people being complex and not easy to deal with, the larger the population under the administrator's charge the exponentially more relationships and also possibly exponentially more relationship problems such as communication problems and conflicts he has to handle – with a population of possibly millions of people in a country (which is very much larger in size as compared to the size of a corporation, which is the example used in V. A. Graicunas' "span of control" theory, that could range from several thousand to several hundred thousand in staff strength only) the amount of relationships and relationship issues the administrator of a country has to handle would be many times more than that handled by a corporate manager – therefore if the population of a country grows too large and complex it could be beyond the administrator's capability and effectiveness to successfully handle all the absurdly large number of relationships and also possibly the absurdly large number of relationship problems. Talented and capable administrators who are able to administer a country well might be difficult to find, but they are important and if they administer the country well the government is likely to get more votes in the elections. Having an optimal population is highly important for a government because at that population size the government would be able to function at its best and is most effective, with relationship problems most manageable, wherein it could achieve the best for its people.

It should be noted that increasing the birth-rate and population is only for planning for the long term as newly born babies could not contribute to the economy for the next 20 years or so; there is also no guarantee that these babies would be able to contribute to the economy in 20 years' time after they have grown up. In the short term, for pressing manpower needs in the economy, recruitment of talented and skilled workers from other countries is a viable option. Also, the fastest way to increase the population (and also the surest way to get talented and skilled workers) is to persuade these talented and skilled foreign workers to apply to be citizens of the country, instead of persuading women to give birth wherein their babies have to spend nine months in their wombs before being born and given birth certificates/citizenships (and there is also no guarantee that the babies would grow up to be people with talents or skills in about 20 years' time). However, getting foreigners to become citizens of the country might cause social and political problems such as locals resenting the foreigners for competing with them for jobs or stealing their jobs and the government for getting these foreigners to work in the country and stealing their jobs, and, opposition political parties and their supporters accusing the government

of diluting the opposition by granting citizenships to foreigners who are supportive of the government and the political party behind the government and who would vote for this political party in the elections. However, for certain jobs which are normally shunned by the locals, e.g., jobs involving shift and/or weekend work which deprive workers of time for socializing and time with their family, jobs with uncongenial or unsafe working conditions such as those in building construction or jobs with unattractive wages and/or benefits, recruiting foreign workers who would accept these jobs could be a viable option. The other option is to utilize artificial intelligence, robots and automatons, which would not complain about shift and/or weekend work, uncongenial or unsafe working conditions or unattractive salaries and/or benefits, an option which is apparently getting more popular with companies but is viewed as a threat by workers. For jobs which are too hazardous for human beings such as those involving the handling of toxic, flammable or explosive chemicals or substances, robots able to withstand toxic fumes and chemicals, fire and explosion are perhaps the only viable option.

The government aiming for a higher population should have enough jobs or be able to create enough new jobs, e.g., through more public works and attracting more investments in the country by both local and foreign business entities, for the increased population. If in the first instance if work stress and work-life balance issues due to the rat-race have been largely responsible for many people opting out of having children or more children resulting in a declining birth-rate, having a more intensified rat-race and more work stress after a planned population increase due to more people competing for jobs, business and customers might not only not help to further increase the birth-rate of the country it might cause the birth-rate to decline and it might be back to square one with the problem of the declining birth-rate still unresolved if not worsened. Also, competition, aka rat-race, apparently evokes the worst from people, causing people to be self-centered and lacking in consideration for others, envious of others who are more successful, suspicious and distrustful of others, etc.; therefore a more intensified rat-race is likely to make people worse in these undesirable qualities and as a result there is likely to be more relationship problems and conflicts between these people. Viewed as such competition is actually not good, though theoretically it is supposed to spur competitors to perform at their best. As competition or rat-race has been largely responsible for the stress experienced by people which causes them to be reluctant to have children or more children, governments in increasing the population should thus ensure that there are enough jobs for the increased population so that the competition for jobs would not be so stressful for job seekers, whereby they would be more inclined to have children or more children.⁷

Increasing the birth-rate and population might end up with problems and not resolving the manifest problem of replacing an aging work-force with younger workers, for some labor policies have changed with the times as people have been living longer and longer lives. Also, we have to understand that the population of a country could only increase if its birth-rate and immigration-rate exceed its death-rate and emigration-rate. Even if its birth-rate has increased,

⁷Wong (2021)

the population of a country would not increase if its death-rate and emigration-rate exceed its birth-rate (which has increased) and immigration-rate. More of this will be touched on below. Due to the higher standards of living in many countries, particularly in the developed countries, and better health and medical care, people in many countries are enjoying better health and living longer lives with quite a number living to 100 and beyond. As people are living longer lives, their savings might not be enough to sustain them and they probably have to work past retirement age for incomes to survive on. For these reasons, in a number of countries the retirement age and re-employment age have been raised by the government and for some cases they are to be further raised in the years to come. Thus, with more and more seniors opting to continue working after they reach retirement age if they are still medically fit and healthy, increasing the birth-rate and population for the purpose of finding replacements for aging workers should not be a pressing or urgent issue for now, but there could be another issue, namely, if more and more medically fit and healthy seniors opt to continue working instead of retiring at retirement age because they need the income for survival or because they like their jobs and do not like retiring and having nothing to do and feeling bored, etc., they would deprive younger people looking for jobs such as those who just completed their education job opportunities and younger workers waiting in the wings for promotions to more senior positions promotion opportunities. As increasing the birth-rate and population could bring economic results only in about 20 years' time when the newly born babies become adults and join the work-force, it is only for the long term. Anyway 20 years is a very long time-frame, wherein economic forecasts would be very difficult if not impossible (even for much shorter time-frames, e.g., two or three years, economic forecasts are already difficult). Economic cycles normally happen in three to five year time-frames, and within those 20 years or so while the newly born babies are growing up there could be many changes, and, if there is severe structural unemployment in 20 years' time the future of these newly born babies would be bleak and all this effort of increasing the birth-rate and population would be futile.

Gender roles also appear to have changed somewhat. In the past it had been traditional for the married woman to stay in the home to attend to household chores and tend to the children, i.e., be a housewife, while her husband goes to work to support the family and is the family's breadwinner. Now some men become househusbands and do the work of the housewife while their wives who are drawing a higher salary than what they used to earn are working to support the family; also, some women take on full-time or part-time jobs to supplement the family income when their husbands' incomes are insufficient for the family's needs. These working wives are likely to be somewhat reluctant to bear children. Women today are also better educated, more independent, and able to find good and well-paying jobs and fend for themselves instead of relying on their husbands for their needs, and therefore might not be that keen to bear children. Some high-flying women might also not be able to find husbands because men shun them due to feelings of inferiority and fear, with a number of them so focused on their job and career that they have no time for romance, marriage and children. Some women, and also some men, also treasure their independence and freedom and therefore avoid marriage and having children.

Some men without steady jobs and incomes also could not get married and start families. For those who want to get married and start families but are not able to find marriage partners, the government could provide match-making services, something which has been done before. Thus it ought not to be surprising that the birth-rates of many countries are abysmal. All these are social issues affecting birth-rates; if they could be alleviated or resolved birth-rates might increase. Governments should find ways to exhort or educate these driven, career minded ladies who do not want to have children to take things more easy and relax more, to advise them that life is much more than work and career. Perhaps the ladies could not be criticized for not wanting to bear children, for bearing children is not without physical burden and risk such as having to carry the fetus in their bodies for nine months or so, suffering labor pains and anxiety when giving birth and possibly suffering post-partum depression, with some unfortunate ones even losing their lives after child-birth, not to mention the burden of breast-feeding, weaning, caring for and raising the child. On the other hand, the men do not have to go through such physical hardship. The authorities could possibly resort to the exercise of some imagination and creativity in coercing the ladies to want to bear children, e.g., by organizing social activities for unmarried women and childless married women whereby they are made to inter-act with cute children who would appeal to their maternal instinct, and thereby getting them interested or enticed in having their own cute children, etc. Activities could also be organized for the ladies to meet interesting men whereby romance could possibly develop between them and marriage and children could possibly follow; in the author's country there has been a social development unit set up by the government for organizing such gatherings for singles, which has some success in getting the singles hitched.

The serious issue now is apparently the threat of artificial intelligence depriving many workers of their jobs giving rise to severe structural unemployment, prompting the question of whether it is wise to coerce people to have children or more children if job prospects are poor. Perhaps, people already strongly feel this threat to their future and the future of their children and their yet to be born children, and therefore are highly resistant to having children or more children. Though artificial intelligence is a boon to employers as it enables them to reduce costs, avoid human relationship problems, increase productivity and increase profitability, it is a bane to workers who would lose their jobs and would have difficulty finding new jobs. Governments have a responsibility to protect its people against loss of livelihood, being democratically voted into power by the people to represent them and to take care of them. What could the government do to protect its people against loss of livelihood caused by artificial intelligence? Perhaps, this situation is caused by the workers themselves, namely, the troubles they give their employers, such as idling, disobeying instructions or safety rules, have great demands such as demands for high salary increments and bonuses, being choosy about jobs and working conditions, playing truant, arguing or quarreling, etc., which lead employers to happily replacing them with artificial intelligence, robots and automatons. These troublesome workers, whether they realize it or not, are probably also causing future generations of workers to suffer because of poor job prospects. So, what could governments really do about all this? First, governments could consider

providing every citizen a universal basic income (in the same quantum to every citizen for fairness) to fully or partially support basic sustenance. Some form of universal basic income has already been implemented in several countries. Proponents argue that poverty could be eliminated or reduced and people could use the basic income to acquire skills through courses to take up well-paid jobs, while critics argue that the government could have problem getting the finance to support the scheme and people might end up being less keen to work, less hard-working and less productive, etc. Second, as had been suggested by some sociologist/economist, governments could possibly give every citizen a sum of money to start their own business, i.e., be entrepreneurs. Third, there are jobs which artificial intelligence cannot do, e.g., jobs that require the human touch or soft skills, such as counseling people with personal, emotional or mental problems, for instance people suffering from depression or thinking of committing suicide, jobs such as providing comfort and care to the weak and vulnerable such as the elderly and young children as many elderly might be lonely, staying alone, feeling melancholic or in poor health and there are also orphans or abandoned children who need tender care, social workers, welfare officers, psychologists and psychiatrists, nurses and doctors, marriage counselors, personal improvement counselors, etc., which are all important, meaningful and noble work. Fourth, there are many things in society which require fixing or improving, e.g., environmental protection, pollution control, traffic control to prevent traffic congestion, drainage control and flood prevention, animal protection, crime prevention and vigilance, spotting dangers and hazards, accident prevention and safety, help with climate and weather problems, waste and chemicals management and disposal, cleanliness and clearing rubbish, disease and infection prevention such as having health officers or health ambassadors during Covid-19 to ensure people wear their face-masks and practice social distancing (with many volunteers having carried out this kind of important, meaningful work during the Covid-19 emergency), spot dirty, unhygienic or unsanitary places and carry out or organize sanitizing and disinfecting activities, beautify the environment through landscaping and gardening activities, carry out errands for the elderly or those with mobility problems, housekeeping, house-cleaning and house painting work particularly for the elderly and frail or those with health issue staying alone and without the help of a maid, accompany elderly and other people with mobility problems for medical appointments or other activities, tend to and guide delinquents, babysit and care for children when their parents are busy with work, help the homeless to find shelter, help to settle disputes people might have with each other, tutor children or even adults who want to learn, carry out plumbing, electrical, air-conditioner or heater servicing or computer or TV repair work for the poor and underprivileged if one has the skills, guide and teach others particularly the elderly who might be technologically illiterate how to use the latest gadgets, etc. All this is important work which would make society a cleaner, healthier, more pleasant, more efficient, safer, more crime-free, more problem free, nicer place. Letting the unemployed who have talents and skills do nothing because they could not find employment is actually a waste of their valuable talents and skills and there are so many things around that require fixing and improving wherein their talents and skills could be utilized. The great economist John Maynard Keynes had even suggested, perhaps

jokingly, that the government provides people an income by getting them to dig trenches and paying them for it. Fifth, governments could possibly provide funds or seed money for people who have viable business ideas, products or services to start businesses, which some governments have done. Though venture capitalists could provide funds for such projects, they are generally stringent in their requirements, e.g., they ask companies which seek funds from them for their expansion programs to provide track records of past business success. Sixth, governments could encourage the unemployed to start their own businesses possibly by providing them some subsidies, free business training and free guidance by business experts or consultants. These businesses could also be social enterprises which bring benefits to society, e.g., by donating a portion of the profits to charity, by providing jobs for the handicapped, etc., wherein governments could possibly provide them a higher quantum of subsidies as incentive for bringing benefits to society. For some who lost their jobs, the job loss could be a blessing in disguise when they start businesses and become successful businessmen. Seventh, governments could possibly get people to re-train to take on jobs which are available and which they want to have but lack the skills for, e.g., by providing them training opportunities and subsidies or grants for such training, which have already been carried out in a number of countries, with life-long learning now being the go-to thing for workers as they have to frequently keep their skills and knowledge up-to-date for employability because of the fast changes and advances in technologies. Here, the younger workers might have some advantage over the more matured workers, as the younger workers fresh from school might have already been exposed to the latest technologies and also their fluid intelligence is probably better and they also tend to learn things faster than the more matured workers though the more matured workers have more experience. Employers tend to be more in favor of younger workers for these reasons, and also younger workers would not be so demanding about salaries paid to them while the more matured workers having family commitments would tend to ask for higher salaries. In the author's country, more matured workers in their forties and older tend to have difficulties finding jobs, with a number of them ending up with jobs which younger workers shun, e.g., jobs such as cleaners, janitors and dish-washers. Eighth, to alleviate or eliminate a serious unemployment situation, governments could possibly get workers at retirement age to retire instead of allowing them to continue working after retirement age, and for those retirees who could prove that their savings are insufficient for retirement governments could possibly provide them a monthly retirement allowance that fully takes care of basic sustenance, in this way freeing up jobs and promotions for younger people. Ninth, governments should reasonably regulate and control the use of artificial intelligence even though it might be essential for alleviating or resolving the serious manpower shortage problems of some companies and prevent it from causing mass unemployment and thereby serious social problems such as depressed people unable to find employment committing suicide, quarrels over financial problems caused by loss of job and income, people resorting to stealing, cheating or robbery to find money for survival, people borrowing money from loan sharks and being harassed by the loan sharks when they are unable to settle the debts, etc. Unions are apparently also worried about the adverse impact of artificial

intelligence on workers, e.g., the chief of the federation of unions in the author's country has just expressed his concern about artificial intelligence in his May Day message. Unions representing workers have an important part to play in protecting the jobs of their workers and to see to it that their workers get fair retrenchment benefits from their companies if retrenched; they could also lobby the government to pass laws to protect workers' jobs and prevent mass unemployment, i.e., persuade the government to regulate the use of artificial intelligence. Governments could possibly engage people who are unemployed and looking for work to carry out any of the above-mentioned civil work and provide them an income or pay them for the work. It would not be a surprise that because of the meaningfulness of the above-mentioned civil work, some would be willing to do them for free as volunteers, in fact a number of such tasks have been undertaken by volunteers.

As artificial intelligence is apparently depriving more and more workers of their jobs, governments, being responsible for full employment, have to create enough new jobs for the people, e.g., by carrying out public works and attracting investments from both local and foreign sources. However, much of these new jobs from profit-motivated new investments would probably be taken by artificial intelligence, robots and automatons, leaving little or hardly any new jobs for workers. On the other hand, governments could create projects just for workers so that they could have jobs and incomes. If there is mass unemployment, governments could be in for a hard time and would probably be out of power after the elections. Besides taking over the jobs of workers, artificial intelligence could also take over much of the work of government officials, e.g., economic forecasts and projections, estimating the optimum population size, estimating manpower requirements, etc., and could replace these officials, and, possibly carry out the thinking and decision-making for presidents and prime ministers particularly for difficult and complex decisions and could thus possibly end up as de facto presidents or prime ministers. This is not an exaggeration as artificial intelligence has beaten chess grandmasters and chess champions in chess, found solutions for difficult mathematical problems, etc. Such is the awesome power and capability of artificial intelligence. Artificial intelligence is apparently a boon to governments, helping them to govern efficiently.

The manpower requirement or the requisite labor for a country would normally be anticipated by the government, based on economic forecasts and projections. Governmental policies pertaining to birth-rate and population, foreign worker recruitment and immigration normally would be geared towards providing enough workers for the industries and enough jobs for the citizens. The government would also have to prevent a "brain-drain" situation wherein there is a mass exodus of citizens with talents and skills to other countries thus depriving the home-country of talents and skills. Citizens emigrating to other countries also cause the size of the home-country's population to decrease if the number of immigrants (new citizens) and the number of births in the home-country are insufficient for off-setting the exodus and loss of citizens to other countries (emigrants) and the number of deaths in the country. At any point of time, for the population of a country to increase the number of births and immigrants in the country has to be

higher than the number of deaths and emigrants in the country, i.e., the birth and immigration rate has to exceed the death and emigration rate.

Though many countries are now concerned about their declining birth-rates, their populations are probably increasing (not decreasing) and possibly at a high rate too (which makes their concern about the declining birth-rates seem exaggerated). This could happen as people today are generally healthier and living longer lives and therefore death-rates in these countries are probably declining too. If the birth-rate which has declined is still higher than the death-rate which has declined, and assuming that the immigration-rate and the emigration-rate remain the same, the population in the country would increase despite the decline in the birth-rate, the more the population would increase the more the birth-rate which has declined exceeds the death-rate which has declined.

Regarding the concern about artificial intelligence depriving workers of their jobs and causing severe structural unemployment, it should be noted that people without jobs mean they have no money to buy the products and services from the very companies which use artificial intelligence that has deprived many workers of their jobs. With many jobless people with no incomes and no money to buy their products and services, these companies would also sooner or later close down, unless they could find some way to sell their products and services to people who have money possibly overseas, but what if these people overseas are also jobless due to severe structural unemployment caused by artificial intelligence, which could be a global phenomenon? If people have no jobs and no money to spend and companies have no business because of this it would be a recession. Would governments want this to happen?

There is also the question of whether workers generally enjoy their work and would miss it if deprived of it. Probably, most workers work for an income so that they could purchase their daily needs, and not because they like the job or want to be useful to society. For workers who work under bad bosses, which appears a common phenomenon, they would even loathe the job but tolerate it for the income. It is probably true that most people would regret not spending more time at home with their family rather than not spending more time in the office with colleagues and bosses. Most people probably find their jobs stressful and even meaningless, e.g., jobs like sales which are result oriented and jobs demanding long hours and which affect work-life balance. As mentioned earlier, declining birth-rates have been apparently largely due to work stress and demanding jobs that affect work-life balance, which implies that jobs are generally stressful and not good for workers' physical and mental health and therefore workers would rather not carry on with their jobs if they do not need the jobs for income and survival. Thus, if offered a universal basic income that fully caters for basic sustenance many would probably be happy to accept it rather than find work as they want to be stress-free and happy particularly for those who already have some savings and no financial commitments such as mortgages to pay off, etc., wherein they could now carry out activities which are meaningful and of interest to them. It is also a fact that in countries which offer unemployment benefits some people having unemployment benefits do not want to look for jobs, which is the reason in the author's country unemployment benefits are not offered by the government. Governments should therefore

seriously look into and resolve the concerns and grievances of workers whose work environment and working conditions are apparently causing them much stress, thereby bringing about declining birth-rates as is explained above, e.g., by setting up a special department to address this important issue possibly working in tandem with the workers' unions, and, also possibly by passing some legislation to ensure that working conditions in companies are reasonable and do not put workers' physical and mental health at risk. If such workers' issues are properly and successfully addressed, birth-rates might increase.

All this concern about declining birth-rates appears to be due to uneasiness about births not being enough to replace deaths resulting in a declining population, and, possible retrogression in society due to the resultant manpower and skills shortage problems particularly when the deceased also bring their skills with them to the grave, with all this possibly eventually leading to the extinction of the human race if left unchecked.

The ideas about birth-rate and population in this paper should be given serious thought by population planners; as is explained above this issue of increasing the birth-rate and population has some pros and cons and is complex, and should be handled cautiously in order to avoid missteps. Though the paper cautions against simply coercing any women to bear children for there is some risk that many newly born babies would become adults who are a bane to society, there appears little choice but to do so as there is a need to preserve or continue the human race, even though the technology for developing fine specimens of babies who would grow up to be fine adults is apparently not available yet. We could only hope that none of the babies would grow up to be crooks, violent people, murderers or trouble makers, not forgetting that the most evil people who ever existed had once been innocent newly born babies. For years now birth-rates have been declining and the countries concerned do not appear to have much success in stopping this downward trend with the South Korean government, e.g., so desperate for babies that they recently announced a huge monetary reward for each baby born, which goes to show that this is a complex and difficult problem to resolve. The question here is whether the implementation of the ideas and proposals in this paper would be able to resolve this issue. Some of them have been utilized before and have worked. All that could be said is that if they are implemented well and with care they could work.

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