BL40A2010 Introduction to IoT-Based Systems

Statistical socioeconomic analysis and brief study on digitalization in the Nordic countries

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LUT University, 2022

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Abstract

The four Nordic countries of Denmark, Finland, Norway, and Sweden have long led the world in terms of economic stability and social development. This study found out that most Nordic nations have high life expectancy (>79 years of age), 10 or more years of education (>80%), a service-based economy, low rate of unemployment (≤7,8%), low level of homelessness (≤0,11%), and a relatively homogenous population. Some of these statistics could be attributed to the widespread digitalization of the economy, which in turn led to a productive workforce and a good living standard. Effects of the COVID-19 pandemic have been taken into account during research.

Introduction

Due to the lack of data, Iceland was not included in this study. Statistics for Denmark, Finland, Norway, and Sweden was obtained from Helsinki Open Infoshare (1), in the scope of Nordstat studies. The aforementioned countries, hereby called “the Nordic countries”, are often considered to be among the most developed nations of the world, with high standard of living (2) and strong economic growth (3). Despite having adopted the Nordic welfare model, each country has constructed their own national system. This study aims to discover the differences between these, as well as provides a brief study on adoption of digitalization in the region.

Figure 1: The Nordic countries included in this research. Source: rci.com

Life expectancy

Life expectancy in the Nordic countries is higher than the European Union's average (4), at approximately 80 years for men and 84 years for women. The detailed data for each country could be seen from the following chart:

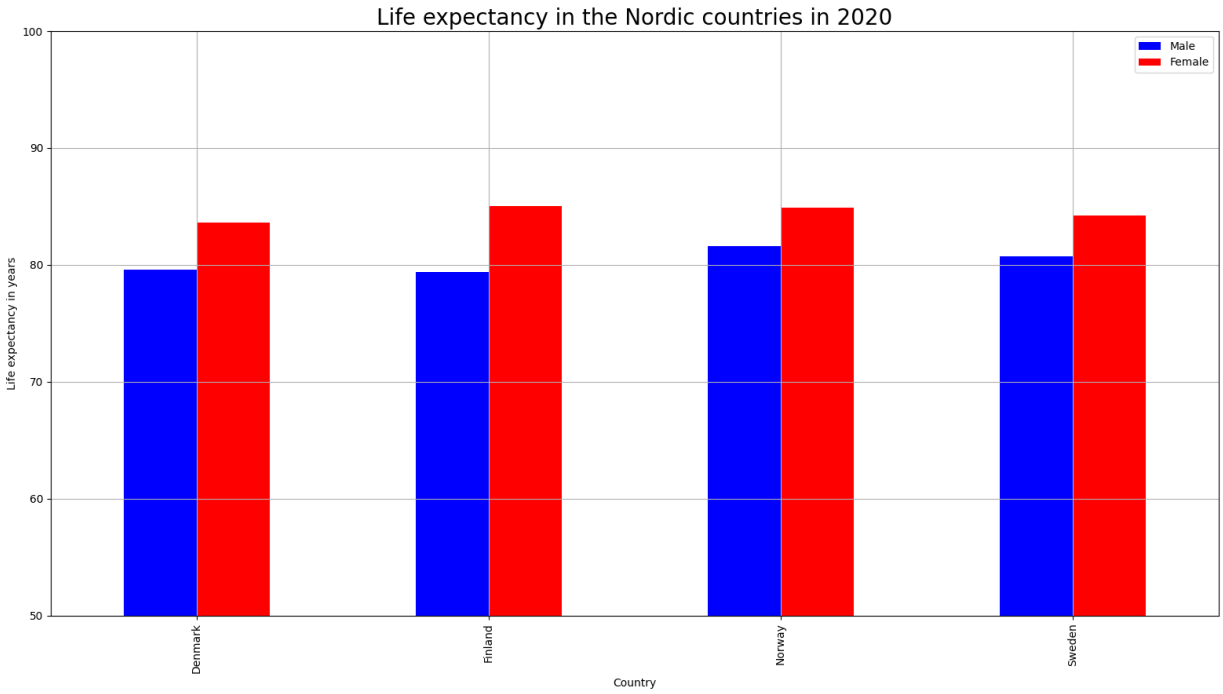

Figure 2: Life expectancy in the Nordic countries in 2020. Source: Helsinki Open Infoshare

Finland in 2020 had the highest life expectancy for women, at around 84 years, and the lowest for men, at around 79 years. However, the difference between men's and women's life expectancy was also the biggest in Finland.

Despite the effects of the COVID-19 pandemic, life expectancy in the Denmark, Finland, and Norway increased. Sweden, on the other hand, experienced a decline: 0.7 years for men and 0.4 years for women (5). When comparing the Nordic region, with the exception of Sweden, to the rest of Europe, it is exceptional (6). In Europe, a decline in life expectancy is the general tendency for the year 2020. The regions of Southern and Eastern Europe had the greatest reductions. During the initial wave, Spain and Italy had some of the highest excess death rates. Only Iceland, Denmark, Finland, and Norway had a rise in life expectancy in 2020. In terms of the magnitude of the reduction in life expectancy, Sweden is in the middle of Europe ranking. Males experienced a greater drop in life expectancy than females in almost every country.

Education

The educational system of the four Nordic countries have achieved relative success, with students' performance among the top 20 out of 79 nations surveyed the PISA test in 2018 (4). More than 80% of the students in these countries complete 10 or more years of education, as illustrated in the following figure:

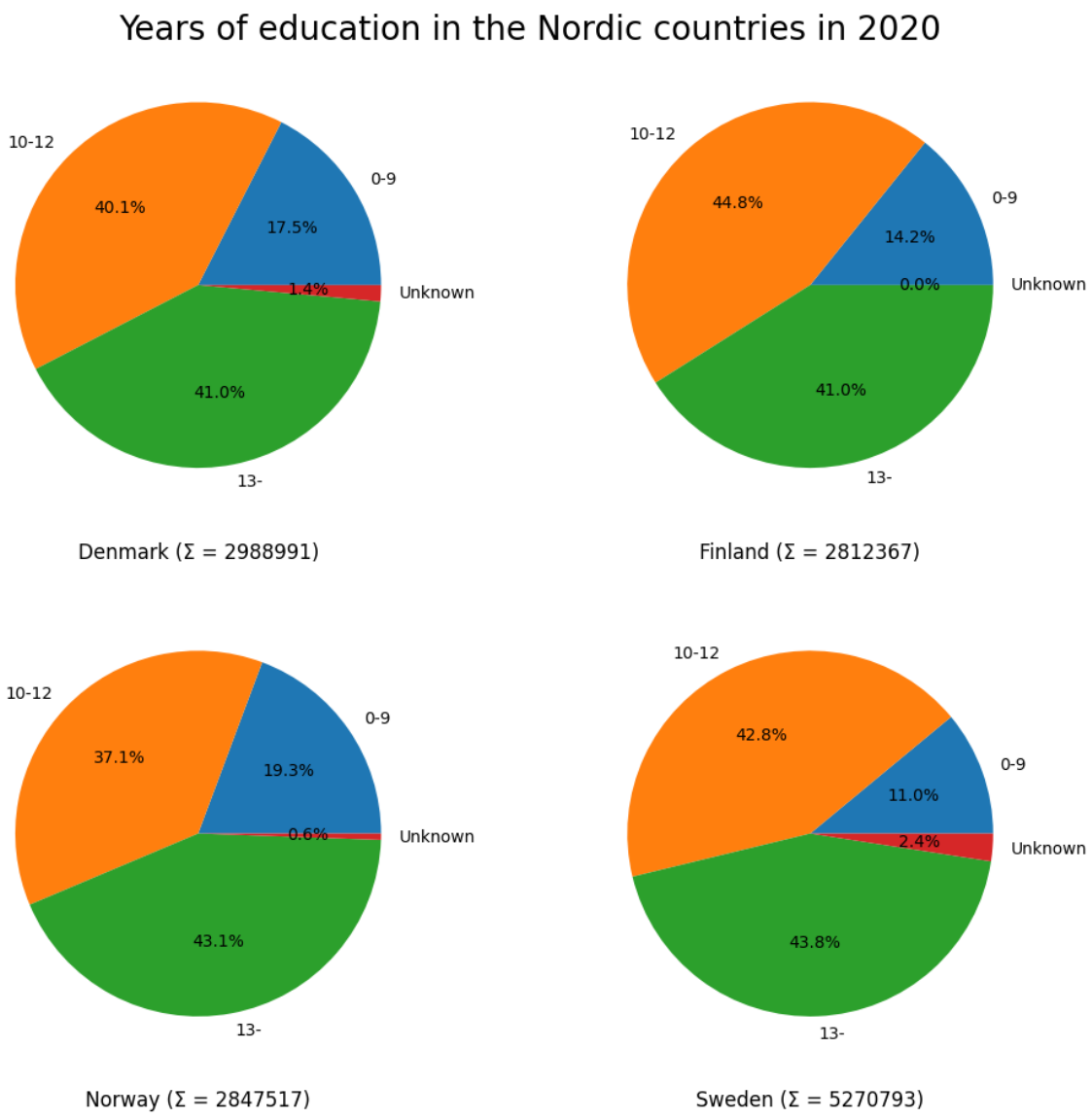

Figure 3: Years of education in the Nordic countries in 2020. Source: Helsinki Open Infoshare

In general, the four countries have very similar educational background. Thanks to the Nordic welfare model, the residents of the region are highly educated, which results in a highly productive and advanced workforce. Less than a quarter of those surveyed received less than 10 years of schooling. This phenomenon in turn provides a stable foundation upon which these countries could develop and expand their economy in the direction of digitalization and modernization.

Jobs in industry

The four countries of Denmark, Finland, Norway, and Sweden have a stable and strong economy (5), in which the tertiary sector was the biggest contributor to national GDP in 2020:

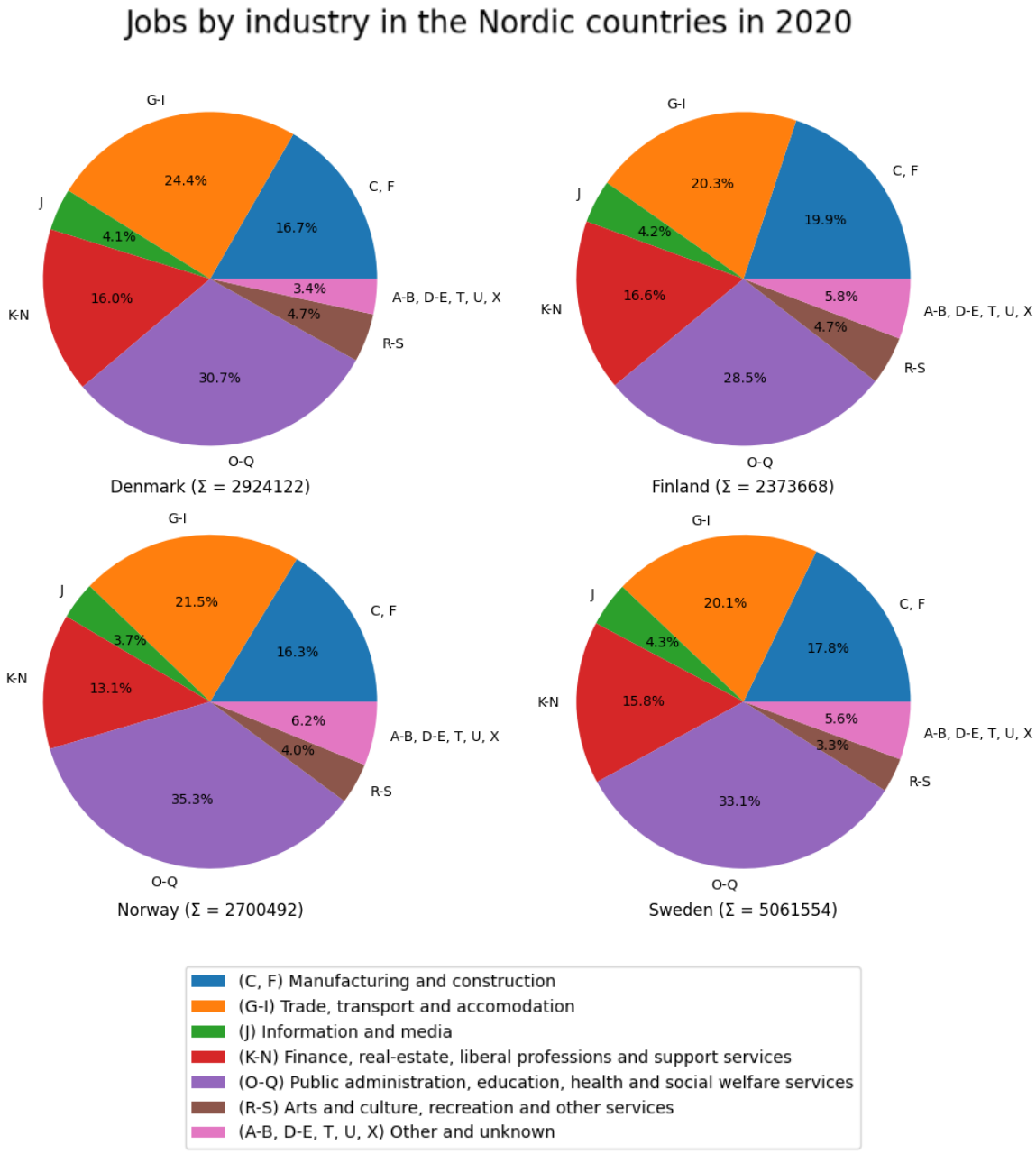

Figure 4: Jobs by industry in the Nordic countries in 2020. Source: Helsinki Open Infoshare

More than a quarter of employments were for the government, educational institutions, healthcare and social services – typical for a welfare state. The next biggest group was in the field of trade, transport and accommodation (>20%). Financial, real-estate and related services also contributed to a large part of the economy, with around 15% of jobs.

The secondary sector, which primarily includes manufacturing and construction jobs, accounted for 16,3% in Norway to 19,9%. A smaller secondary sector and a growing tertiary sector indicates the transition to a post-industrial economy (6). This trend was further supported by the expand of information and media technologies-related jobs, which made up for less than 5% of the surveyed jobs, but has been increasing rapidly in the last few years.

Unemployment

The Nordic countries have maintained consistent economic growth and a generous welfare system, which often results in low unemployment rate. In the beginning of 2020, the unemployment rate of the four countries was as followed:

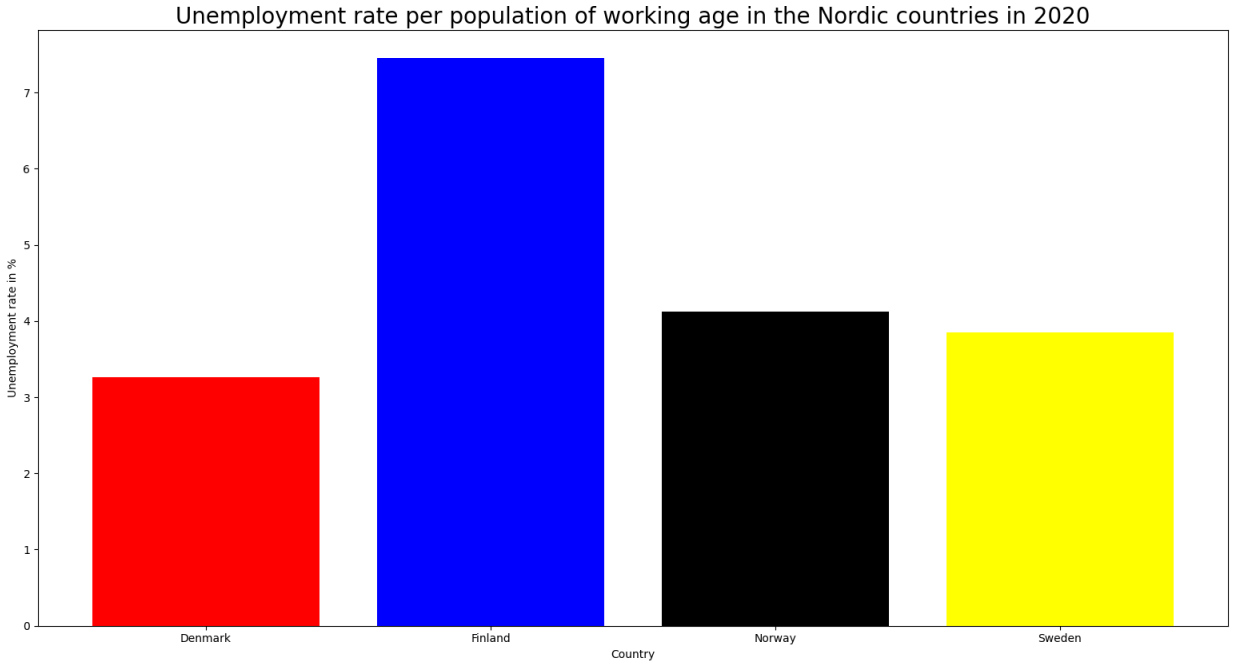

Figure 5: Unemployment rate per working age population in the Nordic countries in 2020. Source: Helsinki Open Infoshare

Denmark, Norway, and Sweden had a low level of unemployment, around 3-4% in 2020. Finland, on the hand, was double that, at more than 7%. Finland's level was higher than that of Germany (3,7%), but lower than other major economies of the European Union (France at 8%, Italy at 9,3%, Spain at 15,5%) (7).

The spike in Finland's unemployment was primarily caused by the temporary layoff scheme, which allows employers facing a large drop-in activity to lay off employees temporarily for whom other suitable work or training cannot reasonably be provided. Prior to the COVID-19 crisis, employers could only temporarily lay off employees who had indefinite-term contracts or their replacements who had fixed-term contracts, and they had to give at least 14 days' notice and engage in cooperation negotiations with employee representatives for up to six weeks if they had more than 20 employees. Employees with fixed-term contracts were also included, and the minimum notice and negotiation periods were lowered to five days to assist firms in adjusting to the crisis. By the end of 2020, these modifications was still in effect (8).

By 2022, the unemployment rate in the Nordic countries have fallen, which indicated a recovery in economic activities across the region. However, the outbreak of the 2022 Russian invasion of Ukraine and the subsequent energy crisis has casted uncertainty over Europe. It would be difficult to predict how the situation will turn out in the next few years.

Homelessness

The Nordic welfare model offer generous benefits and subsides, which allow residents to achieve a high level of education and a stable career afterward. This system creates congruous economic development throughout the years, resulting in extremely low level of homelessness. The data is illustrated in the following figure:

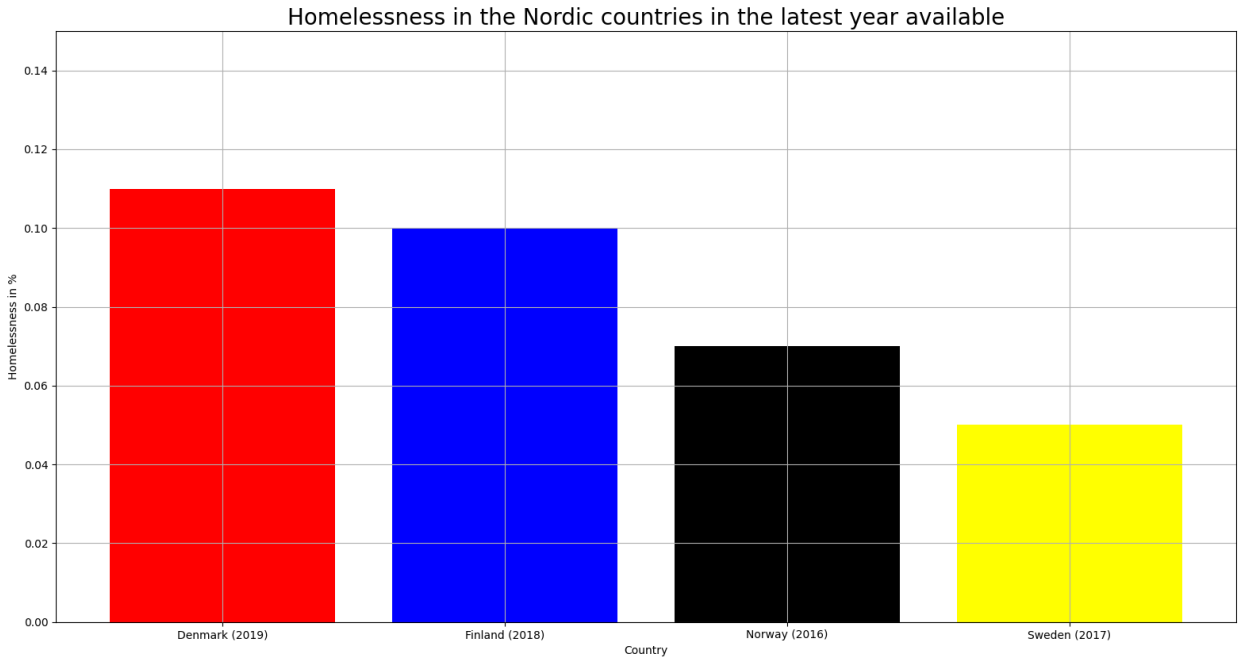

Figure 6: Homelessness rate in the Nordic countries. Source: OECD

The data for the year 2020 was not available, which might be due to the fact that the level of homelessness has dropped too low and the responsible authorities no longer publicly publish it.

The homelessness rate in Denmark, Finland, Norway, and Sweden was very low compared to other OECD countries (9). Denmark had the highest number of homeless people per capita, at 0,11%, while Sweden had the least, at 0,5%. The data for these two countries was skewed: the capital cities of Stockholm and Copenhagen suffered from a lack of affordable housing (10), while the rest of the country remained reasonably priced.

Finland has been maintaining the policy of “housing first”, which helped homeless people to get long-term, stable, and affordable housing. International media claimed that the country has effectively "solved homelessness". However, the queue for these types of housing remained long. For homeless people, this meant spending the night on the street and looking for temporary accommodation. Despite international applaud, the process was slow and hampered even more by the pandemic (11).

Homelessness rate in Norway has been constant over the years. The primary cause of homelessness was economic hardship, substance abuse, or mental illnesses (12).

Immigration and COVID-19

Among the Nordic countries, Sweden has the highest number of foreign-born residents, at around 1 million people:

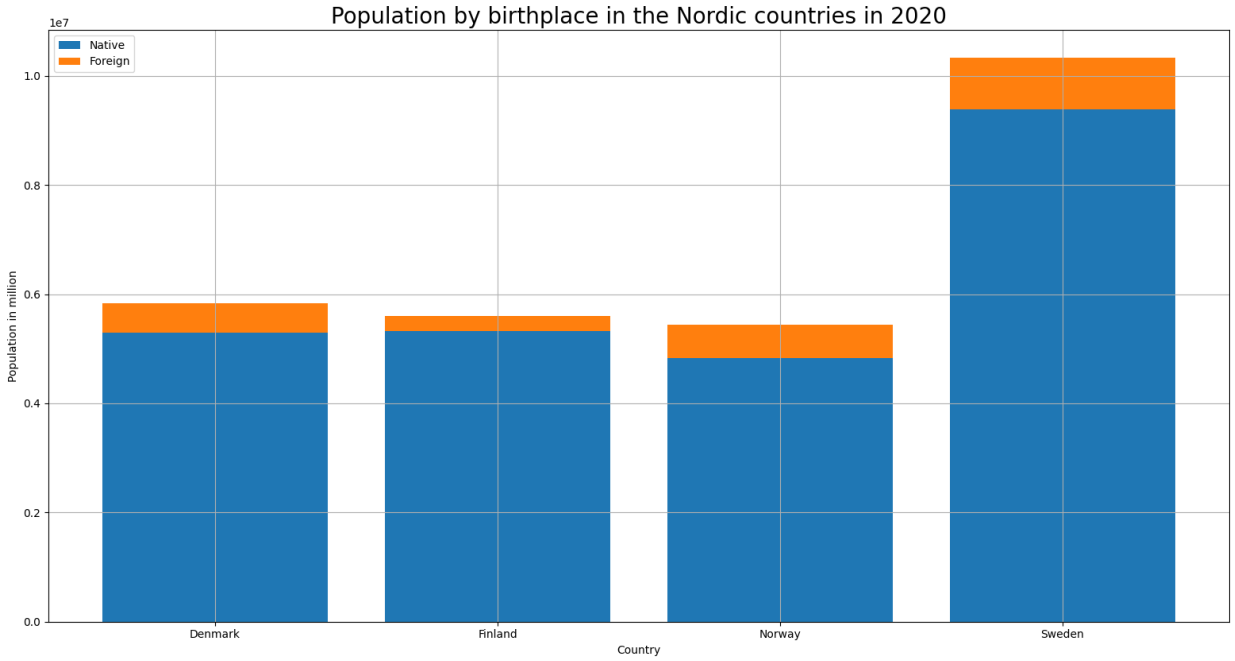

Figure 7: Population by birthplace in the Nordic countries in 2020. Source: Helsinki Open Infoshare

Migration and mobility in the Nordic Region were characterized by a number of phenomena before the COVID-19 pandemic started. First, the populations of the Nordic nations are relatively mobile when compared to those of other high-income nations. In the Nordic nations, anything from 13% to 16% of the population relocates each year. Second, since 1990, two-thirds of the population growth in the Nordic Region has been attributed to immigration. As a result, the proportion of people who were born abroad has increased to record highs. Third, all of the Nordic countries and regions have experienced a long-term trend of urbanization, moving people from isolated and rural areas into bigger urban populations. Finally, due to a long history of second-home ownership, the Nordic people spend a lot of time in multiple locations (5).

One pattern in the Nordic nations over the past several years has been the net emigration of citizens and net immigration of non-citizens, with the inflows of non-citizens being significantly bigger than the outflows of people (16). 2020 saw a reversal or weakening of this trend, most likely as a result of the widespread belief that during the time of limitations and shutdowns, one would be better off staying in the nation of one's citizenship. During the epidemic, almost every nation in the world permitted its residents to return.

Migrants and asylum seekers have been impacted by the closing of national borders. Work-at-home policies and physical separation restrictions have had the unintended consequence of making it difficult or impossible to interview or screen migrants (17). Third-country nationals who require residence permits to stay in Nordic nations have been particularly affected by this (18). Some migrants were left trapped due to the travel restrictions without a valid visa to remain in the nation where they were residing (19).In certain instances, immigrants who lost their careers overseas made the decision to go back to their home nations. Instead of causing forced migration, the pandemic has been called a calamity of inactivity.

Digitalization in the Nordic countries

Despite a downturn in the economy of the Nordic nations during this crisis, the four countries have very high levels of digital innovation, digital transformation, and financial capacity of ICT sectors to bear the negative impact of COVID-19. Moreover, the findings demonstrate that among the Nordic nations, Denmark has the highest level of digital integration between people, processes, and technology. On the network readiness before and after COVID-19 began, Sweden and Denmark had the highest levels of digital maturity. According to the progress of digital performance, Finland has the highest level of digital maturity, with Sweden coming in second. Sweden has a greater capacity for digital innovation than the other Nordic nations do. As a result of robust ICT businesses, Sweden and Finland have higher levels of ICT infrastructure and innovation in the ICT sector than other countries. This will enable both countries to make more advancements in the digital sphere in the future (20).

The high rate and fast growth of digitalization has created a diverse economic environment and a stable development prospect for Denmark, Finland, Norway, and Sweden. The most recent data collected after COVID-19 will be used in the future to display the Nordic nations' true digital intensity and level of digital maturity. Future research will also contribute to understanding the capabilities of the Nordic nations to handle the pandemic crisis taking into account the ICT infrastructure by comparing the pre- and post-COVID-19 condition (20).

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