Data on Immigrants to Finland: The Case Behind Missing Data

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Abstract: This case-based research studies and presents the processes of data- and information gathering to national registers by Finnish authorities from immigrants to Finland. The focus is on understanding and modeling how data is accumulated, on the problems that remain, and the time-lags involved in data accrual within the Finnish system. We look at the actors, resources and the legislation involved and discuss the benefits of having good data and the importance of data renewal. A real-world case of Ukrainians with residence permits based on temporary protection is presented. The data accumulation process is a secondary process when a migrant is received, which makes it essential to pay separate attention to it. During escalating phases of immigration, the performance of the data accumulation process can be estimated. Improvements to data gathering processes, interorganizational collaboration, and data sharing and consolidation are proposed. If processes the immigrants go through, starting from the earliest possible (arrival) stage, do not integrate data collection and data updating, it will be both costly and often difficult to fill data-gaps later. Common and transparent data related processes and a data-collection plan with definition of core variables would provide a solid base for creating a comprehensive data-based profile for every entrant and reliable information on immigrants in general. Data on educational background of immigrants is an example of the type of data that is now collected (mostly) separately and typically remains incomplete. Missing information may give rise to incorrect assumptions and lead, e.g., to actions and assistance being offered at an individual or national level, not being justified by reliable information. Immigration issues are a timely topic that requires reliable data to be understood correctly and researched reliably.

Keywords: Immigration, Data-accumulation, Interorganizational collaboration, Data-sharing, National intellectual capital, Public administration

1. Introduction

In this research we study the Finnish immigration processes and how data of an individual immigrant accumulates during the various administrative processes that face the newcomer to Finland. We are interested in how data is collected and stored into national data registers in general during immigration and specifically during the process, when it is based on temporary protection status. We study why some important data may be left missing or why collection is delayed. The data accumulation process is a "secondary process" when a migrant is received, which makes it essential to pay separate attention to it. In addition to looking at these issues from the point of view of a single individual, we are interested in how the data is aggregated and becomes a part of the national knowledge capital that is usable in data-based decision-support for public decision-making. It can be said that the success of the governmental data processes from the perspective of secondary use of data is evaluated. The availability of high-quality statistical information and research data are features of a high-level knowledge / intellectual capital of a nation.

Migration has been an important field of study for decades and data and statistics on immigrants and the phenomenon generally offer a credible starting point for research. In this vein, the role of different data actors and data collection process is important (Levine, Hill and Warren, 1985). Although immigration data matters (Batalova, Shymonyak and Mittelstadt, 2018), the data is typically a basis for research, not a "target" of research – here we focus on data and data collection processes. To the best of our knowledge, Finnish immigration related data accumulation questions have not been studied in academic literature previously. This is not saying that there has not been discussion and that there would not be any understanding around these issues among researchers and statistics providers. There is a research gap with regards to these questions.

Figure 1 is an illustration of how data accumulates during and after the process of immigration in the case of immigration to Finland, based on temporary protection. Data is collected in bits and pieces and the accumulation of data starts at the boarder by the Finnish Boarder Guard/Police, followed by data collected from contacts with the Finnish Immigration Service. This first part of the process collects basic information on an immigrant. After settling to Finland data is accumulated to registers from different administrative sources via a "sign of life" method during encounters related to different life events and may include supplementary data collections targeted at obtaining missing data. Data starts to accumulate via meetings with governmental actors, but there are inconsistencies and delays in basic data accumulation that sometimes lead to incomplete data that may be relevant to other than direct decision-making related to an individual immigrant (relevant to, e.g., research).

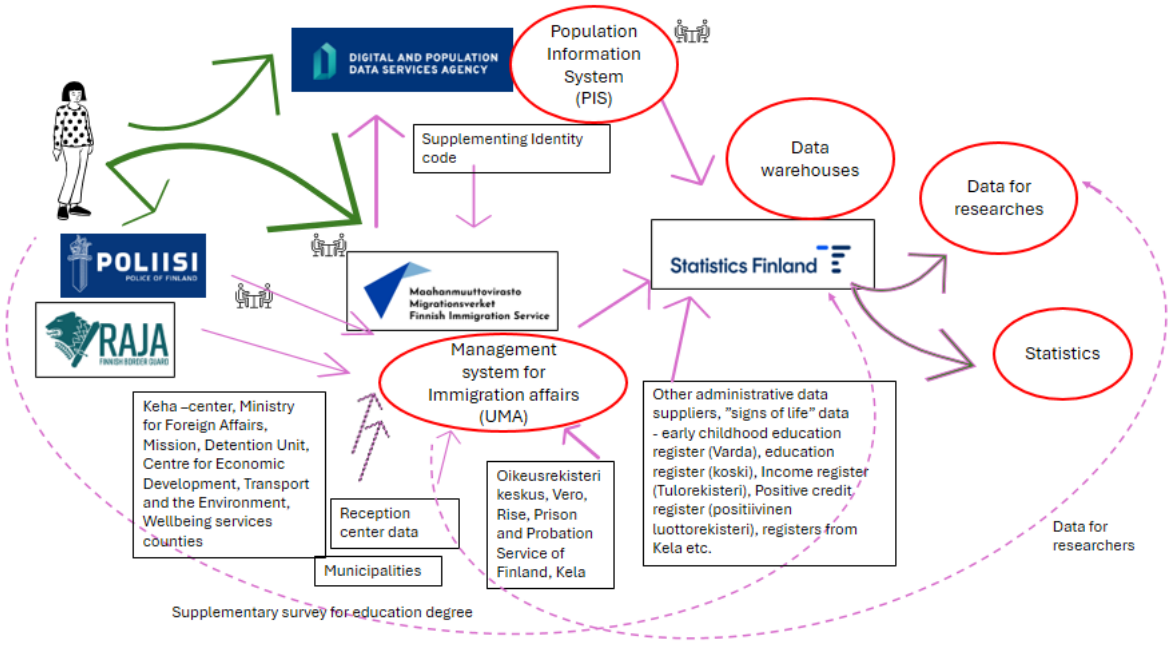

Figure 1: Data accumulation process of temporary protection with the participating organizations

Data accumulation questions are beyond the capacity and scope of any single governmental actor and thus it makes sense to study and focus also on the interorganizational cooperation around data accumulation. Different tasks and responsibilities lead to high levels of autonomy in individual public organizations´ operations (Provan, Fish, and Sydow, 2007) that may ignore interdependence on and collaboration with others (Borgonovi, Anessi-Pessina and Bianchi, 2018; Rajala, Laihonen and Vakkuri, 2018). Here the different tasks and responsibilities are studied from the point-of-view of three actors, i.e., the pool of joint data controllers for the Management System of Immigration affairs (UMA, incl. Finnish Immigration Service (Migri)), the Population Information System (Population Data Services Agency (DVV)), and the Statistical institute (Statistics Finland).

Collaborative governance literature is influenced by the cooperation, coordination, and collaboration (3Cs) theoretical framework (Costumato, 2021). Especially collaboration, which implies comprehensive planning, sets common missions, formulates joint strategies and measures and often establishes a new organizational structure, separate from the individual organizations, with sharing risks, pooling resources, and allocating benefits evenly is important (Costumato, 2021). In our context, we see horizontal collaboration mainly as bilateral or equal with common goals between governmental agencies. Vertical collaboration occurs at national level or between actors at different levels, such as between the ministries and governmental agencies. We identify and propose some points for development of the Finnish system, e.g., creating common and transparent data-related processes and a data-collection plan, including a definition of core variables to ensure the collection of relevant and accurate basic information on immigrants to Finland for statistics and research purposes.

In the next section we present our methodology and then a data accumulation case for temporary protection concerning Ukrainian immigrants to Finland. Then we discuss some challenges observed with data collection, shortly analyze inter-organizational collaboration in this context and close with a discussion and draw some conclusions.

2. On Methodology

The method here is to describe reality by presenting a case of data-driven value creation of knowledge capital at a national level in the case of data collection on immigrants to Finland (see Figure 2). The study is based on the findings of the national statistical production process. We look at the process of data accumulation and data accumulation from the beginning of immigration to the merging of data from various data providers and data processes into statistics and research use of data. In addition to presenting the observed 'story of figures', we also use public material from the institutions involved, information available to the immigrants and the legislation in force: the overall picture presented is based on multiple published sources. Furthermore, these issues have been discussed with domain experts of statistics production process to corroborate the findings. The effects of EU legislation have also been taken into consideration.

This research connects to the knowledge economy framework that includes research of institutions that stimulate efficient creation, dissemination, and use of existing knowledge. This includes innovative actions that promote knowledge accumulation and a modern and adequate information infrastructure that facilitates effective communication, dissemination, and processing of information and knowledge (cf. Marcin, 2013). The presented case presents multi-institution processes and tries to highlight, where the processes need more support. In national intellectual capital research, the public sector as a data collector is often not highlighted, but the importance of relevant and quality data is acknowledged. Quality of data is pivotal for the applicability and credibility of results from data analysis and decisions taken based on low-quality data may be suboptimal or misleading (Orjala, 2021). This public decision-making aspect of data collection issues is a justification for the importance of this research.

In the context of national data management this research shows the value of the structures in place (structural capital) that can produce (collect) intellectual capital and ties this research to knowledge management research. The interoperability of institutions, technological structures in place, legislation, the relational capital as cooperation enabler, financial capital and human capital used all contribute to what essentially is a cross-organizational knowledge gathering and management operation.

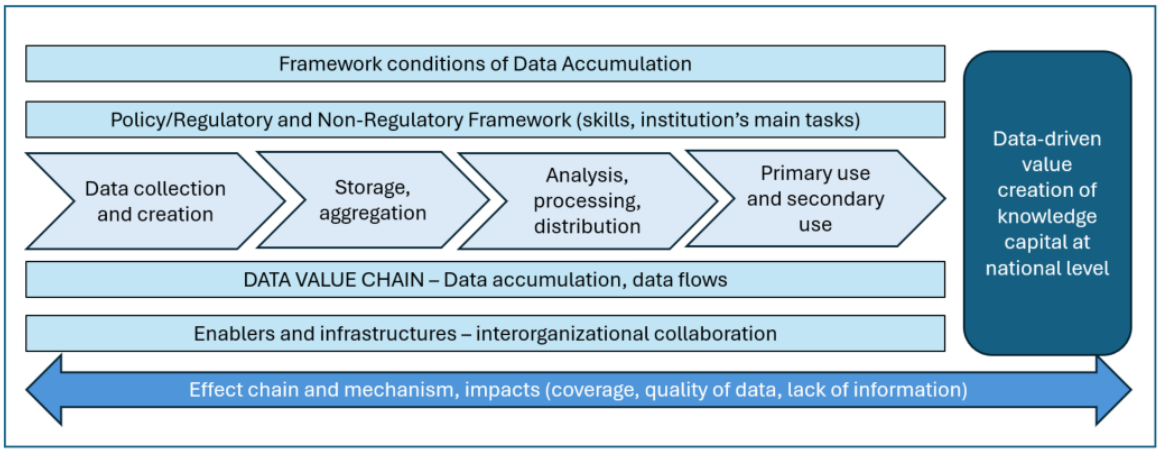

Figure 2: The Data-driven value creation of knowledge capital at national level – case data on immigrants to Finland

Käpylä et al. (2012) mention that a renewal capital perspective is built in all the intellectual capital sectors and refer to a nation´s ability to innovate (see Lee et al., 2017), this perspective is related to this research in that keeping data collected publicly up to date enables decision-support to keep up with the status quo and as such enables informed reactions to changes (redeciding). Figure 2 gives an overall picture of the environment of data-driven value creation for public decision-making. Data accumulation on migration passes through the practices and infrastructures of multiple organizations and includes several obstacles that can be (only) partially resolved through inter-organizational collaboration.

3. Case: Temporary Protection of Ukrainians

This case is about accumulation of data on Ukrainian immigrants to Finnish registers and concerns the immigration after the Russian invasion to Ukraine in 2022. We present a short background data on immigration and then focus on data collection and accumulation related issues. According to the registered population, the number of immigrants from Ukraine was (in 2023) 21 137 persons (Statistics Finland, 2024). The registered population includes individuals with permanent residence information, as the right to municipality of residence is a current condition for a person to be counted in the official population. Compared to the data from Finnish Immigration Service (Migri) the official statistics underestimate the number of Ukrainian immigrants in Finland, as 78 083 Ukrainians had applied for temporary protection during 2022-2024 and 66 726 during 2022-2023. In September 2024, more than 46 000 Ukrainians live in Finland under the temporary protection status (EU 2022/382). The Ukrainians that do not yet have permanent residence, belong to the responsibility of 68 reception centers. During 2023-2024, 28 600 Ukrainians have applied for a placement in a municipality and in the end of 2024 approximately 8 000 Ukrainians live in reception centers, despite the possibility to apply for a placing in a municipality. (Migri, 2025)

Table 1: Immigration from Ukraine 2022-2024

Immigration from Ukraine/Years	2022	2023	2024	Total
Immigration, official statistics[1]	1 533	19 604	13 378	34 515
Temporary protection, applications/permissions [2]	46 641/ 44 939	18 825/ 18 550	12 617 / 12 210	78 083/ 75 699
- applied for municipality placement		13 500	15 100	28 600
-of which temporary protection status, in the end of the year, cumul. % appr.	100	79	62	
-of which living in the reception center in the end of the year			8 000	

[1]Statistics Finland, [2]Migri, European Migration Network, EMN

This data regarding Ukrainians in Finland is indicative but looking at it one can draw some key points. Firstly, the official population stock depends on the registration of the municipality of residence. Secondly, after 12 months of stay the registration is voluntary for an immigrant and requires the immigrant´s own activity. A data collection process that is based on the personal decisions of the targets of data collection weakens data accumulation and lowers the number of migrants and the size of migration peaks in the official statistics. Thirdly, data from different sources differs from each other and a coherent credible picture of the population stock is difficult to form. When looking through the migration figures and statistics, one must be aware of the (data collection) process and of the metadata, as there exists a cohort of residence permit grantees, staying in Finland, who are not included in the annual data, even though they may have migrated to Finland years ago. There is, and will be, delay for more than one year in official statistics regarding the number of Ukrainians in Finland. For example, in 2023 the population living "under-cover" in Finland was nearly 42 000 persons, of which the proportion of Ukrainians was 71 % (Statistics Finland, 2024). The delay in "showing up" in data is a permanent problem and concerns all immigrant groups and becomes more visible when immigration is growing.

Alastalo et. al (2016) pointed out that register-based population statistics leave room for the "illusion of coverage" and accuracy, as they present an exact population figure, even if there is a cohort of resident population not included in the count. While there is a place for criticism, the reasons behind the issue are complex (voluntariness, legislation, imperfections in the data collection). We concentrate on the main (governmental) actors involved in the primary data collection process, i.e., the Finnish Immigration Service (Migri) and the Population Data Services Agency (DVV) and from the secondary use of data point-of-view we concentrate on the Statistics Finland. Migri maintains the management system for immigration affairs (UMA), a large database for immigration data, updated by several other actors in joint data controllership as presented in Figure 3.

UMA is a case management system with several parallel register holders, who can record data and use it via this system in their own processes. The data of Ukrainians starts to accumulate at the border (border guard / police), when the basic information of an arriving migrant is stored. Reception centers take care of the place of stay information and Migri grants the resident permit and stores the data in UMA. Data from the processes of different joint data controllership holders includes data, e.g., on sex, citizenship, date and place of birth , family relations, marital status, location, reception center info and reception allowances. The identification of an immigrant is followed by a separate customer number and a Finnish Identity Code, if one exists. The data is stored temporary in UMA, and it is deleted, e.g., when one obtains Finnish citizenship. (legislation 615/2020).

From UMA (see Figure 3) the data flow to Population Information System is restricted to few data according to the legislation (1330/2019). The Finnish Immigration Service are authorized to record in the Population Information System the surname and first names, sex, personal identification number, foreign personal number, mother tongue, nationality, profession, address abroad, address in Finland, and the start and end dates of temporary residence of a foreign citizen. The same rights have been given also to the Tax Administration (Vero).

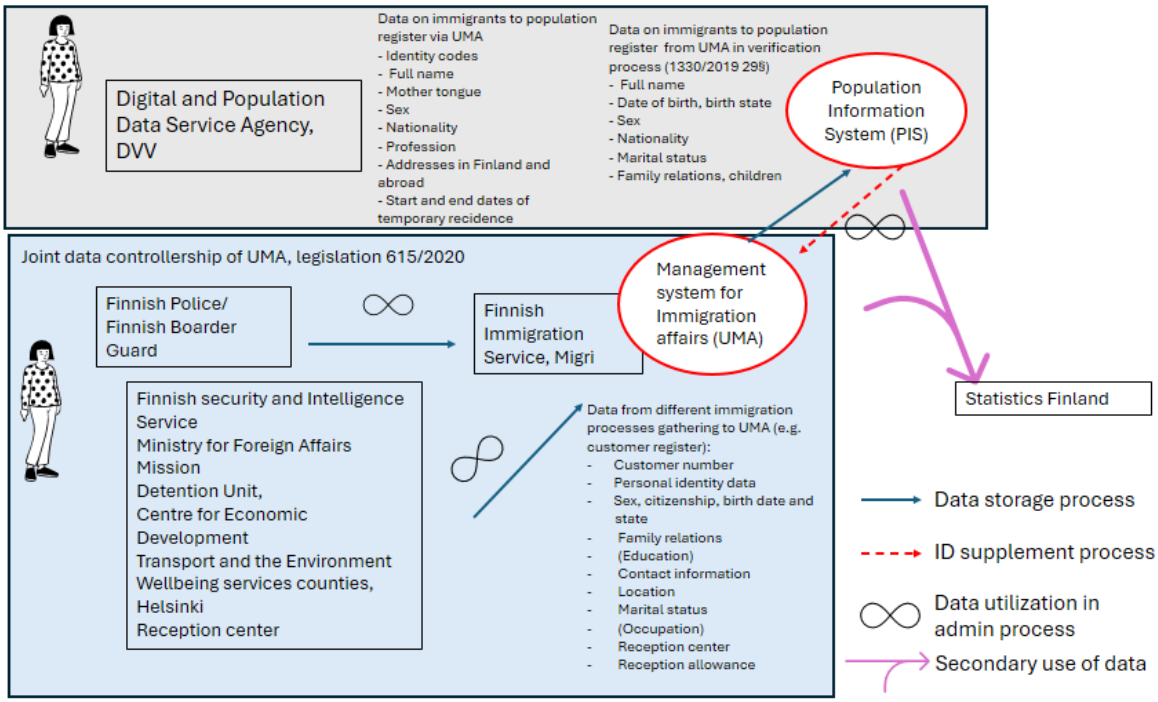

Figure 3: First data flow of Ukrainians – data accumulation to the UMA and the Population Information System

The data recorded in the Finnish Population Information System by DVV echo the powers of Migri despite that DVV has a mandate to record "the other information, the person has given to DVV" (2019/1330). It remains unclear to what extent "the other information" is stored in the Population Information System and to what extent the data of UMA is stored to Population Information System by Migri or supplemented by DVV. One thing to note is that entering information, verification and supplementing processes take resources, which are scarce. The reliability of information on an immigrant is to be ensured with translated and verified documents and in some cases by comparing the data with UMA (661/2009). As a specific detail: data stored into registers cannot be based on an "illegal situation" according to the Finnish law, such as marriage abroad under the age of 18. This means that even if such information were to be obtained, it would not be entered into the system.

It is clear that problems still exist from the data perspective as the data collection on immigration process of the temporary protection persons is fragmented and there are many public sector actors in this process. Many bits of information (variables) are collected or stored partially for specific reasons only and even when collected, they are not included in the data flow, which has impacted the quality of total data. Examples of data on marital status, state of birth, education, municipality of residence and family relations are presented later. Data obtained from the migrants is stored to the Population Information System only partially as the data storage is done based on information backed up by official documents only.

From the data process presented in Figure 3 data is shared for statistical and research purposes. In this data accumulation process the data is enriched by data from other registers and over time, "sign of life" data is accumulated for also for statistical and research purposes to Statistics Finland and UMA. The life events come from other registers such as the early childhood education register (Varda), the education register (Koski), the income register (Tulorekisteri), Population Information System (Väestötietojärjestelmä), the positive credit register or registers from, e.g., the judiciary branch and Kela (welfare, pensions). Researchers can also get data directly from Migri and DVV, but that is not efficient due to created duplicate work (e.g. in data value chain, see figure 2) and increased costs and burden.

4. Observed Challenges With Data

We discuss the challenges in governmental data process from the perspective of the secondary use of data, i.e., statistical and research use. As indicators or examples, we discuss the cases of personal identity code (FI ID), municipality of residence, education, marital status, state of birth and family relations data.

Finnish personal identity code (FI ID) can be given by three authorities Tax authority Vero, DVV, and Migri. In the case of temporary protection, the code is given by Migri. Migri is allowed to admit the status of temporary resident permit without verified documents and without a FI ID code. DVV can supplement codes to UMA. The normal duration of the process for FI ID after immigration is short, as immigrants must finalize their application to Migri within 3 months of immigration. In rare cases a missing FI ID at the time the residence permit is admitted can delay the receipt of the ID until renewal of the resident permit. From the data perspective, the personal identity code is of utmost importance, because it is the common key, when data from different registers and "signs of life" data is merged. Automatic data update flows from different registers cannot be utilized without the personal identity code.

In general, it should be possible to provide a personal identity code immediately at the beginning of the migration process to create an unbroken history of an individual´s stay in Finland from the time of arrival in the country. This is not the case at the moment, and the first data entered for an immigrant at the border by the police (e.g., identity, place of residence and family members) is not tied to a FI ID.

Municipality of residence information is connected legally to the right to use the services provided by a municipality of residence (1994/2001). After receiving municipality of residence, one can get a Finnish identity card and a driving license, use services provided by authorities, and/or receive financial benefits and subsidies. An immigrant can apply for a municipality of residence, when the conditions are met. One main condition is that the person intends to live in Finland for at least one year. Legal stay in Finland is mandatory for this right . Generally, only persons who have right to the municipality of residence include in the population base of official statistics. The statistics on the immigrants and their location, at least during their first year of stay in Finland, are therefore incomplete.

If a person already has a Finnish personal identity code, it is possible to register a temporary address voluntarily in Finland by submitting a notification of a temporary address in Finland via the post office to the Population Information System. In general, temporary address is not comprehensive and as such not valid data to determine the location of an individual but can partly help this data issue. It has been recently suggested (not accepted) that temporary address data is removed from the Municipality of Residence Act, making the use of this information less promising. Addresses in UMA can partly supplement gaps in data, but questions about data validity remain.

One main piece of data (variable) which is not collected during the immigration process is *data on education*. This information is not collected even in the case of work-related immigration. For immigrants who have studied and received their degrees in Finland, the data is automatically transferred to Statistics Finland education register. The register contains degrees received from Finnish education providers via the national databases KOSKI and Virta. Data from education providers not included in these databases is collected through surveys.

If an immigrant has graduated abroad, the data on education is received through governmental processes only if recognition of a foreign qualification is awarded by Finnish national agency for education (Opetushallitus) or the National Supervisory Authority for Welfare and Health (Valvira). Data on degrees awarded in Sweden is received biannually from Statistics Sweden in exchange for the same data from Finland. This exchange of data has extended the number of degrees in the Finnish education register by about 15 000 degrees since 2016. In 2019 and 2023, separate supplementary collections of degree data for the immigrant population aged 18-64 were carried out as a cooperation of relevant agencies and ministries. The data on new degrees received from these supplementary collections included 45 000 degrees (Witting, 2024). The primary option, i.e., the collection of data in connection with the immigration process, cannot yet be implemented. Supplemental collection does not solve the data gap or the basic problem as it may not reach everyone. The education data remains currently incomplete.

Figure 4: Educational structure of the population aged 18-59 by origin, year 2023 (Witting, 2025)

Figure 4 illustrates the situation after supplementary collections. Even after these data collections data on persons with foreign background born abroad was available for only ca. 50% (ca. 290 000 people) of this population. 7.3% of these persons are Ukrainians. Nearly 80% of Ukrainian speakers age over 18 have no entry for education (Witting, 2024). All in all, in the end of the year when a person immigrates to Finland, the lack of education information is nearly 100 % (year 2022 98.3%). Although there are many different data flows, most degrees completed abroad are missing from Statistics Finland degree register. The lack of education information makes it difficult to monitor integration and employment.

One of the basic data points that is missing is *marital status*. Approximately 27 % of this data is missing for the population born abroad 2024 (157 000 persons). This information gap has been growing dramatically since 2004, when the gap was moderate and was (only) 3 800 people (2%).

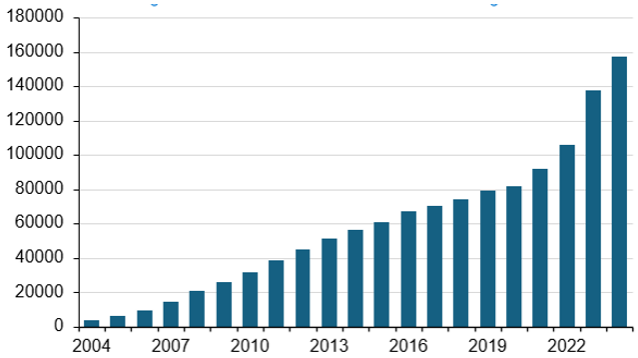

Figure 5: Marital status unknown, population born abroad, development 2004-2024*

Main reason of this lack of data is that provision of this information is (again) voluntary and legalized documents are needed for persons over 18 years in the registration (of data) process. Only for people under the age of 18 is the data stored without documents. If an immigrant is under 18 years and married and even has the legalized documents to prove it, this information is not stored, because it is illegal to be married in Finland under the age of 18. This is a clear “glitch” in the system. A person can make an application to supplement the data later.

State of birth -information is missing for more than 52 000 people in 2024. This information gap is growing fast as the figure was 6000 in 2019. The proportion of people without data on place of birth is almost 9 % of the population born abroad. Most of the gap has accumulated after the year 2022 and 44 % of the individuals with no information are citizens of Ukraine (23 000 persons).

In addition, data on *family connections* is mostly incomplete, even though this information is to some degree available in UMA. Producing statistics or credible information on these relationships is impossible and supplementing it afterwards is very difficult.

In immigration processes, personal contact and physical meetings with governmental actors are obligatory. These meetings could possibly be also used to further the data accumulation concerning core data needed for immigrants. Some data is not recorded as the legislation restricts the storage of the data. In addition, the need for official, legalized and translated documents leads to data gaps. It is also remarkable that even though the migration process accumulates basic data from immigrants into the UMA, the data is not stored permanently nor transmitted to Population Information System. Generally, the utilization of all data sources available should be increased to improve the population base coverage in official statistics.

5. Building Inter-Organizational Collaboration for all Data Needs

The data process of immigrants is a complex and between several public actors with different tasks and priorities. Bilateral cooperation is often insufficient and vertical collaboration is needed to support the accumulation of data from the earliest possible arrival stage. Inter-organizational collaboration can effectively build national knowledge on what is known about immigrants in short and long term, enable renewal of legislation, processes and ICT solutions when needed, i.e., when the actors together observe that a change is needed.

The main actors in the case above, i.e., pool of joint data controllers of UMA (incl. Migri), Population Information System holder (DVV) and Statistics Finland have differing main tasks, data collection roles and filters on data accumulation, i.e., different legislative boundaries. To overcome the negative effects of different priorities on

data collection, collaboration is needed at a national level between the governmental data actors. Collaboration areas include, e.g.:

- Common knowledge of the basic data needs for primary and secondary use of data on immigrants. The lack of data can be long-lasting, in some cases permanent, if the first phases in immigration process are not utilized for data accumulation. If this is not widely known, there may be no "good will" in working to obtain the data.
- During escalating phases of immigration, all data structures should be ready and available. Core indicators and data-related processes must be built in advance and be ready for urgent situations.
- Evaluation of data accumulation and sharing processes are important.
- Common goals, visions, scenarios, joint projects and close cooperation are shared with data actors.
- National Data Policy (Ministry of Finance, 2017), data governance structures and data-oriented renewal of legislation is needed.

Data accumulation in the immigration process is typically not a major issue as a collaboration target, however, it is important to recognize that for a solid picture of immigrants, we need to define the core data that society should have and to form a comprehensive data vision for the basis of actions. The data process and accumulation, the content of the registers, and the needs of all parties in the data process should be considered. We need to ensure that the lack of data is not affecting the holistic picture and clouding the understanding about these issues at a national level.

Putting the above in perspective of previous research, in the knowledge society the need for flexible, open and interconnected organizations is demanded (see Campos et al, 2006). Joie has pointed out the need to ensure that agencies are linked so that they share their intangible assets (Joia, 2008). Chen, Lin and Yen have pointed (2014) that inter-organizational collaborative relationships influence knowledge sharing positively. In addition, in the context of continuous improvements through collaboration structures, some thoughts of rethinking institutional structures have recently been raised, as a solution to design more future oriented institutions (Acemoglu, Egorov and Sonin, 2021; Mulgan 2024). Data governance structures at a national level could be one of the interesting topics in this discussion.

6. Discussion and Conclusions

The aim of this paper is to introduce data accumulation as an important issue in the formation of the knowledge-capital of a society. The collection of primary data has a higher priority in the immigration process, while secondary use of data is needed to bring understanding of the phenomenon of migration and to analyze the background of the immigrants. Both should be considered, when renewal of data collection processes is planned. For fact-based decision-making relevant and complete data is important, also on a personal level for individual immigrants.

The success of inter-organizational collaboration in this context can be approached by looking at what is the quality of the data that is accumulated for secondary data use, i.e., for statistics and research. Inter-organizational cooperation supports the value creation and building the knowledge-capital of the nation, and we need to pay (more) attention to the data accumulation, storage and data exchange in governmental processes. This issue is accentuated by the fact that the world is becoming more and more digitalized and the reliance on digital information within systems demands complete and trustable record-keeping. Organizations easily optimize their actions by focusing on their own needs within the restricted legislation boundaries, such actions looked comprehensively result in inefficiencies.

Immigration is a very complicated phenomenon due to the diversity of different reasons and ways to immigrate. Various public sector administrative bodies have different roles in immigration processes depending on the reasons for immigration. Primary data processes are out of reach of secondary actors. They need collaboration with first-line actors to capture the whole picture of different needs in this complex operating environment. We have made some suggestions for the future. The minimum mandatory data (variables), i.e., core data on immigration for secondary use of data should be defined on a national level and collected starting from the first encounters with of immigrants. The accumulation of minimum core data enables higher register data quality and high-quality information for the entire population. Due to scarce resources, data prioritization should be done in collaboration, considering the responsibilities of all data actors.

Data processes should be ready, tested and available. If processes are not in place, the primary needs of immigration run over data questions, especially in situations of immigration escalation. It is almost impossible

to fill in data gaps later. The gaps may remain for decades, as there is no comprehensive way to supplement data later. Common scenarios and assessment can be tools for improvement. Legislation guides data processes and storage of data. What data can be collected, and stored is strictly legislated, data verification is based on legal and translated documentation, and own announcement is not allowed to be recorded. Some verified data is even "illegal" as the mirror is Finnish legislation. The renewal processes of legislation are not usually optimal for data process needs, as changes to legislation normally have different drivers. We see that in legislation processes, assessment of data process could be useful, in similar ways as impact assessment and cost/benefit assessment.

Some processes don't start without immigrants' own application. This has serious impacts on the population stock, on some data variables and on the validity of statistics. Too strict connection of a variable to administrative decision-making should be avoided in registers. Municipality of residence information is the main example of this kind of data. Despite of that, official statistics should append the population base with immigrants staying over 12 months with, e.g., UMA data when enriching data for research purposes. In addition, only primary data needs are utilized individual meetings with immigrants. Secondary data actors don't have these kinds of natural contacts with immigrants. Physical meetings should be utilized better to the advantage of the whole data process and for all data actors, for example for cross-cutting data-need of the secondary data actors should be considered and data appended in the meetings. The research community should ideally be able to operate with only one public register counterpart for all their data needs.

We want to point out some limitations to this work. The case presented is restricted to temporary protection of Ukrainians which is only a part of immigration and supported by the directive 2001/55/EC and council implementing decision (EU) 2022/382. The data processes in different immigration types vary, which means that part of the data accumulation challenges is not covered in this paper. Another limitation that we point out is that data processes are studied mainly using material, which is available on-line, more information could be gathered through interviews of experts within the studied organizations. This might leave room for open questions such as how prioritization within the main actor organization influences data accumulation and what are the impacts of resource shortfalls in data processes.

We find that future research opportunities within data question are numerous and there is room for integration of research and policy actions to strengthen data processes and utilization of data nationally.

Ethics and AI statement: We, the authors, declare that ethical clearance is not required for the research. We, the authors, confirm that AI tools were not used in the creation of this paper.

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