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**The Political in Digital Migration:
How Intentions & Implementations of Advanced Digital
Technologies for Migration Management differ around the
Globe.**

Bachelor's thesis to obtain the academic degree

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Abstract

The overarching topic of this study is digital migration management, with a particular focus on the use of advanced digital technologies (ADTs) by prominent actors in the Global North and the Global South. Within the past decade, the implementation of ADTs has gained popularity among various fields, like the top-down management of migration. The question is no longer “if”, but rather “how”. Therefore, this research seeks to uncover the question of “*How do policy intentions influence the diffusion of digital technologies for migration management in the Global North and the Global South?*”. This is approached by a systematic literature review of 25 documents, mostly of academic nature, a complementary expert interview and a subsequent qualitative content analysis through ATLAS.ti. The hypotheses state that ADTs are used as a mean to deliver policy objectives, which proved to be true. Moreover, it was expected that performance-related intentions enhance the proliferation which was partially proven. Ideas of national security under the migration management paradigm strongly effect the implementation, as expected. Further, governments tendency towards techno-solutionism and organizations techno-humanitarianism view were apparent in some instances. Overall, the proliferation and implementation of ADTs is dependent on the national and international actors and their policy objectives.

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List of Abbreviations

ADTs = Advanced Digital Technologies

AI = Artificial Intelligence

BAMF = Federal Office for Migration and Refugees

DTM = Displacement Tracking Matrix

EU = European Union

EUROSUR = European Border Surveillance System

Fintech = Financial Technology

Frontex = European Border and Coast Guard Agency

MIDAS = Migration Information and Data Analysis System

IOM = International Organization for Migration

OECD = Organization for Economic Cooperation and Development

SLR = Systematic Literature Review

UN = United Nations

UNHCR = United Nations High Commissioner for Refugees

1. Introduction

In recent decades, ongoing globalization and various crisis like wars have led to an increase in migration movements, which has in turn significantly altered the challenges and complexities in the sector of migration management. Migration does not only concern the movement of people across geographical borders, but also the diverse social, economic, political, and legal aspects that are inevitably associated with this phenomenon in a global world order of nation states. In this context, advanced digital technologies (ADTs) are playing an increasingly important role, since they are thought to have the ability to provide innovative solutions for the management and governance of migration at different points in the process (*Nalbandian et al., 2022*). Although migration is a multi-causal phenomenon, that cannot be explained by one variable, new global issues like climate change are estimated to further contribute to the rising number of forcibly displaced people (*Kaczan et al., 2020*). The rise of digital innovation in the field, however, has only become relevant over the past two decades and now presents itself with new opportunities and considerations. Hence, it is essential to understand the complex dynamics that shape the governance of migration in the digital age (*European Migration Network, 2022*).

There are global trends in migration which have been heavily covered by the media and thoroughly studied by scholars. Especially with regards to western scholarly literature during the time of the so-called “Refugee Crisis” in 2015, which was “the first of its kind in a fully digital age” (*Ponzanesi, 2016, p. 19*), many studies that were conducted addressed the factors influencing South-North migration dynamics. Yet, a proportionally significant number of migrants are part of South-South movement within neighboring countries, which is becoming more recognized by scholars and eventually helps to de-center migration studies and its prevalent views (*Tagliacozzo et al., 2024*). Additionally, the field of digital migration studies needs to be looked at as an interdisciplinary discipline because it combines the field of migration research from the social sciences with research on digital technologies which originally stems from the domain of computer science, engineering and information technology. In 2022, the European Migration Network released a paper in cooperation with the OECD to inform on the state of digital innovative technologies in migration of EU Member States and OECD countries (*European Migration Network, 2022*). For the African Continent, there has recently been a

study conducted on the chances and challenges connected to the application of blockchain technology regarding international migration (*Chatta et al., 2023*). However, to date there is no overarching literature that combines different regional policy perspectives and their choices of advanced digital technology implementation. Thus, it is vital to provide a broader context to the presented issue and lay the groundwork for further academic research to be done.

Digital migration scholars aim to identify the factors contributing to the relationship between digital technologies and migration (*Leurs et al., 2018*). Their focus frequently lays on migrants and how they utilize digital technologies to empower themselves in a cosmopolitan sense, denoted as the “connected migrants” (*Candidatu et al., 2019*). In scholarly research, there is a need for further exploration of the role that other actors involved in the process of migration, apart from the migrants themselves, play with regards to the utilization of digital technologies (*Gillespie et al., 2018*). For instance, there is minimal consideration given to the ways in which political entities utilize digital technologies as a novel form of governance (*Candidatu et al., 2019*) and little attention for the way in which they are used by policymakers and street-level bureaucrats (*Nalbandian et al., 2022*). Gillespie et al. make a proposition in their paper to shift the focus of further research towards how all actors, including nation states, make use of such devices. They continue to mention that thinking of digital technologies solely as solutions is problematic since it omits the nuanced comprehension of the consequences of data gathering and circulation, for example regarding consolidated power-relations (*Gillespie et al., 2018*). Biases concerning race, gender and other are transferred onto digital technologies through daily interactions in online and offline environments (*Candidatu et al., 2019*), which is why we should be concerned with the political underpinnings of digital technologies in the scholarly and the public debate alike, especially when they are used in the humanitarian sector respectively targeting vulnerable populations. Keeping this in mind, there are many speculative uses of digital technologies that yield positive results for migrants and societies (*Nalbandian et al., 2022; Latonero et al., 2018*). However, critical voices also remark that the enthusiasm surrounding technology in migration research perpetuates the perception of mobility as a phenomenon that requires governance and control. Further, it is questionable what the keen concentration on technologies shows and what it simultaneously obscures (*Tazzioli, 2023*). Moreover, access to tech-

nology commonly goes hand in hand with waving data privacy rights. Thus, being attentive to the concept of intention and its influence on considerate public policymaking with digital tools is pivotal (Nalbandian, 2022). The advanced digital technologies that are explored through this study will naturally differ in type e.g., ranging from Blockchain to Artificial Intelligence technologies. Yet, this will not detract from this studies function, but more so contribute to its many-sidedness.

Nalbandian and Dreher define advanced digital technologies in their latest working paper as “emerging technologies that engage the latest digitization and digitalization efforts” (Nalbandian et al., 2022, p.1). The basic assumption of digitization is the conversion of analog information and objects like documents into various digital formats that are workable for computer systems while digitalization means the enhancement of processes through digitized data or digital technologies (Nalbandian et al., 2022). Hence, advanced digital technologies refer to sophisticated tools and systems that leverage cutting-edge innovations to enable enhanced data processing, predictive analytics, and connectivity across various sectors, including migration management (Bither et al., 2020; European Migration Network, 2022). Specifically included in the scope of this study are Artificial Intelligence (AI), Automation, Big Data technologies, Biometric technologies, Blockchain, Cloud Computing, and Internet of Things (IoT), as they are the most prevalent technologies in the sector of migration according to the “Migration Tech Tracker” with the addition of Fintech (Migration Tech Tracker, 2022).

Therefore, the main research question for this study is “*How do policy intentions influence the diffusion of advanced digital technologies for migration management in the Global North and the Global South?*”. The formulated sub-questions to support the answerability of the main research question are the following:

1. Which states or international organizations implement what type of advanced digital technologies for migration management in the Global North and the Global South?
2. What are the formulated intentions and objectives regarding the use of the tool, and do they relate most to matters of performance, national security, or migration assistance?
3. Where are the key differences in intention and implementation of digital migration management between countries located in the Global North and the Global South?

4. To what extent are ethical and legal concerns addressed in the literature?

This study aims to serve a dual purpose: Firstly, it seeks to show the variance of how national governments of the Global North and the Global South, as well as international organizations increasingly draw on the use of advanced digital technology to support their political and humanitarian objectives in migration policies and programs. Secondly, it aspires to critically point at the inherent implications for migrants as “the balance between efficiency and protection largely depends on the intention of the state or organization” (*Nalbandian, 2022, p.17*). The research will be approached in an exploratory way through the method of systematic literature review (SLR) and ensuing qualitative content analysis, complemented by one expert interview.

Conducting research on the implementation of advanced digital technologies for migration management in the Global North and the Global South is both socially and scientifically relevant because of the profound ramifications these novel tools can have on human mobility and societal structures (*Bither et al., 2020*). Socially, understanding how these technologies are deployed can reveal disparities in treatment, access, and rights between different states and regions, highlighting issues of equity and justice. Scientifically, this research hopes to emphasize the underlying intentions of states and organizations in adopting these technologies, whether for control, efficiency, humanitarian aid, or economic benefit. The factor of intention is crucial as it shapes the design and application of these technologies, influencing their impact on the reality of life for migrants (*Nalbandian, 2022*). Furthermore, examining the variance in implementation across the Global North and the Global South can elucidate how contextual differences such as economic resources, political stability, and social norms affect the decisions and effectiveness of adding digital migration management tools. This comparative analysis can lead to better informed policy recommendations that are sensitive to regional challenges and needs, while taking into consideration the effects for migrants as a vulnerable group, thus contributing to more ethical and effective migration governance worldwide (*Bither et al., 2020*).

2. Theoretical Framework

To explore the implementation of advanced digital technologies in migration management by different actors in front of diverse national backgrounds in an analytical man-

ner, a theoretical framework was formed. First, digital technologies are introduced as policy tools with the addition of the “Intention scale” to visually locate intentions of ADT usage between pro- and anti-migration attitudes (*Nalbandian, 2022*). The “Diffusion of Innovations” theory further advances the theoretical framework by stating five factors that facilitate the adoption of digital tools before the paradigm of migration management is elaborated as the overarching idea. Lastly, the framings of technology from a humanitarian and a solutionist standpoint are shown.

2.1 Advanced Digital Technologies as Policy Tools

As stated prior, the investigated geographical locations of ADT deployment are divided into the relational concepts of the Global North and the Global South, whereby the author is aware of the nuances that this classification omits and the undifferentiated perspective that it partly implies. Nevertheless, due to the research design and the limited scope of this study, it is not possible to provide a greater differentiation and the used terminology currently counts as the least pejorative and most neutral conceptualization (*Friedrich Ebert Stiftung, n.d.*). The conceptualization is necessary for this research as it manages to set the groundwork to depict and differentiate the regional circumstances between European and African countries’ ADT use.

Academic literature suggests that the most prominent actors of implementation are international organizations, national governments, also in public private partnership with private firms, and sometimes solely the private sector as the developing source for example. Intentions and objectives are expected to vary accordingly, as these actors naturally have different obligations (*Expert Interview*). State sovereignty and human rights as legal principles play a significant role in considerations of governments and organizations, while the private sector is driven by profit. Yet, it is important to note that digital technologies are able to function as policy tools in and for migration management (*Bit-her et al., 2020*). In scholarly literature and in the general debate around digital technologies, there is a visible dichotomy in the way in which discussions about the use are framed, with the leading narrative either being focused on control or on inclusiveness and connectivity provided by digital technologies (*Garelli et al., 2018*). Nedelcu and Sysüren also highlight the ambiguous potential of digital technologies in their article on the empowerment-control nexus by stating that they have both the potential to empower and to constrain migrants’ agency (*Nedelcu et al., 2022*). Critical literature often heavily

emphasizes the negative, disregarding the potential positive ways of using digital technologies (*Nalbandian et al., 2022*). Continuing this thought, there is a need to conduct analytical studies beyond the perspectives of exclusion and inclusion (*Garelli et al., 2018*) that still address the premises of their use (*Nalbandian et al., 2022*). Consequently, this study interprets the use of advanced digital technologies as a mean to deliver certain policy objectives and analyzes them as such.

In her article on Artificial Intelligence technologies in migration and asylum management, Lucia Nalbandian introduces the concept of an “Intention scale for the use of AI to deliver immigration policies” that ranged from “Anti-“ to “Pro-Immigration” and included a neutral center, to situate the analyzed cases (*Nalbandian, 2022, p.5, fig. 1*). This visualization is beneficial to this study as it helps to analyze and locate different variants of digital technology use by considering the underpinnings behind their implementation whilst acknowledging their dynamic nature. In her analysis, she includes “Intention”, “Use” and a “Technical Assessment” of the chosen applications of AI to evidence how actors’ intentions shape the employment. This conceptual approach allows for a critical perspective of the underlying motivations and ethical considerations associated with the adoption of ADTs in migration management in this study.

2.2 The Diffusion of Innovations

The “Diffusion of Innovations” theory was popularized by Everett Rogers in 1962 and has been frequently applied since then (*Sahin, 2006*). It was chosen to provide a theoretical framework that can expound the technical reasoning behind the proliferation of digital technologies as policy tools since it focuses on the basic mechanisms of diffusion (*Albrecht et al., 2018*). With that, the theory seeks to explain how, why, and at what rate innovations spread (*Rogers, 2003*).

To this end, it looks at the main barriers and facilitators of the adaption of digital tools and, in the way that it is presented by Rogers, the unit of analysis are singular people (*Sahin, 2006*). For this research, the theory will be adapted to study national governments and international organizations as the actors of implementation. Originally, the Diffusion of Innovations theory states that the adoption process of an innovation can be characterized by five key stages: knowledge, persuasion, decision, implementation, and confirmation. Individuals or groups within a social system are categorized based on

their readiness to adopt an innovation, ranging from innovators (early adopters) to so-called laggards (Rogers, 2003). Nation states from the Global North and the Global South, as well as international organizations can be categorized similarly within the global system (European Migration Network, 2022). Factors that influence the diffusion of innovations include the perceived *relative advantage, compatibility, complexity, trialability, and observability* of the innovation (Rogers, 2003). Moreover, communication channels, social networks, opinion leaders, and institutional contexts play crucial roles in facilitating or hindering the diffusion process (Sahin, 2006). It can be expected that different national backgrounds and international cooperation structures have comparable effects (Beduschi, 2021). Rogers' theory has been used across various domains, including technology adoption and public policy, to understand the dynamics of innovation adoption and to inform strategies for more effective implementation and prevalence (Albrecht et al., 2018).

Most vital for this study are the five factors focusing on how implementers perceive the innovation, hence the advanced digital technology. These attributes are circumstanced in the persuasion stage of the Innovation-Design Process, which is more affection-centered than the prior knowledge stage (Sahin, 2006). Relative advantage means that implementers assess whether digital technologies offer advantages over existing methods in achieving their migration management objectives. Their intentions to adopt a tool may be driven by the perceived benefits such as increased efficiency, improved accuracy, or enhanced decision-making capabilities. Compatibility signifies that a combination of the digital technology with existing practices, policies and organizational culture is possible. Their assessment may be influenced by whether they perceive the tool as fitting seamlessly into their current systems and ways of working. Complexity connotes that implementers may consider the level of difficulty as tools need to be simple enough to be understood, used, and integrated. Trialability implies that there is a chance to pilot the tool before committing to the implementation full-scale. Implementers are thus more inclined to adopt a digital technology if the opportunity to pilot the tool presents itself before (Rogers, 2003). Observability from the vantage of this study describes the visibility of the benefits of digital tools in migration management, like tangible results in other countries. Overall, by examining how implementers perceive the characteristics of digital tools in relation to the Diffusion of Innovations theory, their intentions to adopt

and implement these tools in migration management can be explained by expected performance enhancements.

The quest for streamlining processes and greater efficiency seems to be a driving notion (Nalbandian *et al.*, 2022). Therefore, it can be assumed that these factors function as facilitators together with ideas of transparency and efficiency (Bither *et al.*, 2020). The potential effects of ADTs include the enhancement of agency, accuracy, and accessibility for those who implement it as well as for those who utilize it. Both perspectives should be considered (Bither *et al.*, 2020). *Barriers of adoption* are “Ethical Concerns“ (79), “Equality Concerns“ (30), “Data Privacy Concerns“ (39) and “Lack of Knowledge“ (53) or information about the ADT. However, it is assumed that actors of implementation also seek measures to reduce such concerns when inclined to use advanced digital technologies.

2.3 The Paradigm of Migration Management

Within the scope of this study, a migrant is defined as somebody “who moves away from his or her place of usual residence, whether within a country or across an international border, temporarily or permanently, and for a variety of reasons” according to the definition of the International Organization of Migration (2019). It was chosen because of its ability to serve as an umbrella term that is inclusive and can be transferred to the act of migration as a certain type of dynamic movement. The governance of migration is one of the timely global challenges. Discourses around it often insinuate neutrality and refer to it in terms of performance issues like efficiency and yet this disregards the sophisticated motives of stakeholders and their positions (Triandafyllidou, 2020). Hence, intentions and objectives that cannot be grasped by matters of performance are therefore approached by the migration management paradigm in the following.

Thomas Kuhns’ (1962) notion of a paradigm refers to a dominant framework of (scientific) beliefs, theories and methods that guide the holistic perspective and the way of research. Like science so is public policy, including the policies regarding migration, prospect to paradigms (Hall, 1993). Hall suggests that policies are formulated within a framework of ideas and standards that is understandable and plausible to the involved actors. Specifically, policymakers typically operate within a conceptual structure that defines not only the objectives of policy and the types of tools that can be employed to

achieve them, but also the framing of the issues they aim to address. This conceptual structure is visible in the doings and in the language used by policymakers to discuss it. The power and influence of policy paradigms is contingent through their assumed self-evidence and their resistance to comprehensive scrutiny (*Hall, 1993*). Akin to the concept of “normal science” in Kuhns’ conception, public policy is adapted to the “normal policymaking”, without questioning the overarching policy paradigm (*Kuhn, 1962; Hall, 1993*).

The policy paradigm of migration management was initially formulated in a report by Bimal Gosh in 1993, aiming at the orderly regulation of international migration through global norms and rules. Subsequently, in 1997, the Dutch, Swedish, and Swiss governments, along with the United Nations Population Fund, supported the development of a “New International Regime for Orderly Movements of People”. This approach aimed to manage all types of human mobility through three pillars that were proposed by Gosh: harmonization of migration policies, a new international agreement for global mobility and migration, and increased influence from non- governmental actors. Today, organizations like the UNHCR, Frontex, and the IOM actively execute the migration management paradigm, promoting the narrative of “mixed migration flows” to justify expanded border controls and the differentiation of migrants (*Geiger et al., 2010*).

Migration Management as a term already implies a quest for effective action, since it depicts migration as something that needs to be governed (*Tazzioli, 2023*). It is a controversial notion in the scientific discourse as the wish for the organized and predictable management of migration stands in contrast with the complex reality of migration dynamics. Yet, governments and international organizations, as prominent actors, often have the political intention to execute migration management in their strategies, policies, processes, and procedures (*Beduschi, 2021*). Especially in Europe, migration management is treated more as a synonym for migration and border control, which is visible through the restrictive nature of (national) border controls and international cooperation. This is loosely based on the imagination that the cost-benefit analysis must first and foremost work for the receiving society, which makes it a main policy (*Castles, 2010*). The only countercheck to that seems to be public opinion that transforms into political pressure like in the Australian case (*Expert Interview*). But mind, paradigms restrict this ability. Alternatively, in recent times a view on migration as beneficial for

all parties involved has emerged, if the process is safe, regular, and orderly (*Triandifyllidou, 2020; Geiger et al., 2010*). With that, migrants are often discursively divided into “regular” and “irregular”, “legal” and “illegal”, “voluntary” and “forced”, or “legitimate” and “illegitimate” migrants with the latter needing to be restricted by migration policy (*Geiger et al., 2010*). This legitimizes a state-centric view on migration where migrants are framed as a security threat and therefore become a matter of national security, opposed to people in humanitarian needs (*Amnesty International, 2024*). This includes the externalization of European borders (*Latonero et al., 2018*) and eventually also the proliferation of the migration management paradigm. Seeing migration as something to be managed, governed, or solved opens the space for technological solutions (*Expert Interview*).

2.4 Techno-Solutionism

Amnesty International, an established and globally represented human rights organization, is increasingly concerned with the use of technological innovations in the realm of migration governance around the world (*Amnesty International, 2024*). Implementing digital technologies started as a trend when the war on terror was communicated as a matter of risk management after 9/11 (*Amoore, 2006*). This perspective still serves the narrative that migration is a problem that is to be solved with technological solutions (*Amelung, 2021*). Techno-solutionism is the promotion of technology as the sole solution to a naturally complex, but broken-down phenomenon, through which important considerations are most often lost. It follows the idea that all social, economic, and political problems can be overcome by technology (*Sætra, 2023*). However, the use of ADTs should not be dismissed as problematic per se as technological developments will accompany policymaking and implementation. Nevertheless, technological approaches and tools can never be a substitute for sound migration policies (*Bither et al., 2020*). Yet, Malinowski asserts that established practices of migration management are not fit to sustain the challenges proposed to the governance of migration anymore. He further states that modern technology presents a tried and tested solution (*Malinowski, 2017*). This example elucidates how technologies can be portrayed as solutions based on framing migration as a problem. As the areas of migration and refugee policy evolve in an increasingly fast-paced and mobile world, technology will be able to help address some of the more pressing policy issues. Yet, the issue that the technology is supposed

to tackle here is not specified. Accordingly, technologies might be used because they exist, and not because they offer a solution to an actual problem or provide an answer to a specific political question. Techno-solutionism aims to solve every problem through technology, even when viable alternatives are available (*Bither et al, 2020*). However, simple solutions do not correspond well with the reality of complex problems since they omit salient factors. Migration scholars are concerned with the concept's implications on the debate. Hence, closer attention should be paid to signs of techno-solutionism, as this can be the driver of ADT implementation and may result in less attention for negative effects (*Tazzioli, 2023*).

2.5 Techno-Humanitarianism

Techno-humanitarianism refers to the idea that technology can help migrating and receiving communities alike (*Tazzioli, 2023*). For instance, the OECD argues that “digital technologies can help governments to better develop, design and enforce policies and regulations; become more efficient; and reduce waste.” (*OECD, 2020*). This idea is often immanent in international organizations that follow humanitarian goals of providing aid and assistance in the migration process (*Expert Interview*). That means that advanced digital technologies can facilitate rapid needs assessments, optimize resource distribution, and improve communication with affected population. However, while techno-humanitarianism holds significant promise, it also raises critical ethical and practical concerns. Issues such as data privacy, the digital divide, and the potential for misuse must be carefully managed to ensure that technological interventions truly benefit those in need and do not exacerbate existing inequalities or create new vulnerabilities.

2.6 Conclusion & Hypotheses

To conclude, advanced digital technologies can be appointed to function as policy tools and deploy certain policy aims, which are developed as comprehensive, state-centered, migration frameworks focused on political rationales under the policy paradigm of migration management. The latter advocates for the orderly management of migration, assumingly for the benefit of all (*Geiger et al., 2010*). Performance enhancement plays a role in the objectives and thus, the diffusion of innovations. Techno-humanitarianism shows that technologies can be used for humanitarian purposes while techno-solutio-

nism, in this case, suggests that migration is a problem to be solved by digital technologies. This leads to pressing ethical and equity concerns.

The hypotheses that are derived from the combined theoretical framework are the following:

H1: Governments and international organizations implement advanced digital technologies as policy tools to reach their distinct policy intentions regarding the management of migration.

H2: Performance-related policy intentions positively influence the diffusion of advanced digital technologies for migration management in the Global North and in the Global South.

H3: Governments and international organizations work within the migration management paradigm, which promotes policy intentions of national security through advanced digital technologies.

H4: Implementations by national governments are more prone to techno-solutionism, while implementations by international organizations are more prone to techno-humanitarianism.

3. Methods

The continents of Africa and Europe present a compelling case for comparatively studying the implementation of ADTs in migration management due to their unique migration dynamics and socio-economic contexts that stand in stark contrast to each other. Africa experiences a high volume of both intra-continental and outward migration (*Tagliacozzo et al., 2024*), driven by a complex interplay of factors including conflict, political oppression, environmental changes, and economic prospects (*Chatta et al., 2023; Crawley et al., 2018*). South-south migration has long been a globally prevalent phenomenon. Nevertheless, a large body of academic literature focuses solely on migration to the Global North and especially Europe (*Nalbandian et al., 2022; Triandafyllidou, 2022*), leaving out an important perspective that needs to be addressed equally (*Mattelart, 2019, Nawyn, 2016*). As thoroughly covered, Europe experiences migration as an inward motion for the greater part nowadays (*Triandafyllidou, 2022*). These diverse migration patterns provide an extensive foundation for analyzing how digital technologies

are implemented to better manage migration, to enhance national security or to offer aid and assistance. Additionally, the regulatory environment and technological infrastructure in many African countries differ significantly from those in Europe, where strict regulatory frameworks and distinct digital applications are more prevalent (*Beduschi, 2021; Chatta et al., 2023*). Examining Africa's approach can shed light on innovative, low-resource solutions (*Bither et al., 2020*) and the role of international cooperation and private sector involvement in bridging technological gaps (*Singler, 2021*). The intentions behind implementing ADTs in Africa are said to center around humanitarian goals, economic development, and enhancing accessibility of aid for migrants (*Chatta et al., 2023*), contrasting with Europe's focus on security, control, and regulatory compliance (*Malinowski, 2017*). By comparing the regions, researchers can gain insights into how different political and social intentions shape the adoption and impact of digital migration management tools. In Europe, the implementation of digital technologies is expected to be frequently driven by the intention to maintain national security, control irregular migration, and comply with complex legal standards. In Africa, however, the focus may be set on leveraging technology to facilitate migration processes, support economic integration, and manage internal and cross-border movements more effectively. This contrast can highlight how varying levels of technological advancement, different political intentions, and socio-economic conditions influence the adoption and impact of digital tools in today's migration management.

3.1 Research Design

The goal of this study is to gain a deeper understanding of the intentions and objectives of actors that influence, shape and drive the implementation of advanced digital technologies for migration management processes in nation state contexts. Further, this study aims to take the entailed implications that stand out in relation to forced migration and asylum-seeking processes into consideration. The study therefore engages in a qualitative, exploratory approach including a Systematic Literature Review and a complementary expert interview. Exploratory questions are about filtering out individual phenomena in an open, inductively oriented process (*Mayring, 2012*). Systematic Literature Review is a research method utilized to systematically identify, evaluate, and synthesize existing scholarly literature on a specific topic or research question (*Ressing et al., 2009*). This design is beneficial to the study because it allows for identification of digital technolo-

gies in migration management as this study seeks to ascertain trends and their influence in two regions. Unlike traditional literature reviews, which may be more narrative or selective in nature, systematic reviews follow a rigorous and transparent process to minimize bias and ensure comprehensiveness. This does not only allow for better reproducibility of the study, but also assists to depict the current state of scholarly knowledge.

Following the aim of strengthening the research design and gaining supplementary in-depth insights into the topic, the systematic literature review is complemented with an expert interview. Expert interviews are most commonly conducted in a semi-structured manner, like in the case of this study, and can count as one of the most frequently used methods of qualitative research (*Liebold et al., 2009; Helfferich, 2014*). Experts are chosen as those who have specific knowledge regarding the respective research interest and can be expected to make a relevant contribution to the corresponding research question by providing access to their expertise (*Liebold et al., 2009*). Semi-structured interviews are based on the conscious methodological decision to limit maximum openness for reasons of research interest following the principle “as open as possible, as structured as necessary” (*Helfferich, 2014*). The interview was conducted for a duration of 30 minutes due to the experts restricted availability and included six questions.

3.2 Method of data collection

The method of data collection applied in this research project is systematic literature review. It is an independent scientific method that aims to identify and evaluate all relevant literature on a topic to derive conclusions for the research question under investigation. The data collection was mainly carried out through the electronic literature database SCOPUS provided by the eminent publishing company Elsevier. Access was provided through the library of the University of Twente. Scopus was chosen as the database because it encompasses a wide range of academic publications. The process of data collection was threefold: First, a search strategy needed to be determined. The search strategy encompassed a combination of the three keywords “migration”, “digital” and “technology”. The keyword “migration” directly targets the primary subject of the research which is migration management whilst simultaneously catering for an extensive initial pool of data. Using both “digital” and “technology” connected through the Boolean operator “or” ensured a similarly broad scope to capture the technological aspect of

the research since some studies might use the term “digital technology” while others might refer to “digital tools”. The concatenation of the core concepts through the Boolean operator “and” is likely to yield salient results and including the three notions in this way increased the likelihood of effectively capturing all relevant studies whilst providing sufficient flexibility for detailed analysis. This approach is helpful to systematically collect data on the use of ADTs in migration management and to understand how policy intentions might influence their diffusion.

Secondly, inclusion and exclusion criteria needed to be established prior to determine which studies are to be included in the review (*Ressing et al., 2009*). These criteria typically specify the types of publications (e.g. peer-reviewed articles), study designs, publication dates, and language of publication that will be considered eligible for inclusion. Since this study followed an exploratory approach around the grand topic of digital migration management, no study designs were excluded. However, due to the limited scope and timely recourses available for this research project, the large body of available data needed to be reduced to a feasible amount.

In order to ensure the comprehensiveness of the following section, it will follow a chronological order and make use of the wording that was deployed by SCOPUS. The first criterion that was established was the time frame. In line with very recent advancements in the technology sector, especially in hindsight of Artificial Intelligence technologies, which fall under the umbrella of the advanced digital technologies that are supposed to be explored and investigated in this paper, the evaluation period was set for the past six years tracing back from 2023. The year of 2023 was chosen as the terminus of the range to circumvent the possibility of missing a paper that was published after the process of data collection, but still within the time frame of conducting this research. Originally, the investigated years of publication were supposed to merely cover a period of five years, however after the initial attempt of data collection and engaging with the database, it became apparent that the year of 2018 showed a significant surge in publications in contrast to 2017. This was qualified as an indication for the importance of this publication year for the field which is the reasoning for it being additionally included. More inclusion criteria were established in the categories subject area, which was limited to *social sciences*, the document type, which was limited to *article*, the publication stage, which was limited to *final* and the keyword, which was limited to *migration*. The speci-

fic focus on the social sciences and migration allowed for papers regarding the use of digital technologies in other scientific realms to mostly be excluded while the exclusion of reviews, editorials, and notes as well as articles in press arranged for the data to be similar in length and thus more comparable in the later analysis. Moreover, the source type was limited to journal articles to ensure comprehensiveness as well as the language, which was set to be limited to publications available in English to ensure the overall understanding. The categories author name, source title, affiliation, funding sponsor and open access were not limited by any exclusion or inclusion criteria. Lastly, to further reduce the scope and align the data collection process with the epistemological interest of this literature study in terms of geographic region, the country/territory was limited to all available countries within the geographic scope of Europe to represent the perspective of the Global North and all available countries from the continent of Africa to depict the vantage of the Global South on digital migration management like described in the previous sections. All other countries available were excluded from the systematic literature review data collection. Through these two steps, 230 documents in total were found. Albeit the structured and rigorous application of exclusion and inclusion criteria to identify relevant research studies, not all texts are applicable to the specific research question.

Additional criteria regarding the content are therefore the use of advanced digital technologies in the sector of migration, with the exclusion of ICTs. This leads to the third step in the triad of data collection in which the studies that were found through steps 1 and 2 are investigated with regards to their applicability and utility to the research based on their titles, abstracts, and full texts, applying the inclusion and exclusion criteria established earlier (*Moniz et al., 2023; Guba, 2008*). This process is typically conducted by two or more independent reviewers to minimize bias, which is not possible in the scope of this study and therefore poses a limitation to the execution of the quality criteria reliability. To reduce errors, the process was conducted in two consecutive rounds and resulted in a total of 17 articles (round 1: 15, round 2: 2) that were eligible for analysis. The articles that were filtered out through the data collection process stem from a variety of academic journals related to the social sciences and the topic of migration.

To complement the systematic literature review, a semi-structured expert interview with a length of 30 minutes was conducted and later transcribed to be included in the coding

process. Within this interview, the expert made multiple references to additional potential sources of information which led to a target search that resulted in another five documents including a methodological framework, an informational brochure, an inform, a primer and a navigation guide. During the textual analysis two more articles were identified through snowball sampling.

3.3 Method of data analysis

In order to properly analyze the selected data, this study takes on the method of qualitative content analysis, which is a standard technique of textual analysis and is widely applied in the social sciences (*Mayring, 2015*). Since this research follows an exploratory approach, the data analysis was conducted with an abductive coding scheme (see appendix) through the content analysis software ATLAS.ti, combining elements from both deductive, starting with theory, and inductive reasoning, starting with observation. Abduction is a useful approach for qualitative research to draw logical conclusions and present initial ideas of reasoning (*Given, 2008*). This involves creating categories and codes to then examine the texts for their presence or absence. Given the unstandardized nature of this analysis, its design is closely tailored to the specific case being studied. The coding scheme is further developed through an interaction between the theory and the concrete material and is refined and reviewed throughout the analytical process. Ultimately, the results are interpreted in relation to the main research question, and the significance of the analysis is evaluated (*Mayring, 1990*). Hence, the coding took place in two consecutive rounds, with a review and accommodation of the applied codes in between. This intermediate stage included the refinement and merging of codes, as well as dismissing marginally or redundantly used codes. The initial coding scheme included codes derived from the theoretical framework and the epistemological interest of the research question. Codes that were added to the coding scheme during the process were derived from popular phenomena as apparent in the documents.

4. Analysis

After the data collection and data analysis have been carried out, the results must be summarized and conclusions for the research question can be derived (*Fink, 2014*), since a systematic literature review is not a mere summary of a topic but must go beyond that (*Briner et al., 2012*). The findings section of the analysis is structured in three main

parts, mirroring the research interests of the sub questions. When referring to the coding scheme, it is important to consider that although a high frequency of occurrences in certain codes may indicate pivotal phenomena, it might not always be indicative of its importance, especially when the degree of abstraction is high. Yet, it can be viewed as general indicators for a centrality of meaning (*Mayring, 2012*). The content emphasized by the quotations is used to generate answers to the research question, without claiming to be exhaustive. The discussion section aims to interpret the a priori described findings against the backdrop of the theoretical framework and hypotheses as outlined in Chapter 2.

4.1 Findings

In total, 25 documents were analyzed (see appendix 1) with a coding scheme consistent of 58 individual codes categorized into two distinct themes and multiple groups (see coding scheme). The scholarly literature includes multiple methodological approaches, among them single case studies, ethnographic research including interviews, literature collection, lit. analysis, and more. This provided a broad range of perspectives and valuable insights on the use of ADTs for migration management in the Global North and the Global South, which were supplementary spot-checked and compared with the findings of the Migration Tech Tracker (*Migration Tech Tracker, 2022*).

4.1.1 Implementation of Advanced Digital Technology

A lot of advanced digital technology is developed or deployed by non-state actors such as international organizations, which is visible in the code “International Cooperation” collecting the highest number of quotations in the group of *actors of implementation*, with a count of 76. The documents most frequently include the UNHCR and the IOM by far, but also the EU, the Red Cross, the UN Migration Agency and global governmental agencies as actors involved or interested in the use of ADTs (*Cheesman, 2022*). The UNHCR is also striking as an advocate for innovations such as Fintech being the future of migration assistance in Kenya, even if they have not had grand positive effects in evidence (*Bhagat et al., 2020*). Also clearly visible is the cooperation between national and international actors, often in complex networks and geared towards a joint objective of heightened border control, as seen with the externalization of EU borders (*Donko et al., 2022*). Frontex and Interpol are involved in the processes as well and can

closely cooperate with national entities in African countries through MIDAS, the Border Management Information System provided by the IOM (*Donko et al., 2022*). EU member states can, as part of the EUROSUR framework, share up to date information from surveillance tools with their neighboring countries (*Jumbert, 2018*), which created new forms of state interaction (*İşleyen, 2021*). In cooperation with other states and private companies, states have the ability to exercise control through the use of digital technology and datafied tools (*Saunders, 2023*). This technology enabled development towards international cooperation was initiated by a few countries of the Global North, before engaging with more states, including Global South countries (*Saunders, 2023*), with the help of the IOM as a key mediator (*Singler, 2021*). These findings align with the information received by the Expert on trending actors (*Expert Interview*).

Consequently, another trend seems to be the inclusion of the “Private Sector” (45) in the developing process, sometimes in a “Public-Private Partnership” (25) with state actors, which has implications for the implementation (*Expert Interview*). In Kenya for example, the provision of Fintech applications is implemented by profit-oriented private companies and therefore only takes interest in assisting migrants that have entrepreneurial prospects (*Bhagat et al., 2020*). Further, the relationship between private companies as the developers and the implementers is often opaque, like in the EU-funded border control system “iBorderCtrl” that uses Artificial Intelligence and Biometric technologies (*Sanchez-Monedero et al., 2022*). This raises ethical questions, similarly to the construction of “a migrant” by private actors through the analysis with Big Data technologies, which is adjusted in terms of the risk category into what seems most profitable with regards to the policymakers’ interests (*Taylor et al., 2019*). In addition to that, the terms of access to the data, for example from social media companies, can be altered at any time by choice of the private firm (*Tjaden, 2021*). Moreover, it is interesting to consider how companies systematically draw on Biometric technologies (*Tazzioli, 2023*), ever since the industry flourished after 9/11 and national security objectives realigned with private companies’ interest (*Madianou, 2019*). Therefore, the research findings align with the expertise and show that the private sector is simply driven by motivations of maximizing profit (*Expert Interview*).

Pure “Government-led” implementations are with 25 applied codes the least apparent. This is insofar interesting as national governments, once actors under the migration ma-

nagement paradigm, seek to delegate responsibility to coincidentally evade accountability (Geiger et al., 2010). This notion feeds into the self-reliance trend that governments, as well as international organizations increasingly follow to empower migrant's agency and simultaneously direct more tasks back to them (Tazzioli, 2023). On the other hand, national governments explore and pilot the inclusion of advanced digital technologies to become more efficient as case numbers grow, along with their own frameworks to guide the implementation and use (Ziebarth et al., 2021). For example, Germany independently piloted a Blockchain technology for the management of Dublin procedures (European Migration Network, 2022). It can be concluded that this trend is more prevalent in European, than it is in African countries (Expert Interview). The code "Early Adopters" (5) shows that international organizations such as the UNHCR and the IOM were early initiators of Biometric technologies (Madianou, 2019; Singler 2021) and that the European Union was (next to the US) at the forefront of using digital technologies to better control their external borders (Glouftsiou et al., 2021). Settlement countries that also count as part of the Global North like Canada, New Zealand and Australia pioneered digital migration management systems (European Migration Network, 2022), which makes them interesting case studies to investigate further (Expert Interview).

All types of advanced digital technology that were listed beforehand and are therefore included in the coding scheme are apparent in the analyzed documents. The types of ADTs that are most prominent, however, are "Biometric Technologies" with a quote count of 60, followed by the one of "Artificial Intelligence" with 35 quotations. Similarly high in coding frequency are "Big Data Technologies" which are coded 32 times. The least apparent with four quotations is "Fintech", which was expectable due to the fact that it was not part of the list provided by the Migration Tech Tracker (Migration Tech Tracker, 2022). Yet, the two studies focusing on financial technology in particular (Baghat et al., 2020; Cirolia et al., 2020) provide interesting insights and are therefore not to be disregarded. "Blockchain" resulted in 20 code quotations and "Internet of Things" in 21 total, while "Automation" and "Cloud Computing" are coded nine times each. Codes were applied multiple times if the technology was mentioned on several occasions, which explains the disproportionate amount of quotations in relation to the number of documents. Moreover, not all studies cover just a single technology or clearly separate the ADTs if there are multiple involved in the scope of the study. Some researchers also

argue that there are technological assemblages of two or more ADTs that are difficult to divide and analyze on their own since they are intertwined in their practices and purposes (Madianou, 2019; Ponzanesi, 2019). In European countries, the applications of ADTs are very diverse and tailored to the specific national context (*European Migration Network, 2022*), while in Africa, the large majority of countries leverages Biometric and Big Data technologies (*Migration Tech Tracker, 2022*) with the addition of a few Fin-tech applications (Bhagat et al., 2020; Cirolia et al., 2020)

In terms of *location*, the code “Global North” appears 77 times and “Global South” 55 times. This does not necessarily reflect the mere level of geographical proliferation of ADTs to be higher in Europe than in Africa, but rather the fact that governments of the Global North and especially the European Union (EU) are often mentioned, since they also intervene in migration matters in countries of the Global South (Donko et al., 2022; Frowd, 2018). The countries that are covered in the studies and the informational papers and coded as part of the Global South conceptualization are Kenya, South-Africa (Cape Town), the West African region including Burkina Faso and Niger, South Sudan and Mauritania. Hence, the coding for the Global North applied to the countries of Germany, Turkey and Greece, the Netherlands, France, Estonia, Latvia and some more briefly mentioned in the EMN-OCD inform (2022). A few documents did not include a specific national context, but rather focused on a region like the Mediterranean Sea (Jumbert, 2018), one type of advanced digital technology like automated decision-making (Ziebart et al., 2021), or the prominent application of specific system like “DTM” or “MIDAS” in the Global South through the International Organization of Migration (IOM) (Singler, 2021).

These findings lead to the interim conclusion that advanced digital technologies are nowadays widely applied in migration management. In Europe, the implementing actors are mostly private sector companies and national governments, often in cooperation with neighboring states, while in Africa, international organizations like the IOM and the UNHCR are the most prominent in implementation efforts. Applications in Europe prove to be of diverse nature whereas the ADT implementation in Africa is rather identical, due to the last-mentioned fact. It is already apparent that implementers, especially in the Global North apply ADTs to reach certain policy objectives.

4.1.2 Performance-related Intentions of ADT Implementation

Enhancing the performance of processes in migration management is a popular reason for the implementation of advanced digital technologies, that are thought to bring innovative solutions. The coding group of *facilitators of adoption* includes the factors suggested by the Diffusion of Innovations Theory with the later addition of “Efficiency” due to its frequent occurrence in 41 quotations. Efficiency can be counted as a simple matter of performance enhancement, however it is often connected with notions of better border control or faster rejection of visa applications. Biometric systems, like deployed in the Global South for example, hold assurances of efficiency in border controls (*Glouftsiou et al., 2021*). Even in cases where the efficiency of actual border control is regarded as low, technologies contribute to a persuasive border imagination (*Jumbert, 2018*). ADTs are also more commonly adopted by European government agencies with intents of higher efficiency and neutrality (*Leurs et al., 2018*). The basic principle is, that data-driven appliances like biometric technologies can process more people in less time (*Saunders, 2023*), hence saving time and other resources (*European Migration Network, 2022*), which explains why they are preferred over traditional methods (*Vrabiescu, 2022*). Promoters of these ideas are the IOM (*Singler, 2021; International Organization for Migration, 2023*) and the UNHCR, who used to primarily highlight efficiency gains (*Madianou, 2019*). Contrasting this notion, the idea of efficiency is often inflated (*Singler, 2021*) and rather serves the narrative of a neutral and simple technological solution, aligning with governmental ideas of streamlining processes (*Ziebarth et al., 2021*).

“Relative Advantage” holds 24 quotations and thus proves to be a factor that is commonly referred to. It describes lower costs (*Cirolia et al., 2020*), greater convenience (*Bhagat et al., 2020*), and heightened granularity in e.g. identification as the main argument (*Saunders, 2023; Taylor et al., 2019; Tjaden, 2021*). Yet, scholars remark that while there are advantages in use, launching a Blockchain technology for example, is not always necessary (*Madianou, 2019*) or suitable to specific national challenges, and yet, many African states requested IOMs MIDAS anyway. According to IOM Officials, this is due to the fact of seeing it work for neighboring states (*Singler, 2021*). The codes of “Compatibility” (14), “Complexity” (10) and “Triability” (11) play a role in some contexts of implementation, like seen with the blockchain technology FLORA as a pilot

project from the German BAMF (Federal Office for Migration and Refugees) (*European Migration Network, 2022*). Nevertheless, compatibility is made out to be a leading factor in the Global South because the tools that are provided by the IOM, MIDAS and DTM, are designed to fit as many national contexts as possible to ensure easy and customizable use for proliferation (*Singler, 2021; International Organization for Migration, 2022; International Organization for Migration, 2023*). “Observability” was only discussed and coded five times and is therefore not counted as an important factor, with the exception of the a priori described effect as seen in African countries. Factors of “Transparency” were included and mostly coded as negatives, so as a lack thereof regarding the internal and external processes of ADTs (*Tjaden, 2021*) within eleven quotations. There is also a lack of transparency regarding the use of data by private companies (*Tjaden, 2021*) and the security measures that are taken (*Ziebart et al, 2021*). Yet it is not elaborated in the literature whether this influences the implementer’s choices.

The *barriers of adoption* coding group comprises such “Ethical concerns”, which are a prominent topic throughout the literature review indicated by the 3rd highest number of 79 quotations. Here, issues of exploitation through Fintech (*Bhagat et al., 2020*), informed consent in Blockchain and Biometric applications (*Cheesman, 2022*), and saturation of power relations (*Glouftsiou et al., 2021*), as well as function creep, which connotes the potential use of ADTs for something different than what it was intended for (*Ponzanesi, 2019*). Closely related are the 39 quotes of “Data privacy concerns” that display the flipside of ADT use, which is the risk of violations of data privacy and their consequences, as well as equally important challenges concerning “Equality concerns”, as seen in the 30 quotes treating issues like the digital divide (*Cheesman, 2022*). “Measures to reduce concerns” are with 19 quotations the least touched upon, but arguably the most significant call for action implementers must engage in before (*Tjaden, 2021*). This has been addressed in legal frameworks of the EU (*European Migration Network, 2022*). The legal principle of “Human Rights” is directly and indirectly addressed in 52 instances with scholars pointing at problems and possibilities thereby. In principle, however, it is not about the technologies but rather about the techniques of migration management, e.g. critically described as the criminalization of migration at EU border controls (*Jumbert, 2018*).

Since efficiency is identified as one of the performance-related drivers behind the use of ADTs, *process optimization* in certain areas is a topic in many studies. Especially goals related to the “Modelling and Forecasting” of migration are mentioned 33 times and relate to the motivation of states and organizations to be able to make predictions through the tracking of data and movement. Taylor et al. further argue that the intrinsic rationale of this goal is to make migration more controllable by mapping and categorizing it (Taylor et al., 2019). The act of “Documentation Processing” is referred to seven times within the documents and denotes the digitalization of steps in registration and asylum procedures (Sanchez-Monedero et al., 2022). This is now often combined with features of Biometric technologies, like fingerprints or iris scans to avoid multiple registrations of the same person (Madianou, 2019; Glouftsiou et al., 2021). Hence, this is also related to rationales of better control and can restrain migrants’ agency to make their case in negotiations (Glouftsiou et al., 2021). Another realm of process optimizations was thought to be “Labor Market Integration” which holds eleven quotations that show diverse perspectives, like the precarious nature of migrant work, which is often informal labor (Cirolia et al., 2020; Jumbert, 2018). After that, the perspective of states to differentiate migrants along their prospects of easy and beneficial integration into the labor market and alternatively, to help in matching migrants better to locations through tools like “GeoMatch” (Ziebarth et al., 2021; Expert Interview). Case workers are said to have increased effectiveness and thus more time available for more difficult cases. Yet, risks of “decision fatigue” or biases within the Automation technology must be considered and countered with a so-called “human in the loop” making the final decision, based on their professional ability (Ziebarth et al., 2021).

The codes within the *effects of implementation* group are derived from the literature and entail “Enhanced Agency”, meaning the heightened ability and capacity of migrants or the actors of implementation to act through the use of ADTs. This code is applicable 30 times while “Enhanced Accuracy”, for example in the data made available, is mentioned 23 times. ADTs can also result in “Enhanced Accessibility”, which is stated in 22 quotes and again, pertains for migrants and their access to humanitarian aid and assistance or on the other side, may mean more and easier attainable information for the actors implementing it. Lastly, a “Lack of Knowledge” is described 53 times in relation to missing information of ADTs inner workings, unknown effects of technology adoption in

the migration process, and gaps in the academic literature on digital migration management, which will be referenced in the final conclusion.

The interim conclusion that can be drawn from the findings regarding the intentions and objectives of performance enhancement is that despite their importance in certain contexts, like the technologies provided by the IOM to use in many states of the Global South, they do not stand alone but often relate to rationales of migration management and fortified border controls. Ethical and legal concerns are addressed in the literature, yet only in relationship to third parties.

4.1.3 Intentions of the Migration Management Paradigm

The coding group related to the paradigm of *migration management* entails multiple codes that manage to depict the actions that nation states and international organizations engage in separately or together, to reach the aim of an orderly and regulated migration process as described in the theoretical framework. The code “Migration Management” has 63 mentions that relate to all kinds of measures that can be taken to better govern migration and national borders. The IOM provides migration management training for West African security officials and combines rationales from security, development, and humanitarianism in so-called capacity building projects. Through that, the IOM helps migrants, but also states in their management of borders (Frowd, 2018). Singler even calls it “one of the most influential and multidimensional transnational actors operating in the field of migration management” (Singler, 2021, p. 455). İşleyen argues that the features of technologies and their daily use in the Mediterranean Sea constitute migration management as a matter of concern (İşleyen, 2021). This resonates with the governmental anxieties, as Tazzioli calls it, that revolve around better migration governance (Tazzioli, 2023). As follows, “Border Control” is with 75 quotations the most prominent action that is taken, together with measures of “Surveillance” (63) and acts of “Migration Control” which is coded 58 times. Similarly to İşleyen, Cheesman states, that the act of developing tools for border control already augments these borders (Cheesman, 2022). Closely related to the act of bordering are Biometric, AI and Big Data technologies (Sanchez-Monedero et al., 2022), as well as Internet of Things appliances like radar technologies for surveillance (İşleyen, 2021). Top-down governance of migration and borders in Europe is more and more dependent on digital technologies (Leurs et al.,

2018), argumentatively sustained by the envisioned political crisis (*Sanchez-Monedero et al., 2022*), and driven by private sector companies (*Tazzioli, 2023*).

Following this trend, “National Security” is referred to in 39 quotations while “Irregular Migration Prevention” is said to be a driving objective in 31 cases. Undesired migrants under the paradigm of migration management are generally, but especially with a view to Europe, seen as threats to security (*Donko et al., 2022*). To counteract this, states increasingly draw on digital technologies for the orderly management and differentiation of migrants to identify irregular or undesirable migration patterns (*Glouftsiou et al., 2021*). The IOMs MIDAS relates to the logic of border enforcement and particularly to the idea of filtering populations (*Singler, 2021*). In Europe, this is underpinned by problem-narratives created to justify the securitization and externalization of European borders (*Jumbert, 2018*). The governance of migration therefore becomes a state-centric political question, instead of one that is grounded in morality (*Expert Interview*). In this sense, “State Sovereignty” refers to the principle that independent states have the supreme legal authority and responsibility to regulate political affairs and govern their population within their territory (*Ballotpedia, n.d.*). It has 43 quotations, mainly describing the role of sovereign states and their power in migration management processes (*Cheesman, 2022*). Least common is the objective of “Counterterrorism” with six quotations in total that are, however, distributed across five documents all briefly mentioning the association that is drawn between migration and risk of terrorism, as well as the subsequent backlink to acts of surveillance and control (*Singler, 2021; Madianou, 2019; İşleyen, 2021*). As with “Public Opinion and Political Pressure” in the theoretical framework, the management of migration paradigm is sometimes contested, but also encouraged by the pressure emanating from the public to the political sphere and vice versa (*Geiger et al., 2010*). This co-constitutive relationship is quoted 24 times and resonates with the framings and narratives about migration.

The highest rate of quotations is reached within the group of *political rationales* by the code “Political Rationales” with 100 quotations referring to some kind of political underpinning, assumption, or explanation. International Organization inherit rationales of care and control, where they support states in controlling borders and simultaneously care for the humanitarian needs of migrants. Especially in African states, rationales of development, state building and cooperation are prevalent to maintain international bor-

ders (Frowd, 2018). In Europe, the narrative of a European common territory and the reinforcement of external borders prevails (Vrabiescu, 2022). This often correlates with particular narratives regarding migration and technology which were composed under the codes “Framing Migration” and “Framing Technology”, whereby the latter is a little less common with 71 quotes than the first, which is with 93 coding’s the 2nd highest in number. The prominence of the two most frequently used codes is regarded as an indicator for the importance of, for one, the political underpinnings and the way in which migration is framed as a problem. Migration is moreover framed as something potentially threatening (Donko et al., 2022; Frowd, 2018), and migrants as a generalizable type of person with limited agency and abilities (Cheesman, 2022). In defiance, scholars underscore migrants’ capacities and capabilities to argue for less biases in research (Glouftsiou et al., 2021).

Technology can further be framed as a solution to the problematized migration framing through “Techno-Solutionism” which is frequently described in the documents with 54 quotes (Jumbert, 2018). “Techno-Humanitarianism” is only depicted in 17 instances, which shows that policy intentions of humanitarian nature are less abundant in the implementation of ADTs overall. These perspectives are often connected with specific approaches to migration that can either be a “Negative Migration Approach”, which is apparent 44 times, while the opposite, a “Positive Migration Approach” has five quotations. This illustrates the great discrepancy between the way in which migration is discursively approached and treated. That influences the “Intentions” of implementing actors, which are defined as the underlying motivations and mentioned 57 times, while the “Objectives”, defined as the specific goals directing the action are referred to 59 times. While the intentions range from pro-migration ideas of humanitarian aid allocation of international organizations in the Global South to anti-migration notions of national security under the migration management paradigm in the Global North, the objectives relate to the datafication. A subitem of the latter are “Economic Objectives” with 33 quotations, followed shortly by its specification in form of “Profit”, with 34 mentions solely in relation to companies.

Migration holds a lot of significant humanitarian questions and immanent calls for action within *humanitarian affairs*, which is why this coding group was expected to yield numerous results, especially in relation to international organizations. “Humanitarian

Goals” are quoted in 34 occasions and relate to humanitarian principles (*Frowd, 2018*) and challenges (*Jumbert, 2018*) followed and faced by mostly international organizations. The code “Migration Assistance”, so the act of providing aid to migrants is even more common with 39 quotations describing the way in which ADTs can help to offer assistance to migrants. In the Global South, Self-Sovereign Identity, akin to Blockchain, simplifies migrants’ ownership of identity data (*Cheesman, 2022*), while Big Data technologies can help better allocate aid (*Jumbert, 2018*). The code “Migration Support” (17) is the connecting point between providing assistance and “Empowerment” (20) of migrants because it connotes a positive sentiment and narrative. In the Global North, support for migrants can be provided through technologies that match them with ideal placing (*Ziebarth et al., 2021*). In the Global South, there are opportunities of empowering migrants through Fintech applications (*Bhagat et al., 2020*). However, there are also mentions of disempowerment collected under the same code, as well as criticism of the juxtaposition of surveillance and control versus empowerment, since it leaves impacts in between unaddressed (*Tazzioli, 2023*).

To conclude, it can be said that the formulated intentions and objectives regarding the use of ADTs in migration management differ among the actors due to their different responsibilities and positions. International organizations blend humanitarian goals with intentions of national security and performance enhancement, while ADT use by governments and private companies in the Global North is mostly geared towards national security interests and process efficiency.

5. Discussion

The findings clearly illustrate that governments and international organizations implement advanced digital technologies (ADTs) to deliver distinct policy objectives in both the Global North and the Global South. The mode of implementation is closely tied to these policy intentions, confirming the first hypothesis that ADTs are utilized a mean to deliver policy objectives, hence as tools of public policy. However, significant differences exist in the patterns of actors and the proliferation of ADTs, as highlighted by the Migration Tech Tracker (2022). In Africa, the MIDAS and DTM systems, provided by the International Organization for Migration (IOM), are most prominent. This indicates that the intentions of African states are less distinguishable from those of the IOM, which is the leading actor in implementing ADTs in Africa than they might be in Eu-

European countries where implementations are also developed in cooperation as in public-private partnerships, but still driven by governments' intentions due to the profit interest of the private sector and its ability to adjust to the context. In contrast to Africa, Europe showcases various individual approaches to digital migration management through their different ADT types of applications (*European Migration Network, 2022*). Despite this, both regions share commonalities in the use of ADTs for performance-related benefits.

The second hypothesis relates to the enhancement of performance in migration management processes and as the analysis has shown, the factor of efficiency is a driving, or at least a remarked factor in almost every application of advanced digital technology. Whether the MIDAS implemented through the IOM in an African country or a certain Blockchain technology in a European country, it must be able to provide a relative advantage often in form of heightened efficiency. Performance related benefits are often formulated as the reason for the implementation and the process improvement is visible, however, there is often a political rationale that underpins this fairly neutral objective with a normative intention of controlling migration.

The technologies that are developed by non-state actors are often being leveraged by countries of the Global South and especially within the African continent. This is visible in the widespread adoption of MIDAS and DTM (*Singler, 2021; Migration Tech Tracker, 2022*). At first sight, the IOM provides these technologies for purposes of supporting migrants and supporting the immigration decision making processes (*International Organization for Migration, 2022; International Organization for Migration, 2023*). Nevertheless, the extensive literature has shown that local circumstances of African countries are becoming more connected to the global ideas of border control and migration management (*Donko et al., 2022*), which can be recorded as the proliferation of the migration management paradigm. Biometric technologies have become the norm at national borders and promise governments to become more efficient in their governance while, more importantly, becoming part of global security agreements as well (*Glouftsiou et al., 2021*). Yet, digital borders may reduce mobility, particularly in regions like West Africa, where historical and economic reliance on free movement is significant which in turn has serious implications for the life of migrants. Migrants as vulnerable individuals often lack agency over their data, whether for biometric registration

to access aid or in asylum processes requiring the disclosure of sensitive information (*Bither et al, 2020*).

To answer the fourth hypothesis, techno-solutionism plays a role for governments in the framing of technology and migration, however, it is not that prominent. Techno-humanitarianism on the other hand can be interpreted as one of the IOMs political rationales. This aligns with the Experts perception, that although it makes an appearance in the migration sector, the issue of using technologies as solution, even if they are not fit , is not that grand (*Expert Interview*).

6. Conclusion

To conclude, this exploratory study investigated the influence of policy intentions on the implementation of advanced digital technologies for migration management in both the Global North and the Global South. The findings suggest that policy intentions, particularly those centered around national-security and migration control under the prevailing paradigm of migration management, significantly shape how digital technologies are deployed in migration management. In Europe, the focus lays on using technologies to streamline border controls and monitor irregular migration, aligning with broader security and regulatory objectives. In contrast, African countries tends to implement these technologies under the guidance and support of international organizations like the IOM, often with a dual aim of enhancing migration management efficiency whilst addressing humanitarian needs of migrants. The research question can therefore be answered by stating that the intentions and intrinsic motivations of governments and organizations under the migration management paradigm influence the diffusion the most by treating technology as something that is necessary for the proper management of migration.

The theories applied in the study elucidate the mechanisms between actors' intentions and the implementation of advanced digital technologies. This study has added to the state of the art by elaborating the idea that political intentions are a fundamental determinant in the diffusion and implementation of advanced digital technologies for migration management. While the Global North and the Global South share common goals of controlling migration and supporting migrants, their approaches and priorities differ significantly due to varying political contexts and resource availability. By understanding

these differences, policymakers can develop more effective, ethical, and context-sensitive migration management strategies. In the Global North, there is a need for a balanced approach that ensures security without compromising migrants' rights. In the Global South, efforts should focus on building institutional capacities and addressing practical challenges to continuously safeguard salient ethical and legal standards. Policymakers and stakeholders must enhance their understanding of the applications of ADTs as policy tools to evaluate their potential impacts on future migration management effectively.

The lack of knowledge was additionally addressed through the coding scheme, to show scholars' perceptions of necessary further research in combination with the gaps identified through this study. There is still a lack of information about the impact of Blockchain applications (*Cheesman, 2022*). Fintech applications and remittances also need to be investigated further, especially in hindsight of the power systems, but also generally within the scope of migrant infrastructure (*Cirolia et al, 2020*). Whilst there were a couple of in-depth analyses on the IOM, including an interview with their staff about how they perceive the organization and its way of working, the nature of their interventions within migration governance also remains opaque (*Frowd, 2018*). To foster informed debate and protect migrants' rights, understanding the policy intentions behind digital technologies in migration management is essential. Despite the expanding field of digital migration studies, there remains limited attention to the specific context of forced migrants (*Leurs et al, 2018*). Future research should explore the long-term impacts of advanced digital technologies on migrants' lives (*Bither et al, 2020*). There is also a need for comparatively approached studies that include more diverse case studies, for example settlement countries and longitudinal data can provide deeper insights into the evolving dynamics of intentions and objectives in migration management. The most important factors to consider are the actors of implementation, as well as the developing agents (*Expert Interview*).

In conclusion, this study underscores the importance of fair and ethical migration policies, highlighting the potential benefits and pitfalls of digital technologies in migration management. It calls for greater inclusivity, understanding, and caution in deploying these technologies to ensure that they serve to protect and empower migrants, rather than exacerbate vulnerabilities.

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Appendix I - Literature List

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Diffusion of Innovations

Group	Code	Operationalization
Type of Technology	Biometric	Identification Technologies
	Artificial Intelligence	Predictive Technologies, Machine Learning
	Big Data	Complex and Large Datasets
	Automation	Automated Responses
	Blockchain	Decentralized Ledger-Technology
	Cloud Computing	Remote Servers on the Internet
	Internet of Things	Drones & Surveillance Technologies
	Fintech	Financial Technologies
	Actors of Implementation	International cooperation
Private Sector		Involvement of Private Company
Public-private partnership		Government and Private Company
Government-led		Government
Early Adopters		First Implementers
Location	Global North	Countries in Europe
	Global South	Countries in Africa
Facilitators of Adoption	Efficiency	Efficiency Gains/ Losses
	Relative Advantage	Advantage over existing Methods
	Compatibility	Combination with existing Context
	Complexity	Level of Difficulty
	Triability	Possibility to Pilot
	Observability	Visible Advantage
	Transparency	Easy to Understand
Barriers of Adoption	Ethical Concerns	Missing Consent, Information,
	Data Privacy Concerns	Sharing of Data with other Parties
	Equality Concerns	Digital Divide, Exclusion
	Measures to Reduce Concerns	Legal/ Ethical Frameworks
	Human Rights	Fundamental Rights Mentions
Process Optimization	Modelling and Forecasting	Mapping and Predicting Mobility
	Documentation Processing	Digitizing Physical Documents
	Labor Market Integration	Finding a Job
Effects of Implementation	Enhanced Agency	More Abilities to act

Migration Management Paradigm

Group	Code	Operationalization	
Migration Management	Migration Management	Manage Migration and Processes	
	Border Control	Controlling Borders	
	Surveillance	Oversee Mobility	
	Migration Control	Controlling Mobility	
	National Security	Opposing security Threats, Protection	
	State Sovereignty	Legal Principle of territory,	
	Counterterrorism	Prevent terrorism	
	Public opinion and political pressure	Pressure from Media, Public on Politics	
	Political Rationales	Political Rationale	Political narratives, underpinnings
		Framing Migration	Narrative
Framing Technology		Narratives surrounding Technology	
Techno-Solutionism		Technology use as the Solution	
Techno-Humanitarianism		Technology use for Humanitarian aims	
Negative Migration Approach		Negative Statements about Migration or Migrants	
Positive Migration Approach		Positive Statement about Migration or Migrants	
Intentions		Ideas, Notions of possible Effects	
Objectives		Mean to reach Intentions	
Economic Objectives		Labor Market	
Profit	Making Money		
Humanitarian Affairs	Humanitarian Goals	Meeting Humanitarian Needs	
	Migration Assistance	Aid or Assistance Provided to Migrants	
	Migration Support	Endorsement of Migration Process	
	Empowerment	(Dis-)empowerment	

Group	Code	Operationalization
	Enhanced Accuracy	More Details available
	Enhanced Accessibility	Easier to use, Easier to get at
	Lack of Knowledge	Missing Information