

## Revisiting Theoretical and Methodological Aspects of a Scientific Inquiry of Migration in the Era of Digitalisation

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### Abstract

*This paper discusses how new information technologies will change the inquiry of social processes, particularly regarding migration studies. Modern innovations in the sphere of collection and processing of information, like digitalisation, analysis of Big data, and the development of data science, might transform theoretical approaches to migration studies. Applying Babbie's (2021) macro and micro theory of social process inquiry, the intention in the current article is to add a nano level, which will be increasingly utilised in the coming years, particularly in the sphere of inquiry of population migration using personal biological (fingerprints, eye features, and even DNA) characteristics. The paper underlines that modern information technologies will not only allow for a deeper understanding, but also for a broader capture of social processes. Moreover, these technologies will facilitate the use of mixed method research, i.e. incorporating quantitative and qualitative approaches. It is also important to understand the continued importance of ethical principles regarding the protection of personal information.*

**Keywords:** *Migration theory; digitalisation; research methodology; nano level*

### Introduction

One of the main characteristics of modern scientific inquiry in social sciences is the extremely quick adoption and implementation of new technologies for data collection and treatment. In a time of widespread use of new informational technologies, ever more diverse and novel methods of research into population movements are becoming a reality. However, scientific inquiry of population movements needs robust theoretical frameworks. Babbie (2021) argues that theories shape and direct research efforts toward likely discoveries through empirical observation. They provide systematic explanations for the observations made.

One of the theories that have been utilised to explain migration is gravity theory or Newton's law of Universal Gravitation which was gradually implemented in natural and social sciences. For example, similar to the international trade theory (Krugman, 2009), under this lens, the power of migration between two regions is positively linked with the number of people who live in these regions and negatively with the distance which separates them (Kingsley, 1946; Cohen, 2008; Rosenberg, 2019; Tatibekov and Hanks, 2017; Tatibekov and Hanks, 2018). This does not mean that other theories and models of international migration are irrelevant. For example, the dual economy model (Lewis, 1989; Fields, 2014) and the neoclassical

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economics model are all powerful in explaining population movements (See Massey et al., 1993; Ranis et al., 1993). As Babbie (2021) argues, macro and micro theories of migration need to be linked. In an era of new information technologies, we can consider adding the Nano level for a broader and more in-depth understanding of personal characteristics of migrants including fingerprints, eye features, and even their DNA.

We would like to emphasise that with new information technologies available, scholars should use mixed methodologies for the scientific inquiry of migration processes. That is, a combination of quantitative and qualitative methods in this context will deliver richer, more robust, and rather interesting findings. We believe that using inductive and deductive methods or ideographic explanations in combination with nomothetic explanations allows an in-depth and broad understanding of migration processes.

### Conceptualising migration processes in the era of digitalisation

As mentioned earlier, combining macro and micro approaches and adding the nano level can offer a more powerful conceptual framework for understanding migration processes. Such addition to the existing theoretical literature would not be overstretching the current state of the art in this field. A systematic inquiry of migration processes is needed. Accordingly, we should note that the epistemology of migration studies should take on some systematic form too. Regarding which, we would like to underline importance of the use of the paradigms of macro and micro theory. The former refers to the social processes inquiry about groups and structural constraints Whilst the latter pertains to individuals (Babbie, 2021).

If we use these theoretical approaches, including new discoveries in the sphere of computer sciences and technology, psychology, biometrics measurements, and genetics, we can present the theoretical and methodological bases of the inquiry of migration processes in a systematic way as shown in Figure 1.

**Figure 1.** Theoretical and Methodological Bases for Scientific Inquiry of Migration

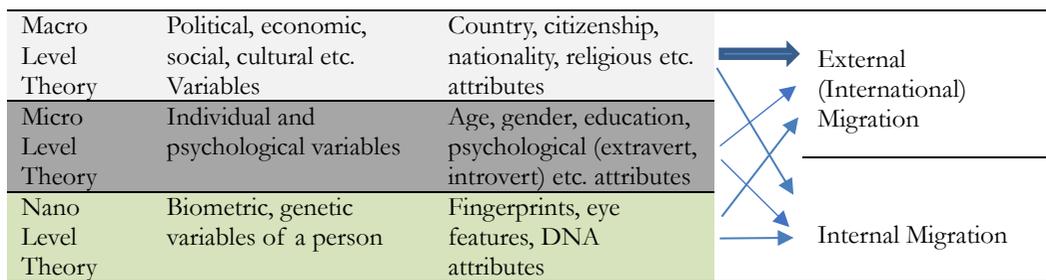


Figure 1 illustrates the factors that should be taken into consideration at the Macro, Micro, and Nano levels for a systematic inquiry of migration processes. This model clearly shows the diversity, complexity, and versatility of the different factors that affect population movements. This model should not be considered as complete but rather it is still a work in progress as we aim to capture a wider variety of factors influencing migration on different levels in a more systematic format. The novelty of the model is the inclusion of various factors and levels differing regarding international and internal migration.

Clearly, the factors underpinning external and internal migration work interactively and exhibit great complexity, with their impact at the macro and micro levels varying. For example,



citizenship is a macro level factor relevant to the inquiry of international migration. Culture, religion, economic factors are other macro level factors.

Nevertheless, these factors are less important for the inquiry of internal migration. Political systems, culture, or religion differ much less within a country compared to between different countries. In many cases, a country exhibits a unique national identity comprising of a specific political system, an official or first language, and a characteristic economic system etc.

Our proposed model emphasises consideration of Micro level or personal features of the migrant for an inquiry of human mobility. For instance, features such as age, education, and psychological traits of the individual are important aspects of any inquiry into the processes related to migration. In general, younger migrants have more causes to migrate in comparison to seniors. In particular, younger migrants have more time ahead to reap the potential benefits of their move. Another important factor for the analysis of the processes of migration, both internal and international, is the education of the migrant. In general, persons with lower levels of education participate less in international migration in comparison to the better educated. The same is true regarding language. Possession of additional languages facilitates migration to other countries.

Furthermore, psychological characteristics, as part of individual features of a migrant, should also be taken into consideration though at present, they are not regarded as factors of migration. Psychologists distinguish between extrovert and introvert personalities (Jung, 1923) and it might be the case that in case of every other factor being equal extrovert persons are more active in taking the decision to migrate than introvert individuals.

Our proposed model does include not only Macro and Micro level factors but also Nano level. The rationale for this is given below. In the history of scientific discoveries (in natural and social sciences), novel theoretical provisions arose thanks to the appearance of new mechanic, electrical, chemical biological, etc. tools of collection and analysis. For example, invention and use of the electronic microscope was the cause of the appearance of new theories in medicine, biology, chemistry etc. (Goris, 2012; Lewczul, 2021). As another example, thanks to the new space telescope “Hubble” our opinion about our Universe in some directions has been changed (Ries, 2007). In case of our own planet, the modern space apparatus and communication tools such as GPS (Global Positioning System) allow us to define our route of relocation from one point to another. The gadgets we use, even correct our route and provide use directions per voice.

The use of computers, new means of communication and information processing reflect other achievements of our modern lives. Many of these systems interconnect with each other and work together as a one-unit system revolutionising the sphere of processing and recording information. Digitalization, development of Data Science, Big Data processing at the present time create completely new opportunities for the scientific inquiry of different social processes including migration.

Developments in Data Science provide new opportunities for the scientific processing of information of different types and levels (from Macro to Nano) to analyse migration processes. Creation of software and algorithms based on different programming languages beginning from basic Assembler level up to high level languages such as Python, C++, Java allow wide ranging analysis of collected information.

While traditionally, information for the analysis of migration has been collected using qualitative and quantitative methods and tools, developments in Data Science allows the assessment of information collected via different official applications and processes such as the use of personal biometric data. For example, on many state borders, analysis of eye characteristics has become obligatory, hence eye characteristic analysis is carried when a migrant passes a state border. Thus, even tiny personal characteristics have become a unit of analysis and investigation regarding a person's movements. It would be not surprising when, in the future, DNA is used to monitor human mobility.

The entirety of Macro level, Microlevel and Nano level attributes of migrants and data collected is expected to provide input to Big Data analysis covering the analysis and treatment of international and domestic migration processes.

At this point, we shall define the concept of digitalization, which is not limited to the codification of data into binary form but includes the collection and treatment of all information related to migration by modern space technologies, personal computers, mobile phones, and other devices.

### **Methodology of migration process inquiry in the condition of digitalization**

Reviewing the epistemology of migration studies, we would like to note that until the end of the last century the scientific analysis of migration processes was organized in many cases from a geographic point of view.

In accordance with the recommendation of the International Labor Organization, data on migration processes has been, in many cases, collected through household surveys where respondents aged 15 and over were asked certain questions aiming to establish indicators at Macro and Micro levels such as country of residence, citizenship, age, language, income, education and so on (Bilborrow, 1999.)

Nevertheless, quantitative methods are not always sufficient to capture the many peculiarities of the processes related to migration. Qualitative methods like focus group survey, observation, interview, case study, Delphi method, etc. might provide scholars with in-depth information and a clearer vision regarding the factors of migration.

Many scholars have underlined the importance and the need to use quantitative methods in social research(Downey, 1979; Morgan, 1980; Smith, 1983). As one researcher has noted: "we believe that qualitative/non-quantitative empirical data resulting from naturalistic inquiry may help researchers and policy makers better understand entrepreneurship in the context if its environment" (Dana, 2005).

The Migration process is not independent of the natural environment of the migrant. Hence, an in-depth interview or a focus group might reveal the psychological aspects of migration as well as the cultural peculiarities of the migrant in relation to the context of origin and destination.

Thus, it would be appropriate to use mixed methods of research. Different methods allow the researcher to understand both the quantitative characteristics of migration processes and qualitative experiences of each migrant.



Exponentially growing source of data is stored in different mediums in digital format on computers, mobile telephones and other gadgets. The sheer abundance of graphic, photographic, and cinematographic material allows researchers a deeper, and graphical inquiry of migration processes. Advances of Data Science is fast and multifaceted. It allows researchers to collect vast amount of information from different sources (cameras, dictaphones, personal and corporate computers, cloud storages etc.)

The collection and compilation of various biological information about migrants is not a theme of science-fiction anymore but instead constitutes a reality. This has become evident in the case of fighting COVID-19 Pandemic. Information on vaccination status, PCR tests, and other biometric data (dactyloscopy and eye tests) collected at border crossings and all that leads to collection of huge volumes of information.

In this perspective, the methodology of migration research should include quantitative and qualitative methods at Macro, Micro and Nano levels. Thus, operationalization of migration inquiry will include not only Macro and Micro variables such as citizenship, age, or education of individuals but Nano variables such as biometric attributes.

Hence, the migrant, as the unit of analysis, will be referred to with a comprehensive and complex set of quantitative and qualitative indicators collected via broader set of methodological tools. This will allow a holistic approach to understanding migration processes.

### **Legal, ethical and practical issues of scientific inquiry of migration processes**

All nation states have rules and laws regulating migration processes. These rules and laws often operate on the basis of or in conjunction with international conventions and treaties as well as guidance by International Organization for Migration, International Labor Organization, UNHCR etc.

In spite that nation states regulate international migration processes with national interests in mind, international organisations operate within the rules largely based on the Universal Declaration of Human Rights (1948). According to article 13 of the Declaration: “Everyone has the right to freedom of movement and residence within the borders of each state. Everyone has the right to leave any country, including his own, and to return to his country.”

Migration is a process involving individual decisions. The decision to move or migrate to another place might be sensitive and ethically challenging in some cases. Thus, analysis and study of migration processes should protect migrants’ identity and dignity.

While previously, personal information was largely collected through surveys, forms, or other voluntary online or paper mediums, in the age of digitalization many personal information is collected directly or indirectly by governments, third sector or private organizations with or without the consent of the subjects. Personal data can even be collected via different software applications on a mobile phone or computer or other personal devices. When installing an application, an individual can give permission to personal information to be collected and used. In the world of Big Data, information collected by such applications may be available for use by researchers. Migration researchers must be careful with the use of such secondary data; serious consideration should be given to the issues of protection of personal information, confidentiality and privacy. This is above and beyond our usual responsibilities

as ethical researchers. Potential vulnerabilities of the participants in surveys, focus-group interviews, and other types of primary data collection methods must be protected to a maximum while participants' consent must always be sought in advance.

It is the responsibility of the data collecting organization to protect the recorded information from any breach. Digitalised private and personal information must also be protected at the state level. This has become a common rule around the world. For example, in Kazakhstan the Law of the Republic of Kazakhstan "On Informatization" was adopted on November 24, 2015. According to article 36 of the law, "Electronic information resources, which include personal data are considered as confidential information. Their use is limited by the aims of collection. It is not allowed to use electronic information resource with personal data if its use can lead to material or/and moral harm of a person or limit realization of his/her human rights and freedom". However, such a provision is not adequate to protect privacy and confidentiality. It should be clearly defined what kind of personal data is sensitive and what kind of breaches or disclosures could cause material and/or moral harm to the individual or limit him/her exercising human rights and freedoms.

Historically, it is known that new inventions every time outstrip existing rules and laws. We did not have adequate traffic rules when we first began to drive cars. Gradually, the experience and practice led to tighter rules and regulations for road movements. Same can be said about inventions and implementation of new devices and applications allowing digitalization and collection of vast amounts of data. The rules regarding the protection of the individual and his or her personal information are not yet perfected and there is more to be done in terms of protecting personal data.

## **Conclusion**

It is not an easy task to bring together all the issues and methods about and arising from space, time, economy, the Gravity Theory, Theory of Net Migration, psychology of migrants, language, quantitative and qualitative methods of inquiry, information at Macro, Micro, Nano levels, GIS, GPS, biometric data and so on. However, this is the way to connect all these dots into a systematic treatment for a better understanding of migration processes. Digitalization and Big Data analysis have the potential to allow real time processing of such diverse data. Yet, we are at the initial phases of this development. Given the opportunities and challenges, creating specialized computer applications for the investigation of population movements would help a better, deeper, and wider understanding of migration processes at Macro, Micro, and Nano levels. In consideration of the current level of digitalization, the academic community shall make use of its full potential by applying mixed methods in migration research. We argue that the integration of Nano level information in our analyses can make a big difference in our understanding of migration processes. The future research efforts may go beyond mere collection and analysis of data. Development of specific goal-oriented computer programs and applications for data collection and analysis can be part of the menu. We are looking forward to new inquiries in this direction and the unique results they might yield.



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