Master Thesis

"DEVELOPMENT OF A STATISTICAL MODEL FOR MONITORING AND EVALUATING QUALITATIVE AND QUANTITATIVE DATA RELATED TO MIGRATORY FLOWS AND THE RELATED AVAILABLE RESOURCES, APPLIED IN THE STUDY OF THE VULNERABILITY OF THE INTERNAL AND EXTERNAL BORDERS OF GREECE"

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Abstract

The issue of illegal migration is considered today as a major challenge for governmental authorities with critical impact to the general community. This is a polyparametric problem that administration systems need to deal with in order to secure both their external and internal borders.

Due to its geographical location, Greece constitutes a gateway to the EU for a large number of illegal economic migrants and refugees whose final destination are, in the vast majority, Central and Northern European countries. Especially the last years, Greece was forced to deal with an influx of refugees and migrants, situation that raised concerns on the country's ability to effectively secure its borders.

The current work will focus on monitoring and evaluating the variables that are connected with migration flows and the associated border's security.

Furthermore, a multiparametric statistical tool will be developed for the correlation and estimation of these variables. The main aim is to reveal the factors that can be used for evaluating and monitoring migration flows and to implement, as an application, a pilot vulnerability assessment model concerning security border issues.

Keywords: illegal migration phenomenon, polyparametric problem, internal – external security, variables evaluation, multiparametric statistical tool, border vulnerability assessment model.

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A.H.P – Analytic Hierarchy Process

A.M.I.F. - Asylum, Migration and Integration Fund

B.G.S – Border Guard Services

C.I.R.A.M. – Common Integrated Risk Analysis Method

E.A.S.O – European Asylum Support Office

E.B.C.G. - European Border and Coast Guard Agency (Frontex)

ECtHR - European Court of Human Rights

E.M.P.A.C.T. - European Multidisciplinary Platform Against Criminal Threats

E.T.I.A.S - European Travel Information and Authorization System

E.U. – European Union

EURODAC – European Asylum Dactyloscopy Database

EUROPOL - European Union Agency for Law Enforcement Cooperation

F.I.R. - Flight Information Region

G.D.P. - Gross Domestic Product

I.A.P. - Irregular Arriving Person

I.B.M. - Integrated Border Management

ICISnet – Costums Information System

INTERPOL - International Criminal Police Organization, ICPO

I.O.M - International Organization for Migration

I.S.F. – Internal Security Fund

J.A.D - Joint Action Days

M.S – Member States

N.C.A – National Combating Ability

OCGs - Organised Crime Groups

P.C.S – Passport Control Services

P.D – Police Directorate

Pe.D.R.A. – Personal Data for Risk Analysis

PNR – Passengers Name Record

SAR – Search and Rescue

SELEC - Southeast European Law Enforcement Center

USA – United States of America

VIS – Visa Information System

km – Kilometers

nm – Nautical miles

Please note: *In the sections of this research where a mixed migratory movement or mixed migration flows are being referred to, the word migrant is used broadly to refer to all people on the move. This includes refugees, asylum seekers, irregular migrants and involuntary migrants, unless a distinction is otherwise made.*

CHAPTER 1 – Introduction

The migratory phenomenon is intertwined with the human existence and the appearance and evolution of the first civilizations. Either as a necessity or a free will choice is still there and is an option for different categories of people that want to guard, save or improve their lives.

In this ever-changing environment, and due to the fact that in 2015 and 2016 the E.U. experienced an unprecedented influx of migrants and refugees, which set the national border and immigration management systems of the Member States within the limits of their capabilities, the E.U has agreed to implement a series of measures to deal with the crisis, improving security at borders, tackling migrant smuggling and offering safe procedures for people to legally enter the E.U.

At the same time, the importance of effective border control is being reinforced by the increasing interconnection of illegal immigration with other forms of organized crime, like illegal trafficking of migrants or use of forged / falsified documents.

For the above mentioned reasons, cooperation between Member States and International Organizations and E.U. Institutions as well as bilateral cooperation between Member States could bring considerably benefits in the field of border surveillance and security.

E.U in order to respond to on-going migratory challenge has launched a series of measures on border and migration management. Beyond those measures, Member States must also be on alert trying to explore innovative ways to strengthen their national capabilities on border management.

Migration is a key importance issue not only for Europe in general and its institutions but also for Greece, which due to its geographic position is not only the ideal but the necessary transit point that allows migrants / refugees to reach E.U. Therefore, it is crucial to understand the importance of restoring border management, especially in Greece.

Chapter 2 presents an overview of the basic key concepts related to the migration crisis, which are of particular importance in its explanation.

In Chapter 3, we explain how the use of risk assessment tools and risk analysis methods could have a positive effect on border management and in Chapter 4, we will briefly present risk analysis methods as well as its implementation. Moreover, we will proceed to their evaluation and if their implementation corresponds to the needs of border management or if there is a necessity for developing a new one.

In Chapter 5, we will present the multidimensional aspects of border management and the formulated strategies from other countries, in order to ensure effective border controls and establish border security.

In Chapter 6, we will explain the new methodological basis of the research for the vulnerability assessment in case of Greece and simulation scenarios will also be presented related to migration flows forecasts, as well as vulnerability level in case of Greece.

Finally, in Chapter 7 the main findings of this research will be presented as well as necessary recommendations.

CHAPTER 2 –Glossary on Migration

When conducting a research into migration, it is quite important that we clearly define all the terms we use, since these can make a difference in our findings and the statements we make.

Therefore, in order to have a common understanding of migration terms, we will mention a comprehensive terminology regarding migration.

The terms and definitions are listed in accordance with the I.O.M. Glossary[1].

Agreement	A mutual understanding (written or unwritten) between two or more parties intended to have a legally binding character.
Application	In the migration context, a request (usually written) submitted to the government by an individual or organization seeking governmental or legal action.
Asylum seeker	A person who seeks safety from persecution or serious harm in a country other than his or her own and awaits a decision on the application for refugee status under relevant international and national instruments. In case of a negative decision, the person must leave the country and may be expelled, as may any non-national in an irregular or unlawful situation, unless permission to stay is provided on humanitarian or other related grounds.
Bilateral	Involving two parties or two States.
Capacity building	Building capacity of governments and civil society by increasing their knowledge and enhancing their skills. Capacity building can take the form of substantive direct project design and implementation with a partner government, training opportunities, or in other circumstances facilitation of a bilateral or multilateral agenda for dialogue development put in place by concerned authorities. In all cases, capacity building aims to build towards generally acceptable benchmarks of management practices.

[1]https://www.iom.int/key-migration-terms - IOM, Glossary on Migration, International Migration Law Series No. 25, 2011.
For another accessible and comprehensive collection of migrant-asylum related terminology, please consult "Asylum and Migration" Glossary 6.0 (May 2018) produced from European Migration Network.
https://ec.europa.eu/home-affairs/sites/homeaffairs/files/what-we-do/networks/european_migration_network/docs/interactive_glossary_6.0_final_version.pdf

Country of origin	The country that is a source of migratory flows (regular or irregular).
Country of transit	The country through which migratory flows (regular or irregular) move.
Data protection	The systematic application of a set of institutional, technical and physical safeguards that preserve the right to privacy with respect to the collection, storage, use and disclosure of personal data.
Detention	Restriction on freedom of movement through confinement that is ordered by an administrative or judicial authority. There are two types of detention: criminal detention, having as a purpose punishment for the committed crime; and administrative detention, guaranteeing that another administrative measure (such as deportation or expulsion) can be implemented. In the majority of countries, irregular migrants are subject to administrative detention, as they have violated immigration laws and regulations that are not considered to be crimes. In many States, a non-national may also be administratively detained pending a decision on refugee status or on admission to or removal from the State.
Displacement	A forced removal of a person from his or her home or country, often due to armed conflict or natural disasters.
Dublin II Regulation	Council Regulation (EC) No. 343/2003 of 18 February 2003 establishing the criteria and mechanisms for determining the Member State responsible for examining an asylum application lodged in one of the Member States by a third-country national (OJ 2003 L 50/1), named "Dublin II," which replaces the provisions in the Dublin Convention (Convention determining the State responsible for examining applications for asylum lodged in one of the Member States of the European Communities, signed in Dublin on 15 June 1990). Under the Dublin II Regulation, Member States have to assess, on the basis of objective and hierarchical criteria, which Member State is responsible for examining an asylum application lodged on its territory. The system is designed to prevent "asylum shopping" (where an asylum-seeker submits several requests for asylum in various States) and at the same time to ensure that each asylum applicant's case is processed by only one Member State.
Economic migrant	A person leaving his or her habitual place of residence to settle outside his or her country of origin in order to improve his or her quality of life. This term is often loosely used to distinguish from refugees fleeing persecution, and is also similarly used to refer to persons attempting to enter a country without legal permission and/or by using

	asylum procedures without bona fide cause. It may equally be applied to persons leaving their country of origin for the purpose of employment.
Emigration	The act of departing or exiting from one State with a view to settling in another.
Facilitated migration	Fostering or encouraging of regular migration by making travel easier and more convenient. This may take the form of a streamlined visa application process, or efficient and well-staffed passenger inspection procedures.
First country of asylum	First country in which a refugee or a displaced person outside of his or her country benefits or could benefit from protection. The notion of first country of asylum is frequently used as a condition of access to the asylum determination procedure
Forced migration	A migratory movement in which an element of coercion exists, including threats to life and livelihood, whether arising from natural or man-made causes (e.g. movements of refugees and internally displaced persons as well as people displaced by natural or environmental disasters, chemical or nuclear disasters, famine, or development projects).
Fraud	A misrepresentation of the truth or concealment of a material fact in order to obtain some benefit.
Fraudulent document	Any travel or identity document that has been falsely made or altered in some material way by anyone other than a person or agency lawfully authorized to make or issue the travel or identity document on behalf of a State; or that has been improperly issued or obtained through misrepresentation, corruption or duress or in any other unlawful manner; or that is being used by a person other than the rightful holder (Art. 3(c), UN Protocol Against the Smuggling of Migrants by Land, Sea and Air, supplementing the United Nations Convention against Transnational Organized Crime, 2000). In a broader migration context, such documents may also include false education certificates in connection with the recognition of diplomas and qualifications as well as fraudulent documents relating to employment such as curricula vitae (CVs) and reference letters from employers.
Freedom of movement	A human right comprising three basic elements: freedom of movement within the territory of a country (Art. 13(1), Universal Declaration of Human Rights, 1948: "Everyone has the right to freedom of movement and residence within the borders of each state."), the right to leave any country and the right to return to his or her own country (Art. 13(2), Universal Declaration of Human Rights, 1948: "Everyone has the right to leave any country, including his own, and

	to return to his country. See also Art. 12, International Covenant on Civil and Political Rights. Freedom of movement is also referred to in the context of freedom of movement arrangements between States at the regional level (e.g. European Union).
Fundamental human rights	A view reflecting the notion that within the large scope of human rights, some human rights are claimed to be of particular significance when considering the dignity and worth of the human person, equal rights of men and women and the promotion of social progress and better standards of living. Support for this view comes from the non-derogable nature of certain rights. Thus, Art. 4(1), International Covenant on Civil and Political Rights, 1966, permits derogation "in time of public emergency threatening the life of the nation" but prohibits any derogation from Arts. 6 (right to life), 7 (torture), 8(1) and (2) (slavery and servitude), 11 (imprisonment for breach of contractual obligation), 15 (retroactive criminal liability), 16 (recognition everywhere as a person before the law) and 18 (freedom of thought, conscience and religion). This notwithstanding, the trend is to regard all human rights as universal, indivisible, interdependent and interrelated, to be treated in a fair and equal manner, on the same footing and with the same emphasis
Immigration	A process by which non-nationals move into a country for the purpose of settlement.
Internally Displaced Person (IDP)	Persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border (Guiding Principles on Internal Displacement, UN Doc E/CN.4/1998/53/Add.2.). See also de facto refugees, displaced person, externally displaced persons, uprooted people.
International airport	Airport designated by the State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out (Annex 9 to the Convention on International Civil Aviation, 1944).
International migration	Movement of persons who leave their country of origin, or the country of habitual residence, to establish themselves either permanently or temporarily in another country. An international frontier is therefore crossed.

Irregular migrant	A person who, owing to unauthorized entry, breach of a condition of entry, or the expiry of his or her visa, lacks legal status in a transit or host country. The definition covers inter alia those persons who have entered a transit or host country lawfully but have stayed for a longer period than authorized or subsequently taken up unauthorized employment (also called clandestine/undocumented migrant or migrant in an irregular situation). The term "irregular" is preferable to "illegal" because the latter carries a criminal connotation and is seen as denying migrants' humanity.
Irregular migration	Movement that takes place outside the regulatory norms of the sending, transit and receiving countries. There is no clear or universally accepted definition of irregular migration. From the perspective of destination countries it is entry, stay or work in a country without the necessary authorization or documents required under immigration regulations. From the perspective of the sending country, the irregularity is for example seen in cases in which a person crosses an international boundary without a valid passport or travel document or does not fulfil the administrative requirements for leaving the country. There is, however, a tendency to restrict the use of the term "illegal migration" to cases of smuggling of migrants and trafficking in persons.
Jurisdiction	A government's general power to exercise authority over all persons and things within its territory, or, the geographic area within which such authority may be exercised. More specifically, it may refer to the legal power or authority to hear and determine a cause of action
Labour migration	Movement of persons from one State to another, or within their own country of residence, for the purpose of employment. Labour migration is addressed by most States in their migration laws. In addition, some States take an active role in regulating outward labour migration and seeking opportunities for their nationals abroad.
Legitimate	Something that is genuine, valid, or lawful. For example, a legal migrant enters with a legitimate intent to comply with the migration laws, and present legitimate travel documents.
Migrant	At the international level, no universally accepted definition for "migrant" exists. The term migrant was usually understood to cover all cases where the decision to migrate was taken freely by the individual concerned for reasons of "personal convenience" and without intervention of an external compelling factor; it therefore applied to persons, and family members, moving to

	another country or region to better their material or social conditions and improve the prospect for themselves or their family. The United Nations defines migrant as an individual who has resided in a foreign country for more than one year irrespective of the causes, voluntary or involuntary, and the means, regular or irregular, used to migrate. Under such a definition, those travelling for shorter periods as tourists and businesspersons would not be considered migrants. However, common usage includes certain kinds of shorter-term migrants, such as seasonal farm-workers who travel for short periods to work planting or harvesting farm products. IOM defines a migrant as any person who is moving or has moved across an international border or within a State away from his/her habitual place of residence, regardless of (1) the person's legal status; (2) whether the movement is voluntary or involuntary; (3) what the causes for the movement are; or (4) what the length of the stay is. IOM concerns itself with migrants and migration related issues and, in agreement with relevant States, with migrants who are in need of international migration services.
Migrant flow	The number of migrants counted as moving or being authorized to move, to or from a given location in a defined period of time.
Migration	The movement of a person or a group of persons, either across an international border, or within a State. It is a population movement, encompassing any kind of movement of people, whatever its length, composition and causes; it includes migration of refugees, displaced persons, economic migrants, and persons moving for other purposes, including family reunification.
Migration management	A term used to encompass numerous governmental functions within a national system for the orderly and humane management for cross-border migration, particularly managing the entry and presence of foreigners within the borders of the State and the protection of refugees and others in need of protection. It refers to a planned approach to the development of policy, legislative and administrative responses to key migration issues
Mixed flows	Complex migratory population movements that include refugees, asylum-seekers, economic migrants and other migrants, as opposed to migratory population movements that consist entirely of one category of migrants.

Nationality	Legal bond between an individual and a State. The International Court of Justice defined nationality in the Nottebohm case, 1955, as "…a legal bond having as its basis a social fact of attachment, a genuine connection of existence, interests and sentiments, together with the existence of reciprocal rights and duties…the individual upon whom it is conferred, either directly by law or as a result of the act of the authorities, is in fact more closely connected with the population of the State conferring the nationality than with any other State." According to Art. 1, Hague Convention on Certain Questions Relating to the Conflict of Nationality Laws, 1930 "it is for each State to determine under its own laws who are its nationals. This law shall be recognized by other States in so far as it is consistent with international conventions, international custom, and the principles of law generally recognized with regard to nationality." The tie of nationality confers individual rights and imposes obligations that a State reserves for its population. Founded on the principle of personal jurisdiction of a State, nationality carries with it certain consequences as regards migration such as the right of a State to protect its nationals against violations of their individual rights committed by foreign authorities (particularly by means of diplomatic protection), the duty to accept its nationals onto its territory, and the prohibition to expel them.
Organized crime	Usually refers to large-scale and complex criminal activities carried out by tightly or loosely organized associations and aimed at the establishment, supply and exploitation of illegal markets at the expense of society. Such operations are generally carried out with a ruthless disregard of the law, and often involve offences against the person, including threats, intimidation and physical violence.
Palermo Protocols	Supplementary protocols to the Convention against Transnational Organized Crime, 2000: Protocol Against the Smuggling of Migrants by Land, Sea and Air, 2000; Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children, 2000; and Protocol against the Manufacturing of and Trafficking in Illicit Firearms, Ammunition and Related Materials, 2001.
Passenger	A person riding in a vehicle (boat, bus, car, plane, train, etc.) who is not operating it.
Passport	A document issued by the competent authority in a State identifying a person as a national of the issuing State, which is evidence of the holder's right to return to that State. In Western traditions, passports have been used for foreign travel purposes, not as domestic identity

	documents. The passport is the accepted international certificate or evidence of nationality, although its evidentiary value is prima facie only.
Permanent residence	The right, granted by the authorities of a host State to a non-national, to live and work therein on a permanent (unlimited or indefinite) basis.
Permanent resident	A non-national benefitting from the right of permanent residence in a host State. See also long-term migrant.
Permit	Documentation, usually issued by a governmental authority, which allows something to exist or someone to perform certain acts or services. In the migration context, reference to residence permits or work permits is common.
Point of entry	A location (on the land border or at an airport or seaport) where persons are stopped by border officials for inspection and clearance, in order to enter the State.
Point of exit	A location (on the land border or at an airport or seaport) where persons are stopped by border officials for inspection and clearance, in order to enter the State.
Race	One of the grounds for refugee status under the 1951 Refugee Convention, race is understood in its widest sense to include all kinds of ethnic groups that are referred to as 'races' in common usage.
Readmission	Act by a State accepting the re-entry of an individual (own national, third-country national or stateless person).
Readmission agreement	International agreement which addresses procedures, on a reciprocal basis, for one State to return non-nationals in an irregular situation to their home State or a State through which they have transited.
Receiving country	Country of destination or a third country. In the case of return or repatriation, also the country of origin. Country that has accepted to receive a certain number of refugees and migrants on a yearly basis by presidential, ministerial or parliamentary decision.
Reception center	A facility lodging asylum-seekers or migrants in an irregular situation on arrival in a receiving country, while their status is determined; in practice, such facility is very often a detention center. Also known as a reception center.
Refugee	A person who, "owing to a well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinions, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country. (Art. 1(A)(2), Convention relating to the Status of Refugees, Art. 1A(2), 1951 as modified by the 1967 Protocol). In addition to the refugee definition in the 1951 Refugee Convention, Art. 1(2), 1969 Organization of African Unity (OAU) Convention defines a

	refugee as any person compelled to leave his or her country "owing to external aggression, occupation, foreign domination or events seriously disturbing public order in either part or the whole of his country or origin or nationality." Similarly, the 1984 Cartagena Declaration states that refugees also include persons who flee their country "because their lives, security or freedom have been threatened by generalised violence, foreign aggression, internal conflicts, massive violations of human rights or other circumstances which have seriously disturbed public order."
Refugees in transit	Refugees who are temporarily admitted in the territory of a State under the condition that they are resettled elsewhere.
Regular migration	Migration that occurs through recognized, authorized channels.
Repatriation	The personal right of a refugee, prisoner of war or a civil detainee to return to his or her country of nationality under specific conditions laid down in various international instruments (Geneva Conventions, 1949 and Protocols, 1977, the Regulations Respecting the Laws and Customs of War on Land, Annexed to the Fourth Hague Convention, 1907, human rights instruments as well as customary international law). The option of repatriation is bestowed upon the individual personally and not upon the detaining power. In the law of international armed conflict, repatriation also entails the obligation of the detaining power to release eligible persons (soldiers and civilians) and the duty of the country of origin to receive its own nationals at the end of hostilities. Even if treaty law does not contain a general rule on this point, it is today readily accepted that the repatriation of prisoners of war and civil detainees has been consented to implicitly by the interested parties. Repatriation as a term also applies to diplomatic envoys and international officials in time of international crisis as well as expatriates and migrants.
Resettlement	The relocation and integration of people (refugees, internally displaced persons, etc.) into another geographical area and environment, usually in a third country. In the refugee context, the transfer of refugees from the country in which they have sought refuge to another State that has agreed to admit them. The refugees will usually be granted asylum or some other form of long-term resident rights and, in many cases, will have the opportunity to become naturalized.
Return	In a general sense, the act or process of going back to the point of departure. This could be within the territorial boundaries of a country, as in the case of returning

	internally displaced persons (IDPs) and demobilized combatants; or between a host country (either transit or destination) and a country of origin, as in the case of migrant workers, refugees, asylum-seekers, and qualified nationals. There are subcategories of return which can describe the way the return is implemented, e.g. voluntary, forced, assisted and spontaneous return; as well as sub-categories which describe who is participating in the return, e.g. repatriation (for refugees).
Return migration	The movement of a person returning to his or her country of origin or habitual residence usually after spending at least one year in another country. This return may or may not be voluntary. Return migration includes voluntary repatriation.
Schengen Agreement and Convention	By the Schengen Agreement signed on 14 June 1985, Convention Belgium, France, Germany, Luxembourg and the Netherlands agreed that they would gradually remove controls at their common borders and introduce freedom of movement for all nationals of the signatory Member States, other Member States or third countries. The Schengen Convention supplements the Agreement and lays down the arrangements and safeguards for implementing freedom of movement. The Agreement and the Convention, the rules adopted on the basis and the related agreements together form the "Schengen acquis". Since 1999, this has formed part of the institutional and legal framework of the European Union by virtue of a protocol to the Treaty of Amsterdam.
Secondary migration	A movement of a migrant within a host country or to a third country, away from the community in which he or she originally resided.
Smuggled person/migrant	A migrant who is enabled, through providing financial or material benefit to another person, to gain illegal entry into a State of which he or she is not a national or a permanent resident.
Smuggler (of migrants)	An intermediary who moves a person by agreement with that person, in order to transport him/her in an unauthorized manner.
Smuggling	"The procurement, in order to obtain, directly or indirectly, a financial or other material benefit, of the illegal entry of a person into a State Party of which the person is not a national or a permanent resident" (Art. 3(a), UN Protocol Against the Smuggling of Migrants by Land, Sea and Air, supplementing the United Nations Convention against Transnational Organized Crime, 2000). Smuggling, contrary to trafficking, does not require an element of exploitation, coercion, or violation of human rights.

Technical cooperation	Coordinated action in which two or several actors share information and expertise on a given subject usually focused on public sector functions (e.g. development of legislation and procedures, assistance with the design and implementation of infrastructure, or technological enhancement).
Trafficking in persons	"The recruitment, transportation, transfer, harbouring or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation" (Art. 3(a), UN Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children, Supplementing the UN Convention against Transnational Organized Crime, 2000). Trafficking in persons can take place within the borders of one State or may have a transnational character.
Transit	A stopover of passage of varying length while travelling between two or more countries.
Transit passengers	Persons who arrive by air or boat from one State in the airport or port of a second State with the sole object of continuing their voyage to a third State.
Transit visa	A visa issued to a non-national passing through the country en route to a third destination. A transit visa authorizes the holder to pass through the territory of the issuing State or to stay there for a very short time, usually 24 or 48 hours.
Travel documents	Generic term used to encompass all documents issued by a competent authority which are acceptable proof of identity for the purpose of entering another country. Passports and visas are the most widely used forms of travel documents. Some States also accept certain identity cards or other documents such as residence permits.
Travel documents	Travel documents issued to refugees in lieu of a (Convention) national passport by a country which is a party to the 1951 Refugee Convention according to Art. 28(1) of that Convention, which provides: "The Contracting States shall issue to refugees lawfully staying in their territory travel documents for the purpose of travel outside their territory, unless compelling reasons of national security or public order otherwise require, and the provisions of the Schedule to this Convention shall apply with respect to such documents. The Contracting States may issue such a document to any other refugee in their territory…"

Voluntary repatriation	Return of eligible persons to the country of origin on the basis of freely expressed willingness to so return. Most often used in the context of refugees, prisoners of war, and civil detainees. Also, one of the three durable solutions to address the plight of refugees.
Voluntary return	The assisted or independent return to the country of origin, transit or another third country based on the free will of the returnee. See also assisted voluntary return, forced return, involuntary repatriation, return, return migration, repatriation, spontaneous return, voluntary repatriation
Vulnerable group	Any group or sector of society that is at higher risk of being subjected to discriminatory practices, violence, natural or environmental disasters, or economic hardship, than other groups within the State; any group or sector of society (such as women, children, the elderly, persons with disabilities, indigenous peoples or migrants) that is at higher risk in periods of conflict and crisis.

CHAPTER 3 – Basic Risk Analysis Methodology

In this chapter, we will be referred on the general existing methodology regarding **analysis** of the **risks**[2,3] and if this methodology fits or could be adjusted to fit to the needs of assessing **border security**[4] **risks** or if there is a need to develop an innovative type of methodology to cover the needs to this area. Furthermore, we will present a brief report on the exact actions that the relevant stakeholders, involved with border management, are undertaking in order to sufficiently fulfill their tasks.

In order to have a common understanding of risk analysis and the capabilities that can offer, we should define the meaning of its functions. In this way it will be possible to be fully understood by readers with different background and level of knowledge in a common way.

3.1 General (Risk Analysis - Risk assessment)

Risk Analysis is the process of identifying and examining potential threats[5], vulnerabilities[6] and impacts[7], the findings of which are recorded in the form of a risk assessment[8].

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[2] Risk can be defined as an uncertain future event or condition that can have either a positive or negative impact on project objectives. Risk management decisions are taken in advance (ISO-IEC Guide 73).

[3] **Classical definition of risk:** Risk is proportional to a measure for the probability **P** of an event (frequency, likelihood) and the consequences **C** of an event (impact, effect on objectives): R=P x C (Blaise Pascal).

[4] **Internal borders:** In accordance with paragraph 1 of the Article 2 in the Border Schengen Code (REGULATION (EU) 2016/399).
External borders: In accordance with paragraph 2 of the Article 2 in the Border Schengen Code (REGULATION (EU) 2016/399).

[5] **Threat:** Load of force acting on the borders.
In the process of threat identification, we have to take into consideration reliability and validity of the information to the threat. Moreover, we have to consider probability and magnitude of threats and notice it in the report to decision makers.

[6] **Vulnerability:** Vulnerability is a weakness in system procedures, architectural system, its implementation, internal control and other causes that can be exploited to bypass security systems and unauthorized access to information. Vulnerability represents any weakness, administrative process, act or statement that makes information about an asset to be capable of being exploited by a threat (ISO-IEC Guide 73).

[7] **Impact:** Consequences of risk events

[8] The identified risks are assessed in order to prioritize those which are most probable and whose dangerous effects are higher.

Risk analysis will identify which risk factors would potentially undermine the success of a project and, therefore, could require specific management actions.

Risk analysis implies a reference period – a day, a week, a month or a year – consistent with the level of decision-making it is to inform.

Risk analysis is framed in the language of internal security as well as border security, ensuring effective and efficient utilization of resources[9] and furthermore their potential allocation or reallocation for border checks and surveillance in ensuring effective and cohesive border controls.

Moreover, risk analysis could help to identify and understand the reasons and the gaps and to this end prevent and detect illegal migration and other forms of major transnational cross-border criminality[10].

3.2 Basic Risk Analysis Model – Risk Assessment Framework

Risk analysis is the procedure of putting in order of importance the risks based on the likelihood of the risk occurring and the effect it would have.

Risk Analysis steps:

- Risk identification
- Risk assessment

Risk assessment process is a combination of qualitative and quantitative tools and techniques.

Totally, we can identify the following three main categories of risk evaluation methods:

i. Qualitative risk analysis
ii. Semi-quantitative analysis
iii. Quantitative risk analysis

Qualitative analysis[11] uses a relative or descriptive scale[12] to measure the probability of occurrence whereas **quantitative** analysis[13] uses a

[9] Human and technical resources.
[10] Example: smuggling of weapons; drugs; explosives; trafficking in human beings; terrorist's movements.

numerical scale[14]. The use of **semi-quantitative** analysis includes different scales in order to characterize the likelihood of events and their consequences. This type of method may lead to various inconsistencies due to the fact that the numbers chosen may not properly reflect analogies between risks, particularly when either consequences or likelihood are extreme.

Summarizing, combining qualitative and quantitative approaches can be viable and fruitful. After qualitative analysis, we can proceed to further analysis in quantitative risk analysis[15] or directly to risk response planning. It is not necessary to do a quantitative analysis of each risk. We can do this analysis only for those risks that are marked for further analysis by performing a qualitative risk analysis.

The main advantages and disadvantages between qualitative and quantitative risk analysis are the following:

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[11] Qualitative technique is often used when numerical data are unavailable or not sufficient and risks cannot be quantified.
We are not obliged to determine the likelihood of data, but we can estimate potential losses.
Tools and Techniques: Risk probability & Impact assessment; Probability and impact matrix; Risk categorization; Risk assessment; Delphi technique; SWIFT analysis; Bow-tie analysis.

[12] Scale of "Low, Medium, High" to indicate the likelihood of a risk event occurring. The scales used can be formed or adjusted to suit the circumstances, and different descriptions may be used for different risks.

[13] **Tools and Techniques:**

a. Sensitivity analysis – Determining which risks may have the most potential impact on the project. This technique can be used to indicate the risk impact in terms of economic planning.
b. Monte Carlo simulation – Most common form of probabilistic analysis. It relies on the random calculation of values that fall within a specified probability. A probabilistic time analysis could be carried out with a Critical Path Method (CPM) network.
c. Influence Diagrams: Allows the development of very complex risk models that can be used to analyze the cost, time and economic values of projects.
d. Expected Monetary Value (EMV) – Effective analytical technique. Reduction of the effects of many project illusions.
e. Decision Tree analysis - Technique that is used to structure a decision process and evaluate outcomes from uncertain events. Applicable to many different project management situations. This form of risk analysis is often used in the cost risks analysis.
f. Bayesian method - Bayesian models are based on Bayes's theory. Development of procedures in order to revise probability.

[14] For example: Risk 1 has a 70% chance of occurring. In quantitative analysis numerical values are assigned to both impact and likelihood. The quality of the entire analysis depends on the accuracy of the assigned values and the validity of the statistical models used.

[15] Once the risks are identified through qualitative analysis, we could use a detailed quantitative one, which will enable the quantification of the risk impacts against the three basic project objectives: cost, time and quality performance.

Qualitative Risk Analysis

Advantages

- Allows the identification of the main risk sources or factors[16]
- Accessible
- Easy to understand, perform and apply
- Save time

Disadvantages

- Lack of accurate results
- Not objective systematic distortions in both process and metrics

Quantitative Risk Analysis

Advantages

- Applicable to large extent
- Trustworthy conclusions

Disadvantages

- Complex process[17]
- Occasionally unavailable data
- Reliance on mathematical method

By definition risk is a probability of a loss that is caused by external or internal vulnerabilities. As such, risk is modeled with probability[18] and impact[19]. Therefore, it is the relationship between probability and consequence (impact) that defines risk.

This concept can be summarized in the following **equation**:

$R = C \times P$ **(3.1)**[20]

Where **C** is the Consequence, **P** is the probability of occurrence and **R** is a constant value called Risk.

[16] Using lists, interviews, brainstorming meetings, personal experience of the risk analyst.
[17] Involves sophisticated techniques, usually requiring computer software.
[18] The possibility that something happens.
[19] The adverse effect of the possibility that something happens.
[20] Qualitative Risk Analysis.

Once the risks have been identified, then we need to determine the likelihood[21] and consequence[22] of each risk. Additionally, consequences and likelihood needs to be combined to calculate the level of the risk[23,24].

The typical classifications used for likelihood and impact, are:

Consequences (Impacts)

- Insignificant: Risk that bring no real negative consequences (Rate: 1)
- Minor: Risks that have a small potential for negative consequences, but will not significally impact overall success (Rate: 2)
- Moderate: Risks that could potentially bring negative consequences, posing a moderate threat to the project or organization (Rate: 3)
- Major: Risks with substantial negative consequences that will seriously impact the success of the organization or project (Rate: 4)
- Catastrophic: Risks with extreme negative consequence that could cause the entire project to fail or severely impact daily operations of the organization. (Rate: 5)

Likelihood

- Rare: No probability of occurring (Rate: 1)
- Unlikely: Small chance of manifesting (Rate: 2)
- Possible: Possible to occur (Rate: 3)
- Likely: Likely to occur (Rate: 4)
- Almost certain: Almost certain to manifest (Rate: 5)

With the use of a risk assessment matrix[25], the level of risk will be defined allowing decision makers to prioritize risks in order to handle them more effectively and determine which strategy needs to be followed.

[21] Levels of probability. It can be measured either by Qualitative and Quantitative methods. The selection of quantitative or qualitative methods will depend on the availability of information and the degree of sophistication or variety of processes to be evaluated.
[22] It can be measured either by Qualitative and Quantitative methods. The selection of quantitative or qualitative methods will depend on the availability of information and the degree of sophistication or variety of processes to be evaluated.
[23] The final step of risk analysis is constituted by the assessment of risk level.
[24] It can be measured either by Qualitative and Quantitative methods. The selection of quantitative or qualitative methods will depend on the availability of information and the degree of sophistication or variety of processes to be evaluated.

We have two options regarding the completion of a Risk matrix either three (3X3) major categories of a risk assessment or five (5X5).

Next tables show risk matrix templates, in general, of the above mentioned categories.

		Consequences		
		Low	Medium	High
Likelihood	Probable			
	Possible			
	Improbable			

Risk	**Green** Low risk	**Yellow** Medium risk	**Red** High risk

Table 1: Risk assessment 3X3 Risk Matrix

		Consequences				
		I	II	III	IV	V
Likelihood	5					
	4					
	3					
	2					
	1					

Risk	Green Low	Light Green Medium Low	Yellow Medium	Orange Medium High	Red High

Table 2: Risk assessment 5X5 Risk Matrix

As it can be seen in the above figures, risk is categorized in function of likelihood and consequence. Risk likelihood and risks are listed in rows and

[25] Also known as a "risk management matrix", "risk rating matrix", or "risk analysis matrix".

consequences (impacts) are columns.

Using colors is a less time consuming procedure that permits an evaluation of the levels of risk involved. The colors of green, light green, yellow, orange and red are used for the purpose of this general approach.

As we mentioned, the outcome of the Risk matrix[26] establishes the level of risk. For instance, the red zone represents a high level of risk because the likelihood is high and the consequences are high as well, therefore measures should be taken to reduce risk level. The green zone represents a low level or risk, with both low impact and low likelihood.

Earlier, we explained that risk level is expressed as a function of consequences multiplied by likelihood (equation 3.1). Therefore, "risk rating" can be determined not only by using color coded categories, but also combine impact and likelihood ratings to help us identify which risk pose the greatest overall threats and then use the color code to assess the risk level.

Example 1: Using a 5X5 risk matrix template, in a quantitative analysis

		Consequences How severe could the outcome be if the risk event occurred?				
		Insignificant 1	Minor 2	Significant 3	Critical 4	Catastrophic 5
Likelihood What is the chance of the risk occurring?	Definite 5	5x1=5	5x2=10			
	Likely 4	4x1=4				
	Moderate 3					
	Unlikely 2					
	Rare 1					

Risk	Green **Low**	Light Green **Medium Low**	Yellow **Medium**	Orange **Medium High**	Red **High**

Table 3: Risk assessment 5X5 Risk Matrix example using ratings in a quantitative analysis

[26] Matrix can be built in the same way, weither we use qualitative or quantitative data.

Example 2: Using a 5X5 risk matrix template, in a qualitative analysis

		Consequences How severe could the outcome be if the risk event occurred?				
		Insignificant (0-5%)	Minor (6-10%)	Significant (11-20%)	Critical (21-40%)	Catastrophic (41-100%)
Likelihood What is the chance of the risk occurring?	40+%					
	21-40%					
	11-20%					
	6-10%					
	0-5%					

Risk	Green **Low**	Light Green **Medium Low**	Yellow **Medium**	Orange **Medium High**	Red **High**

Table 4: Risk assessment 5X5 Risk Matrix example using ratings in a qualitative analysis

Finally, according to table 5, we can distinguish the risk ratings and its definitions, taking into consideration the color code, also.

Risk rating	**Color Code**	**Definition**
Low		The consequences of the risk are minor and it is unlikely to occur. These types of risks are generally ignored.
Medium Low		Likely to occur. The risk is low.
Medium		Risk likely to occur, having more serious consequences. Prevention measures are taken.
Medium High		Serious risks that have significant consequences and are likely to occur. Prioritize and respond to these risks.
High		Risks have severe consequences and are likely to occur. Risk with high priority – immediate response.

Table 5: Risk rating – Definition

In a security context, related to immigration, probability and consequence involve not only internal factors (administrative procedures, legal status, national integration policies) **but also external** (e.g war conflicts, bilateral agreements, political declarations, legislative reforms of M-S, border control measures). The external factors consist external security threats related to migration and their assessment depends on the available related information.

The fact that there is a fraction of security threats that do not create statistical patterns, limits the capability of assessing them. As a consequence, the capability of determining the probability of occurrence through equation 3.1 is also very limited.

In the cases that there is lack of available related information for the security threats we can alternatively categorize them in basic scenarios and in case-by-case basis and focus our efforts in assessing the weaknesses in order to establish sufficient measures against these threats.

Having in mind the above, we could include that in the situation the basis equation of risk could be extended in order to establish a concept of risk in correlation with the threat, the vulnerability and the consequences.

This means, replacing Probability (P) by Threat and Vulnerability due to the lack of statistical information to assess likelihood. The new equation then would be:

R=T x V x C (3.2)

Where **T** represents threat, **V** vulnerability and **C** consequences.

Considering immigration issue, processes or factors both inside and outside the E.U. affect the magnitude and the likelihood of the threat. Moreover, vulnerability is understood as the factors at the borders or in the EU that might increase or decrease the magnitude or likelihood of the threat and consequence (impact) is the effects of a threat on the internal security and on the security of the external borders.

When applying this method (equation 3.2), it is easily observed, that risk refers to several factors that were assessed during the whole process. The fact that threats pose a certain degree of uncertainty, and the complexity of assessing the elements involved in the determination of a risk level has as a

consequence that defining this level of risk, is a complicated process. The elements involved and that should be taken into account are: Threat, Vulnerability and Consequences.

Following, next chapter will provide information on various risk analysis models and their implementation[27].

[27] Risk analysis implementation in different areas such as: Insurance, IT Projects & Software development, Organizational change, Defense, Oil & Gas, Aerospace, Civil engineering, Migration.

CHAPTER 4 – Risk Analysis Models

Depending on the type of project we are involved with, we could have several different risk analysis models to consider, taking also into consideration the needs of the industry considered or the working environment. Whatever the type, the main goal is to increase the likelihood of successful completion of a project[28].

4.1 Bayesian method[29,30,31]

"In 1770s, Thomas Bayes introduced 'Bayes Theorem'. Bayesian risk assessment method was originally developed in the nuclear industry where the consequences of inadequate forecasts can be devastating and has been taken and adapted in many areas. It offers the possibility to use personal and objective probability estimates changing as new data appear as elements of uncertainty are numerous, subjective and may be revised following the acquisition of information. [Van Den Acker, 1996, 71]

Bayesian models based on Bayes's theory have developed procedures to revise probability by changing the initial values based on experimental results. The probability of an event is conditional on another event unknown or uncertain.

A bayesian network is a graphical model probabilistic of relationships between a set of variables. There are several features that benefit their use in systems development [Anderson, Sweeney, Williams, 1999, 156-158]:

- can use incomplete data set which led to their use for developing intelligent systems;
- allow study of causal relations useful when a domain wants understanding and an opportunity to make predictions for some interventions;

[28] Project objectives: cost, time and performance.
[29] Quantitative risk assessment method
[30] https://www.analyticsvidhya.com/blog/2016/06/bayesian-statistics-beginners-simple-english/
[31] Laura-Diana Radu (Genete) "Qualitative, semi-quantitative and, quantitative methods for risk assessment: Case of the financial audit" (Article: January 2009)

- bayesian networks combined with Bayesian statistical techniques facilitates combining domain knowledge with data;
- bayesian methods are used with Bayesian networks and other models offer an effective approach to avoid duplication of data.

Bayesian method was first used in the audit of the Canadian Institute of Certified Accountants in 1980 and was taken over and adapted to different specific situations audit of a large number of researchers in the field. The general formula of Bayes's theorem, applicable to the audit, to calculate posterior probabilities that add additional information is [Van Den Acker, 1996, 73]":

$$P\left(\frac{Ai}{B}\right) = \frac{P\left(\frac{B}{Ai}\right) \cdot P(Ai)}{(\sum_{i=1}^{n}(P\left(\frac{B}{Ai}\right) \cdot P(Ai)))}$$

Where,

P : Probability
A_i : Multiple events
B : Another event

Advantages

- Samples integration
- Control and determination of risk at various levels
- Gives more stable values with smaller standard errors – incorporation of previous information at once into the analysis
- Small data sets can be successfully analyzed

Disadvantages

- The difficulty of obtaining data entry, because function reasoning cannot coexist
- Time to determine the risk is very high especially when there is a large scale of variables

4.2 C.I.R.A.M. 2.0[32]

European Border and Coast Guard Agency (Frontex) has developed its own risk analysis model, called C.I.R.A.M.[33] the Common Integrated Risk Analysis Model, in order to develop a structured approach to help Frontex and Member States in the preparation of risk analysis.

C.I.R.A.M. provides Frontex with a foundation for coordinating joint operations at the external borders. Gaining knowledge on cross-border criminality is essential for the establishment of an appropriate reaction.

Therefore, C.I.R.A.M. enables assessment of the relative risks posed by different threats. It was developed in close consultation with member states, and is applicable both at E.U. and national level.

Moreover, it clarifies how a risk analysis can be done in European level, including the best practices that can be applied, so that specific activities of risk analysis regarding external borders management can be completed.

C.I.R.A.M. relies on a four-tier access control model that involves gathering information from and disseminating risk analysis to a wide range of partners. Partners include border control authorities both within the Schengen area and at the external borders (e.g. Customs) as well as Member State actors in cooperating neighbouring countries and non-E.U. states farther afield.

According to Image 1, we can see that risk is defined by combing three components and also which processes or factors affect them.

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[32] CIRAM 2.0 is expected to be modified (revised provisions).
Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the European Border and Coast Guard and repealing Council Joint Action n°98/700/JHA, Regulation (EU) n° 1052/2013 of the European Parliament and of the Council and Regulation (EU) n° 2016/1624 of the European Parliament and of the Council A contribution from the European Commission to the Leaders' meeting in Salzburg on 19-20 September 2018 (COM/2018/631 final).

Regulation (EU) 2019/1896 of the European Parliament and of the Council of 13 November 2019 on the European Border and Coast Guard and repealing Regulations (EU) No 1052/2013 and (EU) 2016/1624.

[33] https://frontex.europa.eu/intelligence/ciram/

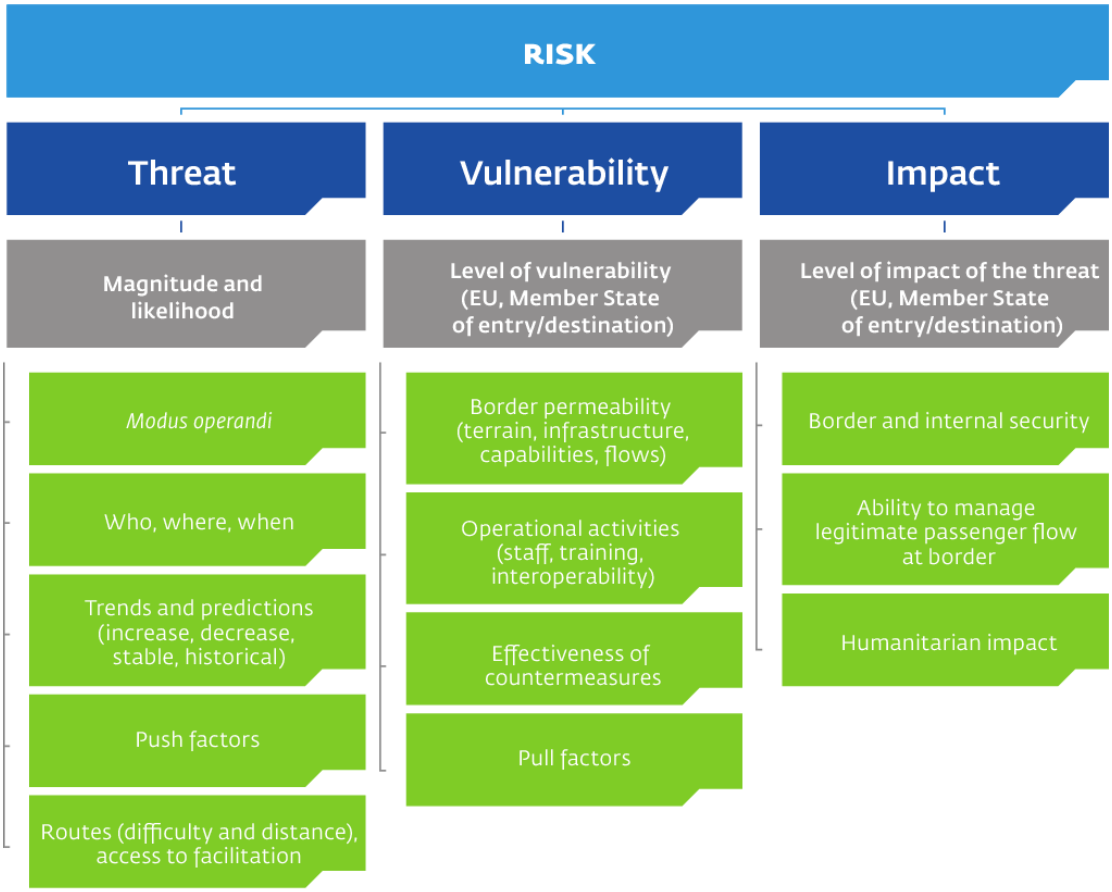

Image 1: C.I.R.A.M. model[34]

C.I.R.A.M.[35] is the tool that E.B.C.G.[36,37,38,39] uses at all levels[40] covering the whole scope of I.B.M[41].

[34] https://frontex.europa.eu/intelligence/ciram/

[35]C.I.R.A.M. is a legal obligation according to Article 4 of Frontex's regulation
https://ec.europa.eu/home-affairs/content/european-integrated-border-management_en
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R1624

[36]https://frontex.europa.eu/
The European Border and Coast Guard Agency (Frontex) was established by Regulation (EU) 2016/1624 of 14 September 2016 on the European Border and Coast Guard (OJ L 251, 16.9.2016, p. 1), replacing the "European Border and Coast Guard Agency" replaces the "European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union".

[37]https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.251.01.0001.01.ENG&toc=OJ:L:2016:251:FULL

[38] COM (2018) 631: Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the European Border and Coast Guard and repealing Council Joint Action n°98/700/JHA, Regulation (EU) n° 1052/2013 of the European Parliament and of the Council and Regulation (EU) n° 2016/1624 of the European Parliament and of the Council A contribution from the European Commission to the Leaders' meeting in Salzburg on 19-20 September 2018
https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2018:631:FIN
https://ec.europa.eu/commission/sites/beta-political/files/soteu2018-border-coast-guard-regulation-631_en.pdf

Establishing trends, classifying risks[42] but also provide consultation on appropriate operational responses to various challenges are the primary aims of Frontex risk analysis. A picture of the circumstances at the E.U's external borders is presented via data, analysed for risk analysis which also identify the key factors that drive and influence this situation.

The development of the ability to conduct capacity assessments and to deploy liaison officers in third countries and uses of the four-tier access control model, for information to be collected are among the 2011 amendments to the Frontex Regulation accommodated in the latest C.I.R.A.M.

It is common knowledge that human rights and humanitarian ideals are exceptionally valuable in the agency's internal discourse and its self-understanding (Frontex 2016).

Nevertheless, it seems that within Frontex, the knowledge production is thereby managing migration as a security threat rather than obtaining concern about awareness of the vulnerability of migrants.

When you look at the risk indicators, it can be particularly evident. An example of what the C.I.R.A.M., presents is vulnerability as being determined by the capacity of a system to alleviate a threat (Frontex, 2012: p. 27).

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http://www.europeanmigrationlaw.eu/documents/COM(2018)631-Regulation%20on%20the%20European%20Border%20and%20Coast%20Guard.PDF

[39] In April 2019 the European Parliament approved the provisional agreement on the European Border and Coast Guard Agency.
https://data.consilium.europa.eu/doc/document/ST-8354-2019-INIT/en/pdf
https://www.consilium.europa.eu/en/policies/strengthening-external-borders/
http://www.europarl.europa.eu/doceo/document/TA-8-2019-0415_EN.html
http://www.europarl.europa.eu/legislative-train/api/stages/report/current/theme/towards-a-new-policy-on-migration/file/european-border-and-coast-guard
https://www.consilium.europa.eu/en/press/press-releases/2019/04/01/european-border-and-coast-guard-council-confirms-agreement-on-stronger-mandate/
European Border and Coast Guard: Council adopts revised regulation
https://www.consilium.europa.eu/en/press/press-releases/2019/11/08/european-border-and-coast-guard-council-adopts-revised-regulation/

[40]From high level strategic decision-making to planning and implementation of operational activities

[41] Integrated Border Management

[42] For example:https://frontex.europa.eu/publications/risk-analysis-for-2019-RPPmXE
As described in this risk analysis product "a **coherent** and **comprehensive analysis** of the **risks affecting security** at the **external borders requires**, above all, the **adoption** of **common indicators**. Consistent monitoring of these indicators will allow effective measures to be taken on the ground. The **analysis needs** to **identify** the **risks** that arise at the external borders themselves and those that arise in third countries".

What defines irregular migrants, including those with legitimate protection needs, are their risk qualities primarily in the technologies – as threats – rather than through their vulnerability and mortality (Aas and Gundhus 2014; Gundhus 2018).

Furthermore, risk analysis is expressed via the language of state security, consequently, despite discussing migrants' vulnerability, it tends to imagine this using the language of state security and organised crime.

C.I.R.A.M. 2.0 model implements a stable structure for delivering risk analysis, which, however, due to the need of its use by all M.Ss and authorities on the field of border surveillance, provides ample postulates, to cover the different provocations, in general.

The general strategy creates obstacles during the creation of risk analysis products, which could be managed with the stipulation of a more specific structure of analysis and measurement of the elements of risk (i.e. the threat, the vulnerability and the outcomes).

More precisely, it is possible to be implemented via an extensive list of risks, as well as indicators which define the size of the aforementioned elements for each risk, in conducting instructions, which are of high specificity but non-restrictive.

The entire process of analyzing can be affected negatively or even withered by the obligation of including the measures of prevention and alleviation of the risks in question in the context of the report.

For this purpose, those measures shall be put in force only when necessary for the process of the analysis.

Those measures should be specified, if needed, with the cooperation among national authorities who are accountable for border surveillance and cross-border crime prevention, as the best practice.

Moreover, risk management approach is not being included in CIRAM 2.0 and it does not involve risk analysis within a risk management process.

Finally, CIRAM 2.0 focus on border control risks, irregular migration and cross border crime without addressing all risks related to I.B.M.

4.3 ISPS Code

With respect to the security of transport, a maritime security framework[43] was introduced[44] by International Maritime Organization (IMO), including the issue of the International Ship and Port Facility Security Code (ISPS)[45,46]. One of the main aims of this Code is to provide a basic methodology for **security assessments**, helping the stakeholders to react to changing security levels.

This methodology is implemented on ship and port security assessment, taking into account the basic risk analysis process[47], nevertheless ship security assessment because of its specific nature, some elements need to be taken into consideration, meaning that the assessment should be specific for each ship or port facility, because each case might be different.

This assessment focuses on threat evaluation, identification of assets that may influence ship or port facility, vulnerability assessment, evaluation of threat-vulnerability-consequences or vulnerability-consequences and risk management and as we mentioned before assessment of the risk must be made in each particular case.

The fact that some maritime security issues create statistical patterns while some others do not, makes more difficult a risk security assessment and moreover the existence of expertise with the appropriate knowledge in the field of security assessment is essential.

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[43] Provide guarantees that a standard of security is maintained on ships and port facilities at international level

[44] International Convention for the Safety of Life at Sea, 1974
https://www.ifrc.org/docs/idrl/I456EN.pdf
http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx

[45] https://www.marineinsight.com/maritime-law/the-isps-code-for-ships-a-quick-guide/

[46] According to the basic methodology provided by ISPS Code, two approaches were also developed in the area of security assessment: The United States Coast Guard Security Guidelines for Vessels and the NSA "Guideline for Performing Ship Security Assessment". Those approaches provide guidelines on what to do regarding security assessment, but not too much how to do it.

[47] Identification of threats, vulnerabilities, evaluate the probability of happening, its possible impacts and the most suitable countermeasures to minimize the threat or mitigate the impact of them.

4.4 Hazard & Operability Study (HAZOP)

The Hazard and Operability Study (HAZOP)[48] is a qualitative method for **risk identification**, usually implemented employed in the chemical[49] and petroleum industries, as well as engineering field[50].

HAZOP is a systematic way to identify possible hazards[51] in a work process.

4.5 Failure Modes & Effects Analysis (FMEA)

Failure mode and effects analysis (FMEA) is a risk analysis method applied in industries[52]. The HAZOP technique resembles the effects analysis method and the failure mode.

It resembles the effects analysis method and the failure mode. It focuses on potential failure modes of systems or components to determine their causes and effects, instead of distinguishing deviation from the design plan. However, this technique also focuses its attention on the evaluation of the severity of those effects.

What an FMEA study does is to assume some possible component condition and try to determine the equal influence on the overall system, from the specific to the general view. However, in general, any system can also be interpreted with a deductive strategy, reasoning from general to specific.

4.6 Fault Tree Analysis (FTA)

Fault Tree Analysis[53,54,55] is a method for punctuality and safety analysis. It is used for complex systems, which enables analysts to identify all possible combinations of events that may occur and all its causes.

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[48] http://pqri.org/wp-content/uploads/2015/08/pdf/HAZOP_Training_Guide.pdf
[49] https://www.sciencedirect.com/topics/chemistry/hazard-and-operability-study-process-safety
[50] https://www.sciencedirect.com/topics/engineering/hazard-and-operability-study-process-safety
[51] Hazard: a danger or risk (Definition of hazard in English by Oxford Dictionaries)
[52] http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.419.7912&rep=rep1&type=pdf
[53] https://www.sciencedirect.com/topics/engineering/fault-tree-diagram
[54] https://www.sciencedirect.com/topics/materials-science/fault-tree
[55] https://www.smartdraw.com/fault-tree/

FTA can produce both qualitative[56] and quantitative[57] information and represents graphically logical relationships between failure events. The created pathways connect events and conditions, using standard logic symbols (AND, OR, etc.).

FTA describes the risk-based path to a root cause. Identified risks causes actions which are intended to mitigate the risk before the project begins.

HAZOP, FMEA and FTA are considered to be the most common risk assessment techniques developed for the assessment of vulnerabilities and the identification of critical points.

Advantages

Some common advantages within the techniques described in the previous sections can be summarized as follows:

- The level of detail a system is analyzed guarantee that almost all possible failures in the system will be identified as well as (if such information is available) the likelihood of occurrence and consequences, defining in that way which parts of the system present a higher level of risk. Therefore, a system analyzed with these techniques becomes more reliable.
- The system can be analyzed to a certain level which ensures that all potential system malfunctions along with the occurrence and the consequences if any information is provided, will be and therefore, defining which parts of the system display a higher level of risk.
- A system is examined more thoroughly if a team of experts is working on it. The diverse culture of each member of a group, as well as their different experiences concerning the analyzed system, accommodate any issue in an advanced way and via different point of view.
- The different steps of these methodologies can be recorded systematically in well-structured formats and reports, which is one of the main advantages thus it also provides the essential documentation for the requirements of the security management system.

[56] Causes and weaknesses of the project
[57] Probabilistic estimation of the top event.

- FTA can give us a better understanding of the security system operation. In the process of building the trees, one can identify various vulnerabilities as well as significant segments of the ship system, that are not so apparent. The efficiency of FTA for security evaluations arises when this technique is used qualitatively.

  Summarizing, we could say that these techniques perform an assessment in a structured and systematic way ensuring the identification of certain problems that are not so obvious.

Disadvantages

The common disadvantages in HAZOP, FMEA and FTA are the following:

- The right team can make a real difference since if the team does not match then results may not be achieved. The study could fail, as the potential team will not be able to cover all the possibilities a problem could involve if the correct balance between expertise and experience is not achieved.
- The team of experts needs extended meetings to develop the work and this designates high costs, as these studies are excessively time-consuming. The study's costs should be measured against the cost associated with the occurrence of an undesired event.

4.7 Canadian Standard: CAN/CSA – Q634

A detailed description of a framework for risk estimation can be found in CSA Standard CAN/CSA-Q634[58]. This document is giving full outlines of the risk analysis guidelines for selecting and implementing **risk analysis techniques**, primarily for **technological hazards**.

This Standard describes the idea, extent, and goal of the risk analysis process. Moreover, it presents the needs for the risk analysis process and it describes applicable risk analysis methods.

[58] http://www.scc.ca/en/standardsdb/standards/5013

The above mentioned method does not make available exact standards in order to establish the need for risk analysis, it does not state exactly the type of risk analysis method that is required for a given situation. Moreover, it does not propose extensive guidelines for particular hazards and it does not address insurance, legal, or financial interests.

4.8 Methodological Framework for Risk Assessment

The proposed methodology is based on the development of a Methodological Framework for Risk Assessment, in order to confront the issue of illegal border crossings (irregular migratory flows) and cross-border crime at **sea borders**[59].

This methodology expands the conventional method of risk evaluation (risk = probability x impact), through an exhaustive study of the various aspects of the problem, such as:

i. A combination of various parameters (eg vessels, land forces, communications, including satellites, legal issues),
ii. Risk-aware resource management framework,
iii. Operational risks (disembarkation areas, transit time, organized networks),
iv. Resource management (human and resource management,
v. Historical data from national and international organizations,
vi. Economic impacts in local and national level
vii. Social impact.

More specifically, the proposed methodological framework includes:

- *Risk assessment of geographical reference areas*. It also includes cost analysis.

[59] For a PhD in Shipping and Business Services from the University of the Aegean – Vassilios Grizis "The Geopolitical Dimensions of Maritime Border Protection and Risk Management" (page 255-260)

- *Risk identification*: Identify weaknesses that affect the process of surveillance of maritime borders. Analysis of the causes that brings out various risks.
- *Vulnerability assessment:* Vulnerability is expressed as (Houdjik 2012): Vulnerability = exposure * vulnerability. In the case of this framework, the vulnerability relates to the investigation of vulnerabilities (for the admission of irregular migrants) into the operational area of responsibility of the maritime border surveillance system.
- *Risk Analysis*: defines the nature and relative size of the risks. Priority assessment of risks for further analysis is made. In particular, the likelihood of occurrence and impact on the objectives of the maritime surveillance system (target identification and identification) is assessed for each significant risk.
- *Security measures*: refers to the strategic management of risks and the parameters of influence.
- *Risk management*: includes procedures for designing and taking risk management measures

When comparing the two methodologies namely the comprehensive risk assessment approach of Mr. Grizis and the new methodology, which will thoroughly be analyzed in chapter 6, we will see some similarities (in the scientific approach and the use of multiple data) but also main differences in the way risk is assessed. Mr. Grizis is following a methodology in which risk consist a basic element and is the first step in the assessment process. More specifically the first step is to recognize the risk. In doing so he doesn't fully take in consideration the dynamic and constantly changing nature of the threat.

The second step is to assess the vulnerability that according to the methodology he follows is only the gaps in the system. In the new methodology the vulnerability consists of two constituent parts, that is the national combating ability and the pull factors. By assessing the national combating ability, the analyst is taking in consideration the resources and the

tools that the system has in its disposal in order to counter react to pressure from the migratory flows. In this way, the gaps of the system are indirectly assessed and the analyst has already fully recorded the capabilities of the system at a given period. Assessing the pull factors is equally critical since the national system is not isolated but interconnected with other external social, political and economic factors that exercise pressure at it.

Another obvious difference is that with the new methodology the analyst does not need to spend time and resources to assess the impact since it is already incorporated in the methodology with the form of weighting of the factors. By doing so the new methodology is more objective and does not give space to subjective judgment of the analyst.

Another difference is that while the steps of the risk management and the mitigation measures are almost identical in the new methodology the counter measures applied are decided as a part of the process while in Mr. Grizis methodology the measures are a different step that is applied before the risk management process comes to concrete conclusions.

CHAPTER 5 – Border Management

5.1 General

"Facilitation of authorized flows of persons, including business people, tourists, migrants and refugees, across a border and the detection and prevention of irregular entry of non-nationals into a given country. Measures to manage borders include the imposition by States of visa requirements, carrier sanctions against transportation companies bringing irregular migrants to the territory, and interdiction at sea. International standards require a balancing between facilitating the entry of legitimate travelers and preventing that of travelers entering for inappropriate reasons or with invalid documentation".

The term and definition is listed in accordance with the I.O.M. Glossary[60]

5.2 I.B.M

Art. 4 of the Regulation (EU) 2016/1624 (European Border and Coast Guard Regulation)[61] describes the main eleven (11) components[62] of the I.B.M.[63,64], which are the following:

[60] https://www.iom.int/key-migration-terms- IOM, Glossary on Migration, International Migration Law Series No. 25, 2011

[61] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R1624

[62] See complete descriptions in article 4 – these are only shortened versions

[63] https://ec.europa.eu/home-affairs/content/european-integrated-border-management_en

[64] According to the Roadmap for the implementation of EBCG 2.0, dated 1st July 2019, Frontex should produce a first Strategic Risk Analysis for European Integrated Border Management (EIBM) by December 2019. Based on this report, the European Commission will then develop policy priorities and guidelines for a 5-year strategic policy cycle on EIBM "defining how the challenges in the area of border management and return are to be addressed in a coherent, integrated and systematic manner" (see art.3 and art.8 EBCG 2.0). Thereafter, the MS will establish their national strategies on EUIBM.
The Strategic Risk Analysis should be prepared every two years, in close consultation with the Member States, and submitted to the European Parliament, the Council and the European Commission (art.30 EBCG 2.0). The multiannual strategic policy cycle will inform integrated operational, contingency and capability development planning (art.9 EBCG 2.0).
In this context, an internal and external consultation process has been launched to actively consult with all stakeholders and obtain essential input (art.30 para.2 & 4 EBCG 2.0).
The analysis will then allow the European Commission identify how EIBM should address the future challenges of illegal migration and cross-border crime in a comprehensive manner.
http://www.europarl.europa.eu/cmsdata/185405/CAAR%202018.pdf
http://www.europarl.europa.eu/doceo/document/A-8-2019-0076_EN.html
https://ec.europa.eu/commission/sites/beta-political/files/soteu2018-border-coast-guard-regulation-631_en.pdf

a. Border control
b. SAR operations during border surveillance operations at sea
c. Risk analysis
d. Cooperation with 3rd countries
e. MS Cooperation supported and coordinated by the E.B.C.G.A.
f. Inter-agency cooperation
g. Measures within the Schengen area
h. Return
i. State-of the-art technology
j. Quality control mechanism
k. Solidarity mechanism, EU funding instruments

In addition to eleven (11) strategic components there are also currently three (3) horizontal topics identified (education and training, Research & Innovation, fundamental rights) which should be covered when operationalizing and implementing the strategic components and especially when developing the strategies.

Aim of the European I.B.M. is to manage the crossing of the external borders efficiently; address migratory challenges and potential future threats; contribute to addressing serious crime with a cross border dimension related to external border; ensure high level of internal security; respect fundamental rights and safeguard the free movement of persons within the Union.

European I.B.M. is based on four-tier access control model which covers measures in third countries, measures with neighbouring third countries, border control measures at the external borders, risk analysis and measures

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Mega-trend: https://ec.europa.eu/knowledge4policy/publication/megatrends-hub-explore-website-14-pages_en
https://ec.europa.eu/knowledge4policy/foresight/megatrends-implications-assessment-tool_en
The priorities of the EU Policy Cycle – EMPACT: https://www.europol.europa.eu/empact
The EIBM components as defined in art.3 of new EBCG Regulation
http://data.consilium.europa.eu/doc/document/ST-5247-2018-INIT/en/pdf

within the Schengen area and return. The responsibility[65] of I.B.M implementation is shared between E.B.C.G.A. and M.S Border and Coast Guard Authorities[66].

Essentially, the European Integrated Border Management Model includes the establishment of a technical and operational strategy by which the national strategies of the Member States should be harmonized.

European Border Surveillance System (EUROSUR)[67,68,69,70]

Regulation (EU) No 1052/2013, established a common framework for the exchange of information and for the cooperation between E.U States and Frontex to improve situational awareness and to increase reaction capability at the external borders for the purpose of detecting, preventing and combating irregular immigration and cross-border crime and contributing to ensuring the protection and saving the lives of migrants.

5.3 Africa[71]

African Union has passed a number of regulations since the late 1990s, regarding the implemenation of border management strategies.

In May 2012, a draft strategy document was finilished describing the three pilars on which the strategy rests.

In general, border management is influenced by various variables such as: country's border (type and length), economic and anthropological features, legal status.

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[65]Article 5 – Regulation (EU) 2016/1624: Member States shall retain primary responsibility for the management of their sections of the external borders.

[66]When carrying out border control tasks.

[67]https://ec.europa.eu/home-affairs/what-we-do/policies/borders-and-visas/border-crossing/eurosur_en

[68] Regulation (EU) No 1052/2013 of the European Parliament and of the Council of 22 October 2013 establishing the European Border Surveillance System (Eurosur) https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32013R1052

[69]https://ec.europa.eu/commission/sites/beta-political/files/soteu2018-eurosur-report-632_en.pdf

[70]http://www.mopocp.gov.gr/index.php?option=ozo_content&perform=view&id=6413&Itemid=664&lang=EN

[71] "Border Management and Security in Africa" by *Dr. WafulaOkumu* (Senior Capacity Building Officer for the African Union Border Programme (AUBP), Addis Ababa, Ethiopia.)

The management of African borders seems to be affected by various factors which are identified in Europe and America.

Measures are proposed in order to ensure border security, such as: the adoption of a strategic plan on border security-management, identify border chatacteristics and its impact, implementation of border agreements, creation of bilateral institutional framework, use of Border security management strategies like I.B.M.

5.4 Italy

Border management and migration control are the strategies to limit migratory flows.

Key issues related to the implementation of Italian border management and migration control measures are primarily related to: a) access to the national territory for asylum seekers b) the 'hotspot approach'[72] and c) the externalization strategy[73].

5.5 Spain

Regarding the prevention, control and organization of migration flows through Spain's external borders, competent authorities monitor and control access, as part of the EU's I.B.M. system.

It is mentioned that Spain has increased its human resources, the use of surveillance techology and has signed readmision aggrements.

In 1993 in Ceuta and in 1996 in Melilla, border fences were construncted. In 1998, the Plan Sur was implemented, improving surveillance of land, air and ports. In 2001, the government began to implement an Integrated External

[72] http://www.europarl.europa.eu/RegData/etudes/BRIE/2018/623563/EPRS_BRI(2018)623563_EN.pdf

[73] Italy has signed several agreements with North African countries.
Towards the countries of origin, such as Libya, strengthening the relations with other countries, is a strategy to mitigate the phenomenon of irregular immigration.
The Memorandum of Understanding (MoU) signed between Italy and Libya in 2011 emphasized the need to strengthen cooperation in combating smuggling of migrants and terrorism. The same holds true for the MoUs signed between Italy and Sudan in 2016 and Italy and Lybia in 2017.

Vigilance System (SIVE), a high tech electronic surveillance and interception system that the Spanish Civil Guard uses to monitor the Spanish coast.

Moreover, we should mention the creation of Africa Plan, in order to control flowa with Saharan African countries. Project Seahorse and Seahorse Network has been developed by spain within the framework of the AENEAS Project, whose objective is to promote cooperation with third countries on immigration and Asylum.

In 2006, the Canary Islands Regional Coordination Centre (CCRC), was created in 2006, whose purpose was to facilitate the coordination between different national, European and local institutions in the fight against irregular immigration by sea.

Spanish National Security Strategy[74] reflects the risks and treats that need to be taken into consideration and establishes strategic lines of action in the priority areas.

Finally, operations carried out by FRONTEX on the Spanish territory, is of add value on the issue of border management.

5.6 USA[75]

With the formation of a new agency, U.S Customs and Border Protection (CBP), continue to accomplish its traditional mission, the prevention of illegal migration in the U.S, as well as preventing terrorists and terrorist wearons from entering the United States.

The Border Patrol's strategy consists of five main objectives, including deterioration of illegal entries through improved enforcement. It identifies threats and vulnerabilities, re deploying all the necessary personel, equipment, technology and border infrastructure.

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[74] https://www.dsn.gob.es/sites/dsn/files/2017_Spanish_National_Security_Strategy_0.pdf

[75] National Border Patrol Strategy – Office of Border Patrol (U.S Costums & Border Protection (September, 2004)
https://www.hsdl.org/?view&did=457100
https://www.cbp.gov/border-security/along-us-borders/overview
https://www.cbp.gov/sites/default/files/documents/bp_strategic_plan.pdf

Conclusion

Despite the different border management systems, there is a common purpose, which is the more effectively response to diverse migration and border management challengeson the national, regional and international level, by improving the policy, legislation, operational systems, human resources, administrative and technical structures.

CHAPTER 6 – New methodology

6.1 General

Risk analysis methodologies in use, and in particular the domain regarding border vulnerability, it is noted to be related either with border penetration or internal security gaps. As such, it was not taken into account that vulnerability is a multipart phenomenon that consists of two constituent parts, that is the national combating ability and the pull factors.

Assessing the pull factors is equally critical since the national system is not isolated but interconnected with other external social, political and economic factors that exercise pressure at it.

The new methodology takes into account the limited resources of the countries in the assessing process and incorporates the impact with the form of weighting of the factors. In this way the analyst does not need to spend time and resources to assess the impact since it is already incorporated into the analysis and also is more objective and does not give space to subjective judgment of the analyst.

Another innovation of the new methodology is that applies similar procedures for the assessment of the threat but instead of taking into account the pull factors of the country, incorporates the push factors that force the immigrants to leave their homelands and seek refugee or better conditions of life in other countries.

Push factors play a critical role and this became apparent in 2015, with the deterioration of the war in Syria, where external factors (threat to the lives of refugees, the need for a better future) forced a huge number of people to cross the border illegally.

Despite the immediate reaction and reinforcement of border security measures, this number dropped when the situation in their countries of origin has calmed down.

To further understand the influence of external factors on mixed migration flows, we can consider the impact of Turkish Invasion of Afrin on

20.01.2018[76,77] or the Turkish military operations on northern Syria on 09.10.2019[78].

In the current chapter, we describe the proposed research methodology, applied in the study of the vulnerability of the internal and external borders of Greece.

Summary of steps

Step 1: We will identify the pull factors, that may affect vulnerability and more specifically their general categories, which we will then specify them.

The scope is to give relevant weights for the general categories[79] as well as the specified ones. In order to set those weights, we first have to identify the impact of each general category in total and then the impact of each sub-category in relation to the general category of the pull factor that belongs.

Those elements correspond to the first category that influences the vulnerability.

Step 2: National Combating Ability of illegal migration phenomenon, will consist the second category that could affect vulnerability. This ability will depend on three major intermediate variables, which will be divided into minor variables. In order to set the relevant weights, as well, we will follow the same procedure as before (step 1).

Therefore, vulnerability will be the sum of those two categories

V = Pull Factors + National Combating Ability (6.1)

Step 3: We need to evaluate the individual variables of the two (2) categories by a scale that the analyst determines (usually 0-1 or 0-10). Then,

[76] http://www.ekathimerini.com/243485/article/ekathimerini/comment/koumoutsakos-to-kathimerini-worrying-increase-of-migrant-flows-in-the-aegean (dated on 11.08.2019)
[77] https://data2.unhcr.org/en/situations/mediterranean/location/5179
[78] President Recep Tayyip Erdoğan's long-term plan was the creation of a safe zone in the region for the return of millions of Syrian refugees.
[79] We have two options regarding weighted ranking for the general pull factors categories: either we use equal weights, either we use different ones.

using mathematical formulas, we will determine the final score, which will represent the level of vulnerability.

It is notified that for the completion of the rating, it is necessary to have specialized information. It is understandable that, due to the sensitive nature of these data, and furthermore due to the need to set up special committees consisting of competent experts of various bodies to meet the needs of this work, the completion of the evaluation phase will be carried out with the help of simulation.

For the final determination of the level of vulnerability, we will use a forecasting method, in order to assess how this may affect its level. This process will be achieved by the help of scenarios, which will also help us monitor how the allocation of equipment, systems, capabilities, resources, infrastructure and adequately skilled and trained staff can affect border control.

Analysis and determination of the vulnerability level is recorded in the form of a vulnerability assessment, which will contribute to an efficient and high border control and will also help competent authorities to identify and later on propose measures to eliminate any eventual weaknesses and thus serve also the purpose of preventing crisis at the external borders.

6.2 Pull factors

People migrate for a number of reasons. These reasons may fall under these five areas: Economic, Political, Socio-cultural, Environmental and **Geographical**[80].

Those reasons can usually be classified into push and pull factors.

[80]**This specific area is added for the purpose of this research**. It does not line in all countries. It consists a particular case for Greece and could be of added value for other countries such as: Italy, Spain, Portugal, Malt, Cyprus, Poland, Romania The borders of those countries consist E.U external borders and have similar characteristics with Greece in the threats they face or in the vulnerabilities their system is facing. In case of countries such as: Germany, Belgium, Danish, Czech, Luxemburg, which borders do not belong to the category of E.U external borders, the area of geographical reason may not be applicable.

Push factors are those associated with the area of origin, forcing the individual to move voluntarily, and in many cases, forcing them because the individual risk something if staying.

On the other hand, **pull** factors are those that are associated with the area of destination, attracting people to leave their home. Those factors are known as place utility, which is the desirability of a place that attracts people.

For the purpose of this research, **we will focus on pull factors**, because as it was described in the begging of this chapter it consists one of the two categories that affect vulnerability.

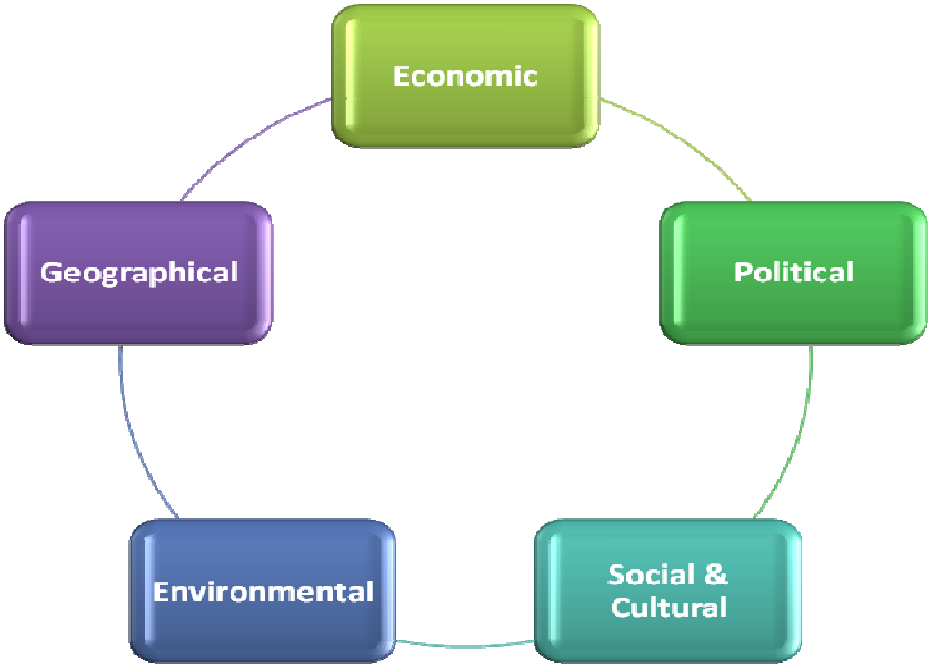

Image 2: Pull factors

- ***Economic[81] reasons***

Pull factors

- More jobs
- Better jobs
- Higher wages
- Opportunities for the future[82]

[81]Economic motives loom large in all human movements, but are particularly important with regards to migration. Lack of economic opportunity tends to push people to look for their futures outside the area of their origin.

Europe, and especially its northern Member States, consist an attractive destination for Irregular Arriving Persons. Europe can offer them a quality of life or security that they cannot find in their home countries and see their future in Europe, despite the difficulties they may face.

Upgrading the level of the workforce in the Northern countries has resulted in a shortage of unskilled or semi-skilled workers in economy sectors such as agriculture, construction industry, household services, etc[83]. This situation makes these countries suitable for the employment of I.A.Ps

I.A.Ps. may influence G.D.P. growth and production, increase labor supply in the area to be employed and mitigate labour shortages. They allow better utilization of productive capacity, by producing non-existent goods and services or lower-priced ones and expanding the production of indigenous workers through their work.

They maintain a significant number of productive activities in the region, limit price and wage / wage applications, improve business profitability and allow the regional economy to remain competitive in one industry or develop advantages over another.

All the above mentioned factors contribute to achieving higher growth rates because low labor costs, high geographical mobility and the employment of certain quality features contribute to increasing domestic production.

In addition, facilitating access to the labor market by I.A.Ps. may have a positive impact on the sustainability of the welfare system and the insurance system.

The increasing aging of Europe's population and the huge decline in birth rates[84] have resulted in a reduction in the labor force and an increased risk of bankruptcy in the E.U. pension systems.

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[82]Temporary compromise in a job with low standards and progressive career up growth, taking into consideration that relevant legal provision exists

[83]Construction, housekeeping, cleaning services

[84]In the European Commission's 2015 report, it is estimated that the aging EU population will increase and employment will decline steadily between 2010 and 2060, assuming potential growth remains stable.

It should be noted that the failure to implement a social protection and legalization policy for illegal immigrants favors black-economy activity[85], as they are an abundant and cheap workforce. This undercutting regime causes revenue to flow to the host state through the employer's failure to pay social security contributions.

The negative effects of migration include over-reliance on certain sectors of the economy by 'foreign' labor, increased expenditures on social benefits, increased needs for social structures, and the fact that most migrant wages do not remain in the host country but is transferred through remittances to the country of origin (slight redistribution of wealth within the host state due to transferring savings behavior - remitting behavior of immigrants).

➢ *Political reasons*

Pull factors

- Principles of political tolerance
- The promise of a better life

It is noted that the movement of I.A.Ps. is likely to foster social reactions such as hostility and fear for immigrants, alienation, etc., feeding support for extreme political forces with an anti-immigration and nationalistic reason.

Moreover, cases of racist violence and internal disturbances are likely to occur, threatening internal public order and security.

In particular, xenophobic and racist phenomena lead to clashes between locals and immigrants, as permanent residents refuse to accept the presence of immigrants in their economy or in their daily life. Also, increase in crime in areas frequented or resettled by migrants (ghettoes), causes difficulties for migrants to integrate, and situations of marginalization and segregation. This jeopardizes social cohesion and political stability, and in particular the emergence of political parties that have a xenophobic or racist agenda.

[85]http://www.sev.org.gr/Uploads/Documents/49757/1_Diagnostic_Report_on_undeclared_work_in_Greece_gr.pdf

In countries where these phenomena are favored, do not suggest an attractive pull factor for I.A.Ps. While countries that have mitigated the above mentioned phenomena and favor multiculturalism, constitute an appealingly destination.

- ***Social & Cultural reasons***

Pull factors

- Principles of religious tolerance
- Good health care and hospitals
- Increased possibility to be closer to family or friends
- Better environment for the children – create family
- Social upheaval[86]
- Cultural proximity

Anxiety and concern about the inclusion of I.A.Ps., when they have a different cultural profile from that of the host country, as the need for preserving the cultural and national identity of the receiving society arises.

Host societies today are called upon to deal with feelings of fear and prejudice against I.A.Ps., as well as discrimination and racist violence. Immigrants are still considered a source of problems by local communities, so they are often victims of abuse and have limited access to social facilities and infrastructure (poor living conditions, inability to access health care, etc.) and are isolated from the rest of the society.

In addition, for the host country, the coexistence of populations of different nationalities contributes to the understanding of other cultures and to the composition of multi-cultural societies. However, the phenomenon of discrimination against migrants, which in extreme cases, leads to social unrest and extremism, is often observed. A typical example is the creation of 'segregation' areas where people of common ethnic origin reside. This is either because local communities cannot "understand" the diversity of immigrants,

[86]Example: Sadiq Khan, the first Muslim mayor of London.

because of xenophobic perceptions and feel safer having them isolated, or because immigrants themselves feel safer surrounded by their own people. There are also cases where immigrants themselves avoid being integrated into societies, fearing losing their identity as there is no 'loss of identity' phenomenon of 'cultural identity', especially for second generation immigrants, who are fully assimilated, from host societies.

➢ *Environmental reasons*

Pull factors

- Attractive environments (mountains, seaside, warm climates)
- Climate suitable for agriculture
- Animal husbandry

In general, climate change, such as drought, adversely affects the crop sector. These are push factors, which are transmuted into pull factors for the countries of destination. New ways are being sought to offer new cultivation opportunities in countries with water reserves, more fertile soil and generally more favorable climate conditions.

In general, climate change is expected to have major effect on human ability to move around. The understanding of "vulnerability" needs to be taken into consideration for future environmental migration, influenced by environmental deterioration, resource depletion and natural threat.

Environmental migrants, will seek a better place that will not undermine their livelihood or even pose a risk to health.

Lack of natural resources forces people to leave their habitat, seeking alternative destinations that will not jeopardize the quality of their life.

➢ *Geographical reasons*

Pull factors

- Geographical position
- Type of borders

The geographical location of a country consists an important role, whether it is the country of final destination or a transit country of the I.A.Ps.

The morphology of the borders and the challenge of their guarding may facilitate the entry of I.A.Ps.

Proximity to countries that are aware of socio-political upheavals and also to developing countries are pull factors for I.A.Ps.

6.3 National Combating Ability

Border security consists an elementary element of the broader border management concept. States are recognized under international law by their capability to maintain their boundaries and secure their territories. The ability to secure national borders is one of the sub-criteria[87] used for states categorization to failed, fragile or successful. A successful state except of the right of the monopoly on the legitimate use of physical force therein has also as one of its main functions the obligation is to protect its citizens from both internal and external threats. In this end every successful state has to be able to prevent and combat every internal and external threat or handle every situation that could potentially affect its status and lead to the deterioration or even the collapse of its functions.

6.3.1 Border permeability

- Geographical position of Greece *(land, sea and air borders)*

In general, strategic location of a country determines its value in the global community and offers opportunities for economic and social growth or allows the country to be part of regional or international organizations (economic, military etc). Sometimes this strategic geographical position can under specific circumstances pose a threat to the country because illegal activities that exist or can take place in its border areas, or the country is a gateway for

[87] The main criterion is "protect and maintain the control of its territory and its borders, or of the monopoly on the legitimate use of physical force therein".

smuggling of persons and goods or drugs trafficking to other countries. Specifically, the strategic location of Greece in the South Eastern edge of the European Continent, in combination with the fact that Greece is a member of the Schengen area consist the country as the main entrance gate for illegal immigrant that have as final destination more economically developed countries of the E.U. This fact sums up to a challenging task for Greece to maintain fully operational functions for the protection of its borders that are also external E.U. borders.

Image 3: Greece locator map[88]

Greece has land borders with Albania, Republic of North Macedonia and Bulgaria to the north, and Turkey to the northeast. The Aegean Sea lies to the east of mainland Greece, the Ionian Sea to the west, and the Mediterranean Sea to the south.

[88] **Source:** Central Intelligence Agency (CIA) – World Factbook, 2014

Image 4: Map of Greece

- Land morphology

The length of the Greek land borders is approximately 1.248 km[89], while the Greek coastline is approximately 20.800 km, while the number of Greek islands and aits, regardless of their size, is 29.369, with the majority of them scattered across the Aegean Sea, creating numerous island chains.

Two-thirds of the Greek territory is covered with mountains[90]. Greek rivers are not navigable, many dry up in the summer and become rushing mountain torrents in the spring.

Greece also features a vast number of islands and consists of a mountainous[91], peninsular mainland jutting out into the sea at the southern end of the Balkans, ending at the Peloponnese peninsula (separated from the mainland by the canal of the Isthmus of Corinth).

[89] Ilias Dimitrakopoulos "Greek Land Borders", PhD Thesis, University of Thessaloniki, 1989, page 66-67 (https://www.didaktorika.gr/eadd/handle/10442/1199).
[90] http://projects.cbe.ab.ca/senatorpatrickburns/landforms.html
https://www.greeka.com/greece-geography/
https://www.quora.com/What-are-the-main-geographical-features-of-Greece-1
[91] Eighty percent of Greece consists of mountains

Specifically,

The Greek - Albanian border of 246 kilometers is mainly distinguished by mountainous parts. Soil morphology and in particular dense vegetation do not favor the operation of illegal circuits in the area concerned, especially in winter when conditions are less favorable.

Image 5: Albania locator map[92]

The Greek - Republic of North Macedonia border, 250 kilometers, is distinguished by lowland sections which in the past offered an outlet for illegal immigrants who wished to follow the Western Balkans route to reach central and northern European countries.

[92] https://www.cia.gov/library/publications/the-world-factbook/geos/al.html

Image 6: Republic of North Macedonia locator map[93]

Greece land border with Bulgaria extends to 531.56 kilometers. Bulgaria is crossed by several transport corridors, amongst them: Greece/Turkey (through the Danube Bridge).

The border between Bulgaria and Greece, begins from the Maritza River, crosses the Arda River, then bends to the west and crosses the Rhodopes (through the Makaza Pass, Tzigansko Gradishte peak, etc.).

Image 7: Bulgaria locator map[94]

[93] https://www.cia.gov/library/publications/the-world-factbook/geos/mk.html

Image 8: The border between Bulgaria and Greece crosses the Rhodopes

The land and river borders between Greece and Turkey, which are predominantly geographically defined by the riverbed of Evros, are 215 km long. Large plain areas on either side of the river are observed, which, although at the first level, appear to be suitable for migratory flows, however, crossing the river is extremely dangerous. The rest of the border lies at a riverside distance of 12.5 km, between Kastania and Nea Vyssa villages in Orestiada – Evros region.

[94] Source: Central Intelligence Agency (CIA) – World Factbook, 2014

Image 9: Greece–Turkey land border, border fence in red[95]

Greece's maritime border with Turkey exceeds 800 km and extends over a large island chain of islands and islets.

At the same time, frequent maritime traffic (the Aegean is crossing the Black Sea) and the very short distance from the Turkish inland borders[96] enhance the transportation of illegal migrants. Specifically, the illegal movement of migrants to Greece is usually via the islands - aits and islets, with the problem particularly intensifying in the Dodecanese islands, as there

[95]wikipedia.org
[96]The islands of the Eastern Aegean are geographically at a short distance from the coast of Turkey

are many uninhabited islands and rocky islands where irregular migrants usually are disembarked by the traffickers.

Traffickers sometimes use high-speed boats to transport I.A.Ps, so they can develop high speeds and increase their chances of escape. In addition, in many maritime areas distances are less than 6 nm, which in combination with the aforementioned, significantly limits the scope for detection and intervention of patrol boats if they do not already exist in the immediate vicinity[97].

The security of the maritime borders of Greece is managed by the Hellenic Coast Guard.

In addition, Greece is responsible for the search and rescue mission in a fairly wide area (FIR ATHENS), which is well over 1 million km^2 (Image 11)[98].

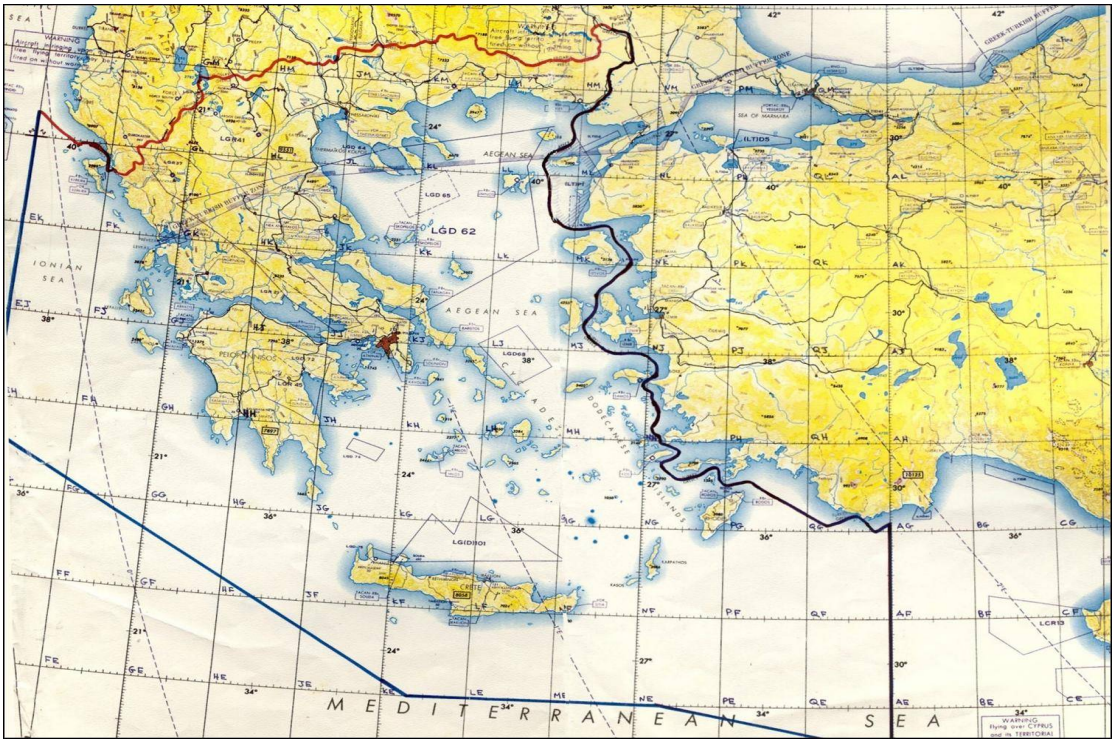

Image 10: Greek sea & land borders

[97]AKRITAS, Advanced Technology and Services Information Coordination Center for Border Surveillance, Cooperation 2011, National Strategic Reference Framework - NSRF 2007-13.
[98]defencegr.wordpress.com

Image 11: Athens FIR compared to neighboring FIR countries

- Infrastructures

  - **Entry – exit points**

Greek borders, are divided into three categories: land, sea and air.

Effective border control is an essential condition for assuring and maintain public order and social living of citizens in the context of effective general policing. However, specific notice is given on the smooth flow of travel, in order insure a fast, secure and efficient movement of goods and persons from the authorized border crossing points of the entry-exit[99].

To achieve effective border surveillance and border controls, Border Guarding Services[100],[101] (B.G.Ss) operate along the country's border points.

[99]Article 3 of Law 4251/2014, Governmental Gazete 1, no 80)

[100]http://www.astynomia.gr/index.php?option=ozo_content&perform=view&id=56&Itemid=618&lang=EN

[101] Presidential Decree 310/1998 "Establishment, organization and operation of the Central and Regional Border Guard Services of the Ministry of Public Order" as amended according to P.D 112/1999 (Governmental Gazete No 80/A'/08.06.1999), P.D 177/1999 (Governmental Gazete, no 166/A/13.08.1999) and P.D 134/2007 (Governmental Gazete, no 172 172/A'/31.07.2007).
http://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=09000016806965ed
http://www.antigone.gr/files/en/library/selected-publications-on-migration-and-asylum/greece/The_Case_of_Kurds_in_Greece.pdf

Among the responsibilities of the B.G.Ss. is the implementation of the policy in place to prevent illegal entry into the Greek territory of foreigners through the border areas and outside the regulated entry points.

With regard to border controls, responsibilities are laid down by national law[102], and the establishment and operation of border crossing points is carried out in cooperation with all relevant Bodies.

Hellenic Police is responsible for the passport controls and the prosecution of illegal immigration, both at the border and within the Greek territory.

Passport Control Services are responsible for controlling the legal movement of nationals and foreigners from the point of entry or exit points within their area of responsibility.

It should be emphasized that the primary objective of the P.C.Ss is the effectiveness of the controls carried out and thus the prevention of any threat to the internal security of the country and public order achieved by the strict application of Community provisions to ensure the necessary level of security and regular movement from the border crossings points[103].

Since 2012, Hellenic Police has set up an evaluation mechanism for its Border Services, with the assistance and support of other relevant bodies, in accordance with the standards of the Schengen Evaluation Committees[104].

Respectively, Hellenic Coast Guard monitors the actions carried out at the frontier, through an institutionalized control mechanism, which systematically assesses the work of the Port Authorities for all their activities and, to the extent relevant to external borders, takes account of the dimensions and procedures of the relevant acquis communautaire[105].

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[102] Law 4251/2014 - Immigration, Social Integration Code and other provisions
https://ec.europa.eu/migrant-integration/librarydoc/law-4251/2014---immigration-social-integration-code-and-other-provisions

[103] Article 5 – REGULATION (EU) 2016/399 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2016 on a Union Code on the rules governing the movement of persons across borders (Schengen Borders Code)

[104] Schengen Evaluation Mechanism
https://www.researchgate.net/publication/331299378_The_Schengen_Evaluation_Mechanism_Exploring_the_Views_of_Experts_in_the_Field_of_Police_Cooperation
https://www.schengenvisainfo.com/etias/
https://www.asktheeu.org/en/details/request/practical_implementation_of_the

[105] Council Regulation (EU) No 1053/2013 of 7 October 2013 establishing an evaluation and monitoring mechanism to verify the application of the Schengen acquis and repealing the

- **Artificial barrier (fence)**

As it was mentioned on the Greek morphology section, an area of the border with Turkey lies at a riverside of 12.5 10 km, located between Kastanias and Nea Vyssa villages in Orestiada / Evros region.

This vulnerability was tackled, when in 2012 Greece built a technical fence preventer (fence) on its border to Turkey to mitigate migration flows through Greek-Turkish land borders[106,107].

According to the Hellenic police, in 2011 a total of 54.974 migrants / refugees illegally crossed the Greek – Turkish land border. While the number was decreased in 2012 (30.433 migrants / refugees) and 2013 (1.109 migrants / refugees). Between 2013 and 2014, an increase of 71.60% was noticed and 2015 compared to 2014, there was an increase of 95,11%, with the number of migrants / refugees reaching 3.713 persons.

2011	2012	2013	2014	2015
54.974	30.433	1.109	1.903	3.713

Table 6: Migration flows regarding Greek – Turkish land borders, between 2011-2015

Source: Hellenic Police

On December 15, 2012, when the fence was finished, only 82 people crossed the Greek – Turkish land border.

Decision of the Executive Committee of 16 September 1998 setting up a Standing Committee on the evaluation and implementation of Schengen
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013R1053

[106] 10.365 metres of fence of 4 metres height was constructed on the land border between Greece and Turkey from Fylakio of Kastanies until the river Evros. The construction that began in May 5th 2012 was completed on December 15th 2012and costed 3 million Euro.

[107] https://euobserver.com/fortress-eu/118565

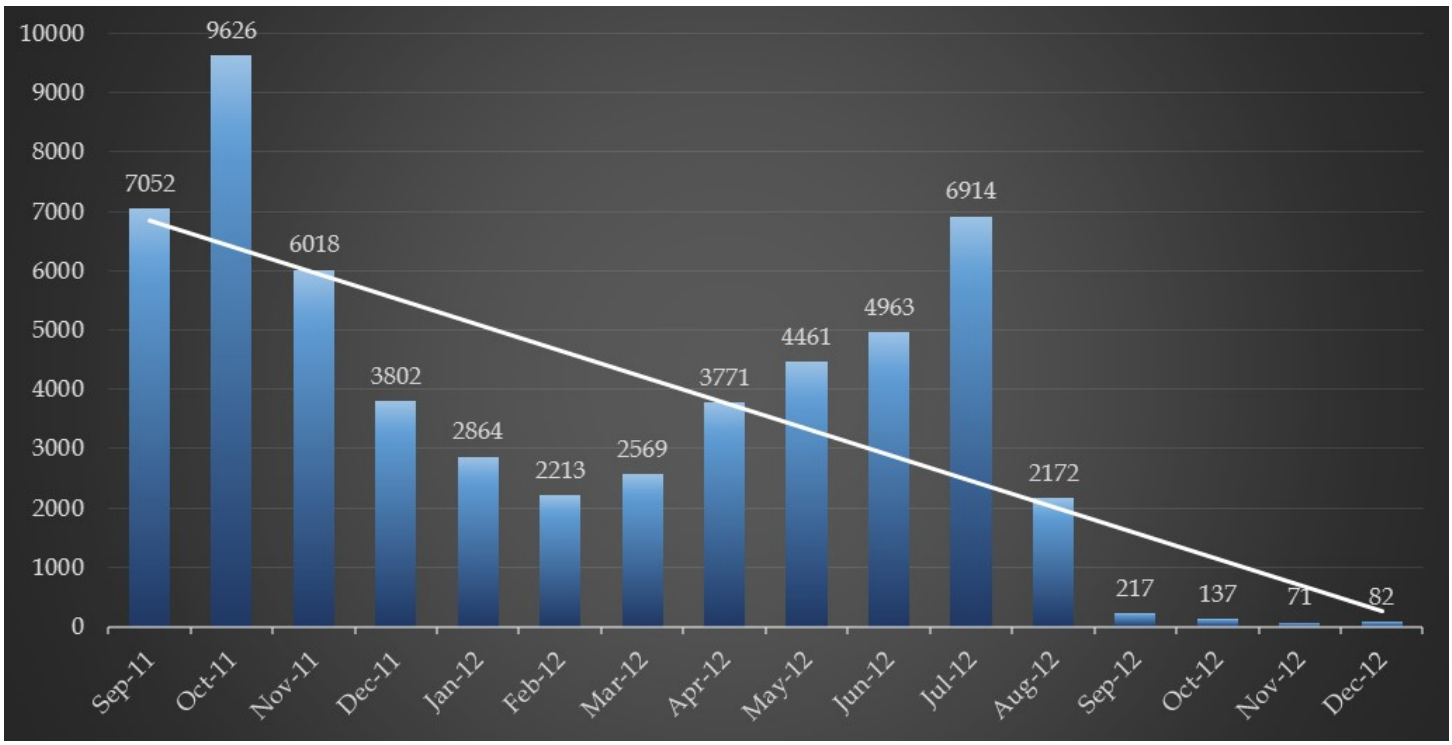

Figure 1: Arrests of illegal migrants / refugees at Greek – Turkish land borders (Sept. 2011 - Dec. 2012)
Source: Hellenic Police

Image 12: technical fence preventer before the flood damage

It is noted, however, that in February 2015 the fence suffered flood damage, which is estimated to have increased the total number of those arrested in the

Greek-Turkish land borders, from 1.930 in 2014, to 3.713 in 2015 (95,11% increase)[108].

Image 13: Technical fence preventer after the flood damage

Image 14: Technical fence preventer after the flood damage

[108] Source: Hellenic Police

Image 15: Technical fence preventer after the flood damage

Finally, it is stated that all necessary steps have been taken to restore artificial barrier's (fence) functionality. It is noted that the fence is fully operational and efficient as it is supported by an automated camera system[109] and is monitored 24/7 by patrols in cooperation with the Hellenic Army and FRONTEX, ensuring its effectiveness.

6.3.2 Operational activities

- National Operational Activities

At national level, the Hellenic Police develops, coordinates and implements strategic plans and measures for the surveillance of land borders and the confrontation of cross-border crime, through operational actions, which are modified according to the needs. Particularly:

[109] Twenty three (23) thermal cameras.

A. National Operation code-named «ASPIDA»[110,111,112,113,114]

The effectiveness of the National Activity has been recognized at both national and European level, as the increased presence of operational resources (personnel and technical equipment) has contributed significantly to reducing illegal migration flows in the Evros region.

B. National Operation code-named «SARISA»[115].

Mission: Control and prevention of secondary migration flows through the activation of Services along the Greek territory (from Attica to the GRC-ALB and GRC-Republic of North Macedonia borders)

Objective: Prevent any attempt for illegal exit from the Greek territory. Reporting the Police Controls at the main road network, Central railway and bus stations as well as Border Crossing Points.

C. Moreover, during 2018, the Action "Strengthening police forces staff to provide security services at the Reception Centers and Identification of the islands of the Eastern Aegean", was launched[116]. This action is being implemented to protect, secure and respond to emergencies in the Hotspots, where immigrants and refugees who illegally enter the Greek territory and operate in the islands of the eastern Aegean remain / host. As part of the action, assistance is provided to the police with appropriately trained and equipped police forces.

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110 "Shield"
111 Combating illegal immigration / Evros region
112 https://www.eliamep.gr/wp-content/uploads/2014/11/MIDAS-REPORT.pdf
113 https://www.eliamep.gr/wp-content/uploads/2014/11/MIDAS-Policy-Paper-EN.pdf
114 file:///C:/Users/265054/Downloads/annual-policy-12a_greece_national_policy_report_part_2_2013_en_version.pdf
115 file:///C:/Users/265054/Downloads/annual-policy-12a_greece_national_policy_report_part_2_2013_en_version.pdf
116 26/05/2019 third modification of the Grant Agreement for Action "Strengthening police forces staff to provide security services at the Reception Centers and Identification of the islands of the Eastern Aegean" by the National Program "Internal Security Fund / Department of Borders and Visas for the period 2014 -2020 " https://www.ydeap.gr/wp-content/uploads/2019/07/63%CE%9C%CE%A446%CE%9C%CE%9A6%CE%A0-%CE%94%CE%9D%CE%93.pdf

- Personnel

It should be noted that the data concerning the police personnel of the Hellenic Police Services, in accordance with the provisions of Articles 5 par. 3 of Law 2690/1999 and 8 par. 1 of Law 3469/2006, in conjunction with no. 109/1981 Opinion of the Council of State refers to the confidential objects of the National Defense and Security of the country, referring to the distribution of the police force, the composition and arrangement of each Service, as well as the manner in which it is available to fulfill its mission.

Hellenic Police, assessing the operational situation at the external borders, adapts actions accordingly, in order to confront effectively illegal immigration.

As part of the implementation of the national operation "ASPIDA"[117], support has been foreseen for police personnel - Special Guards[118].

In addition, Hellenic Coast Guard is sufficiently allocating its resources to confront the phenomenon of illegal immigration, also assisted by personnel and technical means to meet its operational needs.

The Customs Service, in co-operation with the Hellenic Police and Hellenic Coast Guard where required, is planning and conducting Joint Operations against cross-border crime.

- Amenity (equipment)

a. In the framework of the implementation of the National Program of Greece, resources from the Internal Security Fund (ISF) - Borders and Visa (B&V)[119,120], procedures have been launched for the implementation of actions

[117]012/05/2018 4th amendment to the Grant Agreement of Action entitled "Strengthening Police Services with Police Staff (Operation Shield)" from the National Program of "Internal Security Fund / Department of Borders and Visas for the period 2014-2020" https://www.ydeap.gr/wp-content/uploads/2019/07/6%CE%91%CE%9F446%CE%9C%CE%9A6%CE%A0-%CE%96%CE%A5%CE%9B-4%CE%B7-%CF%84%CF%81%CE%BF%CF%80-%CE%B1%CF%80%CE%BF%CF%86%CE%B1%CF%83%CE%B7%CF%82-%CF%87%CE%BF%CF%81%CE%B7%CE%B3%CE%B7%CF%83%CE%B7%CF%82.pdf

[118]http://www.astynomia.gr/index.php?option=ozo_content&perform=view&id=55&Itemid=617&lang=EN

[119]https://www.ydeap.gr/en/isf-b-v-tameio-esoterikis-asfaleias-synora-kai-theoriseis/ethniko-programma-12/

related to country's external land and river borders and the management of mixed migration flows. Indicatively, the following are mentioned:

- Extension of the automated surveillance system on the coastal part of the Greek-Turkish border in the Evros region and interconnection of the Integrated Border and Migration Regional Centers.
- Mobile scanning units to detect any hidden illegal immigrants.
- Mobile heart rate detectors and supply of CCTV camera systems.
- Vehicles of various types.

b. The Asylum, Migration and Integration Fund (AMIF)[121] was set up for the period 2014-20, in order to promote the efficient management of migration flows and the implementation, strengthening and development of a common Union approach to asylum and immigration.

AMIF supports Greek national efforts to improve reception capacities, ensure that asylum procedures are in line with Union standards, integrate migrants at local and regional levels and increase the effectiveness of return programmes[122,123].

c. At the same time, both Hellenic Police and Hellenic Coast Guard, look forward to the financial opportunities that will emerge under the new Multiannual Financial Framework (M.F.F) for 2021-2027 of the E.U.[124], properly prepared, for the targeted and effective use of the funds.

d. Ministry of Foreign Affairs, is a beneficiary of the European Homeland Security / Border Fund and VISA and implements actions related to the VIS

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[120] https://www.ypes.gr/UserFiles/f0ff9297-f516-40ff-a70e-eca84e2ec9b9/ISF-Programme.pdf

[121] https://www.ydeap.gr/en/amif-tameio-asyloy-metanasteysis-amp-entaxis/ethniko-programma/

[122] https://www.ydeap.gr/en/amif-tameio-asyloy-metanasteysis-amp-entaxis/prosklisis/

[123] https://ec.europa.eu/home-affairs/sites/homeaffairs/files/what-we-do/policies/european-agenda-migration/20180615_managing-migration-eu-financial-support-to-greece_en.pdf

[124] COM (2018) 321 final - 2nd of May 2018 - A Modern Budget for a Union that Protects, Empowers and Defends.

information system, infrastructure and equipment upgrades, training, and postings of qualified "field workers".

e. As mentioned, Hellenic Police is responsible for passport controls and the confrontation of illegal immigration, both at the border points and within the Greek territory. For this purpose, Machine Readable Zone (MRZ)[125] and Full Page Readers[126], live scan fingerprinting[127] and cameras are mainly used for the implementation of the common European visa control policy at the external borders, UV illumination devices (UVL), magnifying lenses and travel document benchmarking devices to detect any misrepresentation, heart rate detectors, as well as national and international databases (SIS II, VIS, Interpol etc.) and face control - excluded travel documents.

f. Moreover, thirteen (13) Automatic Passport Control Portals (e-gates)[128,129] have been placed in the Passport Check of Athens International Airport. Their trial began on 29/06/2017 and in February 2018 the Hellenic Police approved, accepted and operated the Gate System. Since the operation of the Automatic Gates, it has been found to be a reliable and secure system of European Union citizens' passage and identification of passengers, who hold new type biometric passports. This system is constantly being upgraded with a view to its continuous improvement.

Image 16: e-gates

[125] https://mrzscanner.com/
[126] http://www.hellenicpolice.gr/images/stories/2018/prokirikseis18/14032018anagnwrisi%20taksidiwtikwn%20eggrafwn.pdf
[127] http://www.fingerprints4all.com/livescan
[128] https://www.news247.gr/technologia/aytomates-pyles-elegchoy-ton-diavatirion-sto-aerodromio-tis-athinas.6491546.html
[129] https://balkaneu.com/athens-airport-gets-automated-passport-control-units/

g. The Customs Service, based on its responsibilities[130], and protecting national interests, uses high-tech means to achieve high efficiency in its controls, such as X-RAY machines, dog detectors[131,132], and accomplishes cross-checks through ICISnet[133]. At the same time, the involvement of the Customs Service in the Passenger Name Records (P.N.R)[134] data usage system will broaden the use of personal information databases.

h. Hellenic Coast Guard is tasked with monitoring and controlling the external maritime borders of Greece[135], on the basis of a surveillance system combined, formed by a set of fixed sensors and a dense patrol network, so that all ships or vessels entering national territorial waters can be spotted and identified. For this reason, it maintains a fleet of inland, land and air means and ensures a cost-effective exploitation, maintenance and high availability.

The planned procurement of a coastal surveillance system, through the utilization of I.S.F funding, is expected to significantly enhance both the operational capabilities of the Hellenic Coast Guard and the general situation, responsiveness, and cost-effective management of available resources[136].

It is noted that, after the national elections in Athens – Greece, July 7, 2019, a new political party took over[137]. On August 31, 2019, under the Presidency of the Greek Prime Minister, Government Council for Foreign Affairs and

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130 Article 3 – Law 2960/2001 "National Customs Code".

131 http://amitos.library.uop.gr/xmlui/bitstream/handle/123456789/3595/%CE%95%CE%9A%CE%A3%CE%A5%CE%93%CE%A7%CE%A1%CE%9F%CE%9D%CE%99%CE%A3%CE%9C%CE%9F%CE%A3%20%CE%9B%CE%95%CE%99%CE%A4%CE%9F%CE%A5%CE%A1%CE%93%CE%99%CE%91%CE%A3%20%CE%A4%CE%95%CE%9B%CE%A9%CE%9D%CE%95%CE%99%CE%91%CE%9A%CE%97%CE%A3%20%CE%A5%CE%A0%CE%97%CE%A1%CE%95%CE%A3%CE%99%CE%91%CE%A3.pdf?sequence=1&isAllowed=y

132 http://amitos.library.uop.gr/xmlui/bitstream/handle/123456789/2333/Deiximos-MAPM-13028-Ergasia.pdf?sequence=1&isAllowed=y

133 Customs Information System

134 https://ec.europa.eu/home-affairs/what-we-do/policies/police-cooperation/information-exchange/pnr_en

135 https://setha.army.gr/sites/setha.army.gr/files/attachments/epitirisi_thalassion_synoron_-_nees_eyropaikes_praktikes.pdf (February 2010)

136 https://www.kathimerini.gr/1031749/article/epikairothta/politikh/systhma-8alassias-epithrhshs-sto-aigaio

137 https://www.euronews.com/2019/07/07/watch-live-greece-elects-2019-is-this-the-end-of-the-line-for-tsipras-and-syriza

Defence[138] was met, in order to take measures and address the increase of refugee flows[139].

Particularly, one of the measures includes the increased border surveillance, in cooperation with FRONTEX and the European authorities, as well as with NATO. In this context, the adoption - after 4.5 years of inactivity of the previous government - of the National Integrated Maritime Surveillance System - a 50 million euro budget system that interconnects the Coast Guard and the Armed Forces systems through the use of new technologies ("simple" and thermal cameras, drones, etc.)

i. Ministry of Foreign Affairs coordinates national consultation on the integration of new European technology systems promoted by the European Commission related to the issuance of Schengen and National VISAs by the competent Consular Authorities through the VIS information system.

j. For the effective control of its external borders, the creation of the Border Guard under the control of the ODYSSEUS[140] program and the ARGO[141] program aimed at co-operating national laws to resolve security issues, border controls, visas and asylum through funding, staff surveys and exchanges.

- Training

Particular emphasis is given to the learning and training of police staff from Border Guards and Passport Control Services, in order to ensure a more effective management of mixed migration flows. In this context, competent

[138] Known by its acronym "KYSEA".
[139] http://www.ekathimerini.com/244101/article/ekathimerini/news/govt-council-decides-on-seven-measures-to-respond-to-migration-crisis
https://www.ethnos.gr/english-version/58255_greece-did-not-have-policy-migration-and-refugee-issue-citizen-protection-min
[140] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2001:0672:FIN:EN:PDF
[141] https://www.euro-argo.eu/content/download/116612/file/Greece_Argo_National_Report_2017.pdf

authorities responsible for the confrontation of this phenomenon, carry out regular trainings on their subject matter.

In particular, participation in training activities on border surveillance and border controls, passport controls, the process of screening, debriefing, and Risk Analysis. Moreover, training on integrated border management and participation in seminars and workshops on the detection of forged travel documents, the modus operandi of I.A.Ps and their traffickers and analysis on.

6.3.3 Effectiveness of countermeasures

- Schengen Borders Code [142,143]

The Schengen area is a territory where the free movement of persons is guaranteed. The countries that have signed the agreement abolished controls at the common internal borders and transferred those controls to the common external borders, in accordance with established common procedures.

In view of this, and in order to combine the free movement of persons without disturbing European security, the SIS II is mainly to compensate[144].

It should be noted that thorough checks are carried out on minors, especially upon departure from our country and are examined Ad-hoc, in accordance with paragraph 6 of Annex VII to Regulation (EU) 2016/399.

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[142]Regulation (EU) 2016/399 of the European Parliament and of the Council of 9 March 2016 on a Union Code on the rules governing the movement of persons across borders (Schengen Borders Code)
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32016R0399

[143]Regulation (EU) 2017/458 of the European Parliament and of the Council of 15 March 2017 amending Regulation (EU) 2016/399 as regards the reinforcement of checks against relevant databases at external borders
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32017R0458

[144]

i. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32007D0533&from=EL
ii. https://ec.europa.eu/home-affairs/what-we-do/policies/borders-and-visas/schengen-information-system_en
iii. http://www.hellenicpolice.gr/index.php?option=ozo_content&lang=%27..%27&perform=view&id=26982&Itemid=898&lang=EN
iv. https://ec.europa.eu/home-affairs/e-library/glossary/second-generation-schengen_en

Security is a source of concern for European citizens, so in order to combat terrorism[145] and tackle issues such as foreign fighters[146], comprehensive border controls, better police and judicial cooperation in identifying suspects and restricting funding are being carried out, the fight against organized crime and the fight against radicalization.

Systematic external border controls[147] were launched in April 2017 for all those entering the E.U, including European citizens, to ensure security in the Schengen area.

The Council adopted the regulation for an entry-exit system[148,149] in November 2017. This system will register entry, exit and refusal of entry information of **non - E.U nationals crossing the external borders** of the Schengen area. The new system is expected to be operational by 2020.

Travelers from third countries who do not need an entry visa to enter the EU should obtain a permit from the European Travel Information and Authorization System (ETIAS)[150,151,152,153,154], which is expected to become fully operational by 2021. ETIAS is an electronic authorization that allows visa-free nationals to travel to the Schengen Area.

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145 http://www.europarl.europa.eu/news/en/press-room/20170210IPR61803/preventing-terrorism-clampdown-on-foreign-fighters-and-lone-wolves

146 http://www.europarl.europa.eu/news/el/headlines/security/20180316STO99922/katapolemisi-tis-tromokratias-ta-metra-pou-lamvanei-i-ee-grafima

147 http://www.europarl.europa.eu/news/en/press-room/20170210IPR61804/stopping-foreign-fighters-at-eu-external-borders

148 http://www.europarl.europa.eu/news/el/headlines/security/20171023STO86604/sengken-exupna-sunora-gia-megalutere-asphaleia

149 https://www.consilium.europa.eu/en/policies/migratory-pressures/strengthening-external-borders/

150 http://www.europarl.europa.eu/news/el/headlines/security/20180628STO06868/europaiko-sustima-adeias-taxidiou-kaluptei-to-keno-stis-plirofories-asfaleias

151 https://www.schengenvisainfo.com/etias/

152 https://www.eulisa.europa.eu/Activities/Large-Scale-It-Systems/Etias

153 https://etias.com/

154 https://www.etiaseurope.eu/

- Asylum Procedure[155,156,157]

Greece, consists an entry point for numerous illegal immigrants – refugees, and for that reason effective border management and implementation of asylum procedures are key factors in order to manage migration flows.

Reforming legislation to deal with asylum claims is essential[158]. The General Committee of the Territory of the Administrative Courts, following a meeting at the Ministry of the Interior on November 8, 2017"[159] to speed up proceedings in international protection cases", in a letter to the relevant Ministers notes that there is "inconsistency in its provisions" Law 4375/2016 », proposing specific legal solutions.

In particular, two (2) key pieces of legislation that extend the length of time for reviewing asylum applications and delay return process must be modified[160].

• Firstly, illegal migrants / refugees have the legal right to resort to an Administrative Court against the negative decision issued both at first[161] and second[162] instance, asking the re-examination of their asylum application[163]. The Ministry of Citizen Protection has called on those seeking an

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[155]https://www.easo.europa.eu/accesstoprocedure
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013L0032&from=en

[156] Regulations: 603/2013 Eurodac & 604/2013 Dublin III
Directives: 2011/95, 2013/33, 2013/32 (L.4375/03.04.2016), 2008/115

[157]Amended proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the European Union Agency for Asylum and repealing Regulation (EU) No 439/2010 A contribution from the European Commission to the Leaders' meeting in Salzburg on 19-20 September 2018.
COM/2018/633 final

[158]https://www.asylumineurope.org/reports/country/greece/detention-asylum-seekers/general
https://europa.eu/rapid/press-release_MEMO-16-2436_el.htm
https://www.ecre.org/wp-content/uploads/2016/10/AIDA-Brief-DurationProcedures.pdf
https://www.ecre.org/wp-content/uploads/2017/05/AIDA-Brief_AcceleratedProcedures.pdf

[159]https://www.kathimerini.gr/939567/article/epikairothta/ellada/anamorfwnetai-h-nomo8esia-gia-to-asylo

[160]**It should be noted that the details provided are related to the status quo before the adoption of the new asylum law on 31.10.2019.**
Law 4636/2019 (Official Government Gazette 169/Issue A΄/1.11.2019) – «International Protection Law»
https://www.asylumineurope.org/news/29-10-2019/greece-new-restrictions-rights-and-procedural-guarantees-international-protection

[161] http://asylo.gov.gr/en/?page_id=75

[162] http://asylo.gov.gr/en/?page_id=78

[163] https://help.unhcr.org/greece/applying-for-asylum/what-happens-after-i-apply/

administrative tribunal to be placed in detention in order to better manage and control them.

• Secondly, the procedure concerning the notification of the applicant on the rejection of the application at second instance, taking into consideration that the deadline for the appeal start the next day after the decision notification date (60 days). The possibility of the service to be done by the lawyer of the applicant or through the Director Reception and Identification center where the asylum seeker resides, is being considered. This will ensure that the person of interest is informed in order to initiate further administrative-legal procedures.

As mentioned before, the Government Council for Foreign Affairs and Defence (KYSEA) in a meeting held on 31 of August 2019, discussed a new "robust" migration policy that will address the stable increase of refugee-migration flows to the Aegean islands, including changes in the institutional framework for the asylum procedure.

Spesifically, abolishing the second part of application examination aiming at - in the event of an asylum application being rejected - the immediate return of the applicant to the country of origin. Always respectful of the acquis communautaire and of the full implementation of the European Union-Turkey Joint Declaration. In this context, Turkey should also meet its commitments.

Moreover, measure includes the increased police inspections on islands and mainland Greece to identify persons who had applied for asylum but their application was rejected by the courts. There are several thousand such cases for which the previous government has taken no action. The Police have already identified approximately 1.000 persons whose return process is underway.

- Vulnerability Assessment

"Vulnerability assessments help to contribute to an efficient, high and uniform level of border control at the external borders of the EU. They enable to identify and subsequently propose measures to eliminate any eventual

weaknesses and thus serve also the purpose of preventing crisis at the EU external borders"[164].

Hellenic Police and Hellenic Coast Guard, actively participate in Vulnerability Assessment processes, under the coordination of E.B.C.G.A., contributing to the development of its Common Vulnerability Assessment Methodology.

In addition, all the competent authorities make sure that both the recommendations of the Schengen Evaluation Committees and the E.B.C.G.A.'s Vulnerability Assessments are implemented within the timeframes provided, by utilizing E.U funding tools.

In this regard, Ministry of Foreign Affairs, assists the Services involved in the efforts made to remedy the weaknesses identified by the European Schengen Evaluation Mechanism, coordinating the actions of the Agencies and acting as a Schengen Evaluation Focal Point.

It is noted that Greece is actively participating in Schengen assessments in other E.U member states, under the coordination of the European Commission. The involvement of relevant Service executives in these evaluations ensures that the participating experts help to ensure the smooth operation of the Schengen area in the rest of the MS and Border Services of our country, through the introduction of best practices, expertise and know-how.

- Deportation process, return & readmission process

Reportedly, upon completion of reception and identification procedures, third-country nationals or stateless[165] persons who do not fall under the provisions of international protection or other forms of protection (vulnerable groups) are referred to the competent police authority by decision of the

[164] https://frontex.europa.eu/intelligence/vulnerability-assessment/
One of the core elements of the new Regulation is that the Agency is now also tasked to carry out vulnerability assessments on Member States' capacity to manage their borders.
[165] https://www.unhcr.org/research/library/3c750b9e2/statelessness-problem-resolving-nationality-status.html

Director of the Center, subjecting them to deportation[166], return[167] or readmission[168] procedures in accordance with the provisions in force[169].

It is noted that almost all I.A.Ps in Greece are applying for political asylum. This has the effect of slowing down the return procedures without the fault of the Services, however efforts are being made by the stakeholders but also changes in the legal framework are being made to shorten the processing time for international requests to protect foreigners who do not fall under the provisions of international protection, in order to facilitate the readmission process in Turkey.

In addition, as a result of the measures taken to manage the migrants hosted in the Reception and Identification Centers in the Eastern Aegean islands, voluntary return to their countries of origin was provided through the I.O.M. Programmes[170].

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166 https://www.globaldetentionproject.org/countries/europe/greece

167 Third country nationals returns in their countries of origin, is the key pillar of integrated external border management.

168 Regarding to readmission process, it is stated that as of 20 March 2016 (date of entry into force of the EU-Turkey Joint Declaration), readmissions to Turkey shall be based on the application of the provisions of the three following Agreements:

a) E.U – Turkey Joint Statement (Brussels, *18-03-2016*).

b) Greece – Turkey Bilateral readmission protocol

c) E.U – Turkey readmission agreement

It should be noted that the readmission process accommodates in the E.U - Turkey Joint Declaration, consists a temporary and exceptional measure and in the event of its termination, the provisions of the bilateral bilateral readmission Protocol and the E.U – Turkey readmission agreement will be applied, where appropriate.

169 https://greece.iom.int/sites/default/files/IOM%20Legal%20Guide_English.pdf

170 https://www.iom.int/assisted-voluntary-return-and-reintegration
https://greece.iom.int/sites/default/files/IOM%20Greece%20Implementation%20of%20AVRR_annual%20report%202_eng.pdf
https://greece.iom.int/en/assisted-voluntary-return-and-reintegration-programs-avrr

Year	Third country nationals arrests[171]	Returns[172]
2016	204.820	19.151
2017	68.112	19.096
2018	93.367	12.744

Table 7: Third country nationals Arrests & Returns, 2016-2018

Source: Hellenic Police & I.O.M data (Migration data portal)

The above statistics, indicate the need to apply the Readmission Agreements in order to accomplish the repatriation of illegal immigrants to their countries of origin.

According to the reports [173] on the Progress made in the implementation of the E.U – Turley Statement, shows it continues to produce tangible results, whatever the problems, ensuring effective management of migratory flows along the Eastern Mediterranean route.

It is noted that Greek Authorities are responsible for the proper implementation of what is agreed in the Readmission Agreement, in respect to the European and international law.

The Asylum Service, with the assistance of EASO, are making efforts to deal with requests for international protection as quickly as possible.

[171] Third country national arrests from Hellenic Police and Hellenic Coast Guard, for illegal entry and stay.

[172] There are two main forms of return migration: voluntary return and forced return.
https://ec.europa.eu/home-affairs/what-we-do/networks/european_migration_network/glossary_search/voluntary-return_en
https://ec.europa.eu/home-affairs/what-we-do/networks/european_migration_network/glossary_search/forced-return_en
https://www.iom.int/assisted-voluntary-return-and-reintegration

[173]Seventh Report on the Progress made in the implementation of the EU-Turkey Statement - COM (2017) 470 final
https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/20170906_seventh_report_on_the_progress_in_the_implementation_of_the_eu-turkey_statement_en.pdf

Dublin III

According to "Dublin III"[174,175] Regulation, it is only possible to apply for asylum in one EU member state. This is not a country of your own choice, but in most cases the country where the refugee first arrived and got fingerprinted. Therefore, in the past, when authorities found the Greek fingerprints of an adult or of accompanied children in their European database (EURODAC[176]), or if they could confirm by other means that a person had first entered the E.U through Greece, they usually tried to deport this person back there.

Following the ECtHR-decision in 2011 until March 2017, deportations to Greece were temporarily halted in most EU-countries.

The E.U Commission recommended to resume Dublin Returns to Greece from the 15th of March, 2017 but to do so slowly.

In September 2015, the European Commission presented a proposal for a Regulation on a permanent crisis relocation mechanism under the Dublin system amending Regulation (E.U) No 604/2013 of 26 June 2013 on criteria and mechanisms for determining the Member State responsible for examining international protection applications by third country nationals or a stateless person ('Dublin system').

The purpose of the regulation is to prevent asylum seekers from being sent from one country to another, but also to prevent abuse of the system by submitting more asylum applications to a single person.

- Security checks[177]

Greece, as the Union's south-eastern external border, has stepped up its security controls across its external borders (land, sea, air). Having as its primary priority the facilitation of cross-border flow while ensuring border security, the competent Authorities involved carry out in-depth controls:

[174] https://ec.europa.eu/transparency/regdoc/rep/1/2016/EN/1-2016-270-EN-F1-1.PDF http://www.europarl.europa.eu/legislative-train/theme-towards-a-new-policy-on-migration/file-permanent-eu-relocation-mechanism
[175] http://asylo.gov.gr/en/?page_id=81
[176] https://ec.europa.eu/knowledge4policy/dataset/ds00008_en
[177] http://data.consilium.europa.eu/doc/document/ST-10152-2017-INIT/en/pdf

- at national, European and international databases (e.g. SIS II, EURODAC)
- at Interpol's databases
- at travel documents
- to third-country nationals
- to E.U nationals

in order to prevent illegal entry by all statutory crossing points, both persons and goods.

6.3.4 Organizational Cooperation – Cooperation with M-S

- Europol

National Operational Plan[178]

On 3 June 2016 Europol's Executive Director Rob Wainwright and the Chief of the Hellenic Police, Lt. General Konstaninos Tsouvalas signed the Greek National Operational Plan[179,180], whose main objective is to target organized migration crime in Greece.

EMPACT[181]

In spring 2017, the EU adopted its next 4-year plan for the fight against serious and organised crime. This plan, known as the **'EU policy cycle'**, will run **until 2021**[182].

[178] Europol Programming Document 2019 – 2021 Adopted by Europol Management Board on 30.11.2018
[179] https://www.europol.europa.eu/newsroom/news/hellenic-police-and-europol-sign-operational-plan-to-combat-migrant-smuggling
[180] **EDOC# 950725v10**. Decision of the Management Board of EROPOL laying down rules on the secondment of national experts to Europol
[181] https://www.europol.europa.eu/empact
[182] http://data.consilium.europa.eu/doc/document/ST-10544-2017-REV-2/en/pdf

The 10 EU priorities adopted by the Council are based on the recommendations identified in the **EU serious and organized crime threat assessment (EU SOCTA)** prepared by Europol as well as other assessments and policies[183].

Image 17: EU fight against organized crime - Ten (10) EU crime priorities
Source: consilium.europa.eu

In line with the EU Policy Cycle for Combating Serious and Organized Crime, Greece is actively involved in actions under the EMPACT Program, which fall under the Strategic Priority of "Fighting Migrant Trafficking", as well as in European J.A.D.

[183] https://www.consilium.europa.eu/en/policies/eu-fight-against-organised-crime-2018-2021/

- International Criminal Police Organization Interpol[184]

International Criminal Police Organization (Interpol), is an inter-governmental organization, helping the police authorities of its member countries to share and access data on crimes and criminals, offering also a range of technical and operational support.

Moreover, Interpol offers investigative support such as forensics, analysis, and assistance in locating fugitives around the world.

- Frontex

Joint Operations[185,186,187]

In addition to the national operational action implemented by Greece in recent years, Frontex's role has been active in the areas of Joint Operations, Risk Analysis and return procedures. Greece, as one of the main gateways for entry of migratory flows into the EU territory, has been actively implementing in recent years Joint Operations in her External Borders (land, sea and air), coordinated by Frontex and the Greek authorities, in which the EU Member States participate, with sufficient personnel and technical equipment and carried out in the Greek territory.

"PeDRA"[188]

Frontex, since November 2016, began collecting personal data of persons suspected of people smuggling, terrorism and other cross-border crimes collected as part of its operation in Greece.

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[184] https://www.interpol.int/Who-we-are/Strategy/Strategic-Framework-2017-2020
[185] https://frontex.europa.eu/faq/frontex-operations/
[186] https://frontex.europa.eu/operations/types-of-operations/
[187] https://frontex.europa.eu/operations/return/
[188] https://frontex.europa.eu/media-centre/news-release/frontex-to-begin-collecting-personal-data-in-greece-on-suspected-criminals-gJzx8D

- Cooperation with EU M-S and third countries

To enhance the effectiveness of external border controls, co-operation is needed, both between the E.U M-S and between the M-S and third countries, such as the exchange of experience in border management issues, as well as cooperation in the field of I.B.M.

Taking into consideration, the current challenges of illegal border crossing and cross-border crime, Hellenic Police further strengthens its actions to achieve practical cooperation with third countries[189], through the international police co-operation services (INTERPOL – EUROPOL – SELEC)[190].

In addition, Hellenic Police actively supports border control actions and cross-border crime by participating in the Cross-border Contact Center in the Promachon area (Greek-Bulgarian border). The main purpose of this service is to combat cross-border crime[191].

Further enhancing co-operation with its neighboring countries, Greece, jointly with Bulgaria and Turkey, launched the 2016 Common Coordination Center at Kapitan Andreevo Border Station in Bulgaria[192]. The aim of the Center is to co-ordinate the three countries, based on information on migration and the fight against organized crime and terrorism, while operating on a 24-hour basis with police officers from the three countries.

Specifically, regarding Turkey, Greece has concluded a bilateral readmission protocol (2002)[193] following the Police Cooperation Agreement signed in 2001[194]. Until the implementation of the E.U Readmission Agreement, this Protocol shall apply. - Turkey (2014)[195], was the only

[189] http://www.astynomia.gr/images/stories/2015/pinakas_symf_ell.pdf.
[190] http://www.astynomia.gr/index.php?option=ozo_content&perform=view&id=50&Itemid=41&lang=EN
[191] http://www.greece-bulgaria.eu/minisite/
http://www.greece-bulgaria.eu/
http://www.greece-bulgaria.gr/
[192] http://sro.sussex.ac.uk/76016/1/Constructing%20the%20Real-Time%20Border%20SRO.pdf
[193] L. 3030/2002 (Official Gazette A' 163/15-7-2002).
[194] L. 2926/2001 (Official Gazette A' 139/27-6-2001).
[195] https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:22014A0507(01)

available tool for readmission procedure for third counties nationals crossing illegally the borders of the two countries.

Respectively, Hellenic Coast Guard seeks to build confidence-building measures with the Turkish Coast Guard, through co-operation on a wide range of initiatives to manage migratory flows in the eastern Aegean and implement customized activities by each Agency within its jurisdiction. The above are implemented on the basis of regular meetings at the strategic level between the Chiefs of the two Coastguards and at the regular level, between the Regional Commanders of the Eastern Aegean[196].

Hellenic Coast Guard looks forward to strengthen bilateral co-operation with third countries in the area of exchange of operational know-how and the organization of joint training activities, in particular on integrated border management issues. As a related initiative, the intention is to conclude a Memorandum of Understanding with the US Coast Guard. (Memorandum of Cooperation with the US Coast Guard), which is currently being consulted by both agencies.

Finally, the full implementation of the "Seahorse Mediterranean" Secure Satellite Communications Network[197,198] will further enhance the possibilities for cooperation and exchange of information with the participating third countries.

With a view to enhance co-operation and exchange of information in the field of integrated border management - with a focus on confronting illegal immigration, enhancing returns / readmission, visa facilitation and combating trafficking in human beings and cross-border crime, Hellenic

[196] https://www.efsyn.gr/ellada/koinonia/186318_synantisi-sto-aibali-gia-ton-syntonismo-ton-aktofylakon-elladas-toyrkias

[197] http://www.panou.gr/%CE%B7-%CE%B4%CE%BF%CF%81%CF%85%CF%86%CE%BF%CF%81%CE%B9%CE%BA%CE%AE-%CF%80%CE%BB%CE%B1%CF%84%CF%86%CF%8C%CF%81%CE%BC%CE%B1-%CE%B5%CF%80%CE%B9%CE%BA%CE%BF%CE%B9%CE%BD%CF%89%CE%BD%CE%AF%CE%B1%CF%82-seah/

[198] https://ec.europa.eu/anti-trafficking/eu-projects/seahorse-network_en

Police and Hellenic Coast Guard have posted Liaison Officer[199,200] in M.S and third countries.

Greek Customs Administration, in the context of Mutual Administrative Assistance, on the basis of bilateral agreements of either the E.U or Greece with third countries and of the 1953 Customs Cooperation Recommendation, exchanges information with third countries on customs issues.

Apart from the existence of an institutionalized communication channel with SELEC, the main cooperation takes place with neighboring countries (Albania, Republic of North Macedonia and Turkey). At the same time, mutual administrative assistance agreements on customs matters have been concluded with the following third countries: Azerbaijan, Albania, Armenia, Bosnia and Herzegovina, Georgia, Serbia, Montenegro, Russia, USA, Moldova, Uzbekistan, Ukraine and Turkey.

Moreover, in the context of Greece's enhanced co-operation with E.U member states and neighboring third countries, as mentioned before, is stepping up its efforts for more effective cooperation in managing external borders and migratory flows.

In particular, cooperation with neighboring countries, in the case of Albania and Republic of North Macedonia, focuses on the exchange of strategic and operational information, with a view to timely identification of migrants and refugees attempting to cross the border without legal formalities, confronting cross-border crime in order to make the necessary resources available and manage them more efficiently.

Concluding, it should be noted that the framework for cooperation with neighboring countries is also shaped by the existing Readmission and Police Cooperation Agreements and is a guide to this effort.

[199] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52003IG0614(01)&from=EL
[200] http://www.ipex.eu/IPEXL-WEB/dossier/files/download/082dbcc54dd56822014dd79013f50139.do

6.4 Weighted ranking & Rating

6.4.1 Weighted ranking

The weighting factors are calculated by the analyst. Identifying weights is essentially a problem of modeling and measuring personal preferences, related to the problem for which we are going to do a risk analysis and not to the country where they are applied.

The process of determining the weights involves the weights normalization phase. Normalization is a preliminary procedure for determining the weighting factors, which is made so that all decision matrix data are comparable, on the same scale.

In decision-making problems different attributes are evaluated based on values and weights. The concept of weighting is the same as the weight given to a criterion. Attribute values describe the qualities, performances, and results of a given alternative (Ding et al. 2016). Attribute weights are the quantification of its value, meaning that are used to measure the value of the criteria among themselves.

At the same time, weights contribute to the estimation of the stability of preferences, offering the possibility to model the decision-making process.

However, there are several specific issues and limitations that arise when determining weighting factors. The limitations of human knowledge and perception as well as the inability to express preference, coupled with the complexity of real decision-making problems, make values and weights uncertain and entail various errors, resulting in distorted outcomes to their prices.

A key element in determining the weighting factors is the experts involved in the process of weighting and analyzing the results. It is a fact that great importance, especially in uncertainty environments, is given to the weighting of the experts, as it is expected to largely determine the end result. It is up to the decision-makers to express their judgment on a decision problem and in

particular to evaluate the importance of a dimension of the problem in order to determine the weighting factors.

For the mathematical modeling of the weighting process, the preference is expressed as the choice of the appropriate value in the binary system. According to modern theories and realistic decision-making conditions, the degree of preference is expressed (DeBaets and Fodor 2010) or even the probabilistic consequence of preference (Robert 1985). Firstly, experts directly express preference for each criterion, or according to some methods such as Delphi[201], and AHP[202] , a preference matrix is constructed for immediate comparison and evaluation (Liu, Chan and Ran 2016).

Weight composition is a very important step in current weighting methods, as it can affect the weighting effect by changing even the ranking of decisions made.

The simplest technique is that of Weighted Arithmetic Mean (Tan, Ip, and Chen 2014). An equally simple and easy-to-use technique for extracting final weight is the Simple Additive Weighting method, where the weighted expected values are aggregated (Fan et al. 2013a). Another simple technique for weight composition, which also leads to the final classification of alternatives, is the estimation of the Weighted Aggregated Sum Product Assessment - WASPAS (Zavadskas, Kalibatas and Kalibatiene 2016). WASPAS technique with zero weighting of the total sum is converted to Simple Additive Weighting technique (Zavadskas, Kalibatas and Kalibatiene 2016).

[201] **Delphi technique**: Method for systematic collection and collation of judgments from isolates anonymous respondents (mainly risk experts) on a particular topic, through the distribution of a questionnaire to experts. Responses are summarized (anonymously) & re-circulated among the experts for comments

[202] The Analytic **Hierarchy Process** (AHP) is a multi-criteria decision-making **process** based on mathematics and psychology
http://www.dii.unisi.it/~mocenni/Note_AHP.pdf
https://www.managementstudyguide.com/analytical-hierarchy-process.htm

6.4.2. Rating (Scenarios)

Image 18: Simplified risk-based assessment process

Step 1 in this process implies a threat assessment. Scenarios should be developed based on the potential threats under specific situations. This step requires an important element of intelligence information that is not always available. For this reason, the model recommends that an initial evaluation should at least consider three (03) types of scenarios.

Step 2 evaluates each scenario in terms of consequences. The consequences are then scored in three levels: catastrophic (3), significant (2) and moderate (1). Usually the appropriate rating at these levels is assigned taking into account the worst scenario.

In **Step 3** each scenario created in Step 1 is evaluated in relation to the vulnerability.

In **Step 4** the consequence and vulnerability scores of each scenario are correlated to determine which of them needs to develop mitigation strategies. For this purpose, three mitigation categories are defined: mitigate, consider and document. Mitigate means that protective measures should be developed to reduce the current level of risk. Consider means that the specific scenario

should be taken into account but protective measures may or may not be developed based on the analysis of each particular case. Document means that the scenario does not require immediate protective measures and therefore only should be documented in order to be considered in future evaluations.

In **Step 5** mitigation strategies are implemented for those necessary scenarios.

Finally, in **Step 6:** Evaluate effectiveness of the scenario (collateral impact).

6.4.3 Case of Greece

It is noticed that, **in case of Greece** we consider that all general pull factors categories, have **equal**[203] weight.

- ***Economic reasons***

Pull factors

- More jobs
- Better jobs
- Higher wages
- Opportunities for the future

Pull factors	Weight ranking[204]	Rating[205,206]	Economic reasons rating
More jobs	0,2	9	9 * 0.2 = 1,8
Better jobs	0,35	6	6 * 0.35 = 2,1
Higher wages	0,2	6	6 * 0.2 = 1,2
Opportunities for the feature	0,25	7	7 * 0.25 = 1,75
Total	1	-	6.85

Table 8: Pull factors weight ranking & rating of economic reasons

- ***Political reasons***

Pull factors

- Principles of political tolerance
- The promise of a better life

[203] Equal weight: giving equal importance in mixed migration flows.

[204] Weight sum is equal to one. General information concerning I.A.P.s. The higher weighting rate reflects the increasing contribution of each variable to the final score for each respective pull factor.

[205] This score serves as an example. The scale varies from 0-1 or 0-10 and gives the country's rating. In the case of Greece, this score gives the final score for the pull factors. **The higher the rating, the more attractive the country is to immigrants.**

[206] **Rating is to a certain degree subjective and depends on the analyst's assessment**. For the, as objective as possible, evaluation the best solution would be the establishment of interdepartmental teams, which will analyze all the factors that may affect it. The current evaluation has been done only for the needs of the current simulation and does not necessarily reflect the situation on the ground.

Pull factors	Weight ranking	Rating	Political reasons rating
Principles of political tolerance	0,5	8	4
The promise of a better life	0,5	6	3
Total	1	-	7

Table 9: Pull factors weight ranking & rating of political reasons

➢ *Social & Cultural reasons*

Pull factors

- Principles of religious tolerance
- Good health care and hospitals
- Increased possibility to be closer to family or friends
- Better environment for the children – create family
- Social upheaval
- Cultural proximity

Pull factors	Weight ranking	Rating	Social & Cultural reasons rating
Principles of religious tolerance	0,2	7[207]	1,4
Good health care and hospitals	0,2	8	1,6
Increased possibility to be closer to family or friends	0,2	9	1,8
Better environment	0,2	7	1,4

[207]Islam, apart from theological differences, is the only living religion so close, both spiritually and geographically, to Orthodox Christianity https://books.google.gr/books?id=wTDcAAAAQBAJ&pg=PA51&lpg=PA51&dq=Islam,+apart+from+theological+differences,+is+the+only+living+religion+so+close,+both+spiritually+and+geographically,+to+Orthodox+Christianity&source=bl&ots=KTZzI3YOi7&sig=ACfU3U2k-kxmYY2_2Jw1Wf2suUWXqTGmEQ&hl=el&sa=X&ved=2ahUKEwiNj-2y1-njAhVHfZoKHdSMCdAQ6AEwC3oECAkQAQ#v=onepage&q=Islam%2C%20apart%20from%20theological%20differences%2C%20is%20the%20only%20living%20religion%20so%20close%2C%20both%20spiritually%20and%20geographically%2C%20to%20Orthodox%20Christianity&f=false (page 51)

for the children – create family			
Social upheaval	0,1	5	0,5
Cultural proximity	0,1	5	0,5
Total	1	-	7,2

Table 10: Pull factors weight ranking & rating of social & cultural reasons

➢ *Environmental reasons*

Pull factors

- Attractive environments (mountains, seaside, warm climates)
- Climate suitable for agriculture
- Animal husbandry

Pull factors	Weight ranking	Rating	Environmental reasons rating
Attractive environments	0,4	9	3,6
Climate suitable for agriculture	0,3	7	2,1
Animal husbandry	0,3	7	2,1
Total	1	-	7,8

Table 11: Pull factors weight ranking & rating of environmental reasons

➢ *Geographical reasons*

Pull factors

- Geographical position
- Type of borders

Pull factors	Weight ranking	Rating	Geographical reasons rating
Geographical position	0,5	9	4,5
Type of borders	0,5	9,5	4,75
Total	1	-	9,25

Table 12: Pull factors weigh ranking & rating of geographical reasons

The aggregate rating score for pull factors will come about when we sum up the individual rating of each factor and divide them by the number of factors[208].

Pull factors	Rating
Economic	6.85
Political	7
Social & Cultural	7,2
Environmental	7,8
Geographical	9,25
Total	(6.85+7+7.2+7.8+9.25) / 5 = **7,62**

Table 13: Pull factors aggregate rating

As noticed previously, in case of Greece, when considering that all general pull factors categories, have equal weight, the same assumption will be made for National Combating Ability categories[209].

Border permeability	Weight ranking[210]	Rating[211,212]	Border permeability rating
Geographical position of Greece	0,5	5	5 * 0,5=2,5

[208] This procedure is followed because we have assumed that all pull factors are of equal weight. If the pull factors were assigned with different weights at this stage, then we would multiply the rating by the new weight ranking for each factor separately and in the end we would simply sum up the scores.

[209] Equal weight: giving equal importance in mixed migration flows.

[210] Which factor is more relevant to the issue of migratory flows

The higher weight ranking reflects the increasing importance for the respective pull factor on the issue of migratory flows.

[211]The higher rankings, reflects the ability of the country to combat the phenomenon.

[212] Rating is to a certain degree subjective and depends on the analyst's assessment. For the, as objective as possible, evaluation the best solution would be the establishment of interdepartmental teams, which will analyze all the factors that may affect it. The current evaluation has been done only for the needs of the current simulation and does not necessarily reflect the situation on the ground.

Land morphology	0,2	5	5 * 0,2=2,5
Infrastructures	0,3	7	7 * 0,3=2,1
Total	1	-	7,1

Table 14: Border permeability weight ranking & rating of N.C.A

Operational Activities	Weight ranking	Rating	Operational Activities rating
National Operational Activities	0,25	7	1,75
Personnel	0,25	6	1,5
Amenity (equipment)	0,25	7	1,75
Training	0,25	6	1,5
Total	1	-	6,5

Table 15: Operational Activities weight ranking & rating of N.C.A

Effectiveness of countermeasures	Weight ranking	Rating	Effectiveness of countermeasures rating
Schengen Borders Code	0,1	6	0,6
Asylum Procedure	0,25	4	1
Vulnerability Assessment	0,15	7	1,05
Expulsion, Return or readmission procedures	0,25	5	1,25
Security checks	0,15	7	1,05
Total	1	-	4,95

Table 16: Effectiveness of countermeasures weight ranking & rating of N.C.A

Organizational Cooperation – Cooperation with M-S	Weight ranking	Rating	Organizational Cooperation – Cooperation with M-S rating
Europol - Interpol	0,3	6	1,8
Frontex	0,5	6	3
Cooperation with E.U M-S or Third countries	0,2	6	1,2
Total	1	-	6

Table 17: Organizational Cooperation – Cooperation with M-S weight ranking & rating of N.C.A

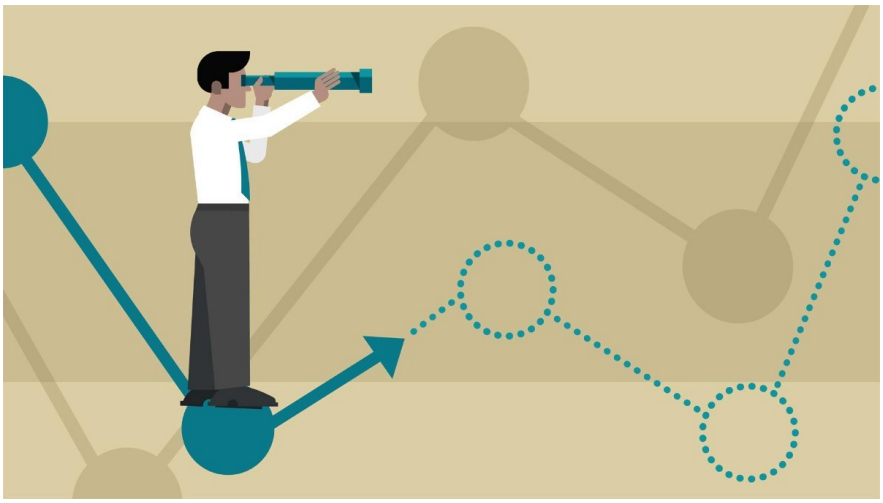
The aggregate rating score for National Combating Ability will come about when we sum up the individual rating of each variable and divide them by their number[213].

National Combating Ability	Rating
Border permeability	7,1
Operational Activities	6,5
Effectiveness of countermeasures	4,95
Organizational Cooperation – Cooperation with M-S	6
Total	24,55 / 4 = **6,14**

Table 18: N.C.A total rating

[213] This procedure is followed because we have assumed that all pull factors are of equal weight.
In case, we wanted at this point, to assign weights, then we would multiply the rating by the new weight ranking for each factor separately and in the end we would simply sum up the scores.

6.5 Forecasting



Forecasting is the process of estimating future events in the most valid way possible based on historical data[214], empirical data and knowledge of future events that could affect it. Stakeholders attach great importance to the forecasting process[215], expecting through this analysis more robust decision-making information in order to achieve their goals.

It is noted that, despite the number of methods developed for better forecasting, it remains an estimate that, as long as unknown factors exist, some error rate will be contained.

Forecasting methods can be based either on mathematical models using the available historical data, or qualitative methods based on the administrative experience of its executives, or a combination of both[216].

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[214] One of the basic principles of statistic forecasting is that historical data should be used, when available, in order to develop forecasting of future trends through their analysis and technical forecasting methods.

[215] Forecasting can be divided into short-term, mid-term and long-term forecasting. The short-term is required for staff planning, and the medium-term for determining future resource requirements in order to purchase logistical equipment or hire staff. Finally, we have the long-term forecasts, which are used in strategic planning.
http://almozg.narod.ru/bible/lf.pdf

[216] Forecasting methods are categorized into qualitative (example: DELPHI method) and quantitative (example: Time series). Qualities are considered subjective and are based on estimations and opinions. Quantitative methods are distinguished by projection methods (time series analysis), causal methods and simulation. Time series analysis is based on the idea that historical observations can be used to predict future observations and deals with the analysis of historical data on factors such as trend, seasonality, etc. Time series forecasting models assume that the variable under consideration will follow the same pattern as in the past.
When choosing the appropriate model for forecasting time series, we must take into account the forecast performance element as determined by forecasting errors. Therefore,

The chronological range of historical data collected and the accuracy of it determine the quality of the information extracted and therefore have an impact on the forecasting and decision making. Of course, in addition to historical data, any knowledge or information of future events that could affect the forecast should also be taken into account.

In conclusion, better decision making requires as wide a chronological range of data if possible, choosing the appropriate forecasting method, but also analysts who, in addition to having a good knowledge of methods and processes, must have an in-depth understanding of the organization and implemented strategy, in addition to being able to collect timely critical information about the future of the entity involved.

For the purpose of this research, the objective is to predict the number of migration flows **over a given period of time**.

It is noted that migration flows forecasting is a difficult task, as flows can vary according to the criteria set for their evaluation. For example, flows can vary from week to week depending on the weather. Therefore, it is understood that based on this criterion, it may be more difficult to predict the pattern of flows to follow.

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stakeholders need to know how to calculate forecast errors and how to identify any errors in forecasting methods.

Forecasting always contain some **error**. Forecasting errors are divided into systematic (bias errors) and random errors. Systematic errors are due to systematic errors in the model, that is, the forecast is always greater or always smaller than the actual one. These errors are often due to overestimation or inaccurate estimation of the model variable. Accidental errors are the result of unpredictable factors that cause the forecast to deviate from the true value. Forecasting error refers to the difference between the forecast and the actual value for a given period. In statistics, these errors are called residuals and are acceptable within certain limits of confidence.

Migration flows are caused by the interaction of several factors sufficiently complex to adequately describe a model. **Therefore, all demand forecasts contain some error**. Various measures such as mean absolute deviation, mean square error, and error standard deviation can be used to measure forecasting errors. If these scattering measures are small, the predicted score is close to actual.

The simulation method allows some hypotheses to be introduced with the forecast.

As noted in Chapter 3, the basic method of risk analysis involves the identification of threats, vulnerabilities and impacts, which contribute to the identification of risk.

It is emphasized that risk identification is essential for the organization to be able to manage uncertainty, since risk is related to changes not only in the internal environment, **but especially in the external**, where the risks of this category are difficult to be predicted and quantified.

Therefore, risks have to be determined and then, in order to measure them, we have to identify the variables that affect their measurement and moreover find their correlation.

The same goes, when it comes to vulnerability, **which is the case of this study**. Therefore, we will describe the steps, we have to follow, in order to accomplish the aim.

Steps description

Step 1: We will determine which statistical data (quantitative variables) we will use for the study.

Moreover, we will examine whether certain conditions are fulfilled.

Specifically:

- The periodicity of the data needs to be considered (statistical data - normal distribution or other type).

- Calculate descriptive statistics

  Measures of central tendency: ex. Mean or Average.

  Measures of location: ex. Median.

  Measures of variability, precision: ex. Sample Variance; Standard Deviation; Interquartile Range; Bias; Level of Confidence; Extreme Values.

Measures of skewness: Asymmetry

Kyrtosis measures: Measure of peakedness of distribution relative to the normal distribution.

Trend following is usually the first step in the forecasting process. The trend refers to adjusting a **line** or **curve** to the data that **shows** the general **trend of size**. This line (or curve) is then adjusted for seasonality, circularity[217], and any other factor that may affect a forecast.

Step 2: Determine the qualitative variables that may affect migration flows (e.g Regional Conflicts / Wars; Climate change effects; VISA issues; Protocols/EU-Third Countries Readmission agreements; Directive for the return of illegal immigrants; Increasing air routes and traveling; Weather conditions)

Step 3: Correlation of Variables

Impact of qualitative variables on migration flows – Correlation with quantitative ones (statistical data) – Methodology

Step 4: Simulation

[217] The cyclicality element is difficult to identify because the cycle of the repetition period and the cause of the circularity of the observations are unknown. The element of cyclicality in migratory flows is usually due to events such as political decisions, war conflicts, economic conditions or social changes.

6.5.1 Quantitative variables - Analysis

The geopolitical developments in the Greater Middle East and the Maghreb, mainly since 2011 and hither, have caused one of the largest movements of people, since World War II, seeking international protection and focusing on the European continent.

Initially in Italy and Greece, from 2015 onwards, were the countries that were found at the heart of this refugee / migration crisis, with official data recording about **1.194.000** entries of I.A.Ps, only in **2014 - 2016** .

In **2016**, there was a significant contraction of migrant / refugee flows in the Greek territory, translated into approximately **204.820** arrests and represents a **decrease of 77.53%** compared to the previous year (2015).

Migratory pressure continued to decline in **2017** as well, with **68.122** detections being reported, a decrease of approximately 67%.

During **2018**, there was an increase in the migration flows in the country, translated to **93.367** arrests, which is an increase of 37.08% compared to the corresponding period of 2017.

2015	2016	2017	2018
911.471	204.820	68.112	93.367

Table 19: Arrests of I.A.P.s for illegal entry and staying in Greece from Hellenic Police & Port Police/Hellenic Coast Guard Authorities, 2015-2018
Source: Hellenic Police

From the following diagram, in addition to the previous observations, we note that the number of I.A.P.s entering the Greek territory[218] in 2016, was the highest in the last 12 years (**excluding 2015**).

It should be mentioned that the implementation of the EU-Turkey Joint Statement of 18/03/2016 (**21/03/2016:** Start of implementation of the EU-Turkey Statement) has restricted uncontrolled influx of I.A.P.s and in particular leading to a flow reduction at the Greek-Turkish sea borders.

[218] Arrests of I.A.P.s for illegal entry and staying in Greece from Hellenic Police & Port Police/Hellenic Coast Guard Authorities, 2015-2018

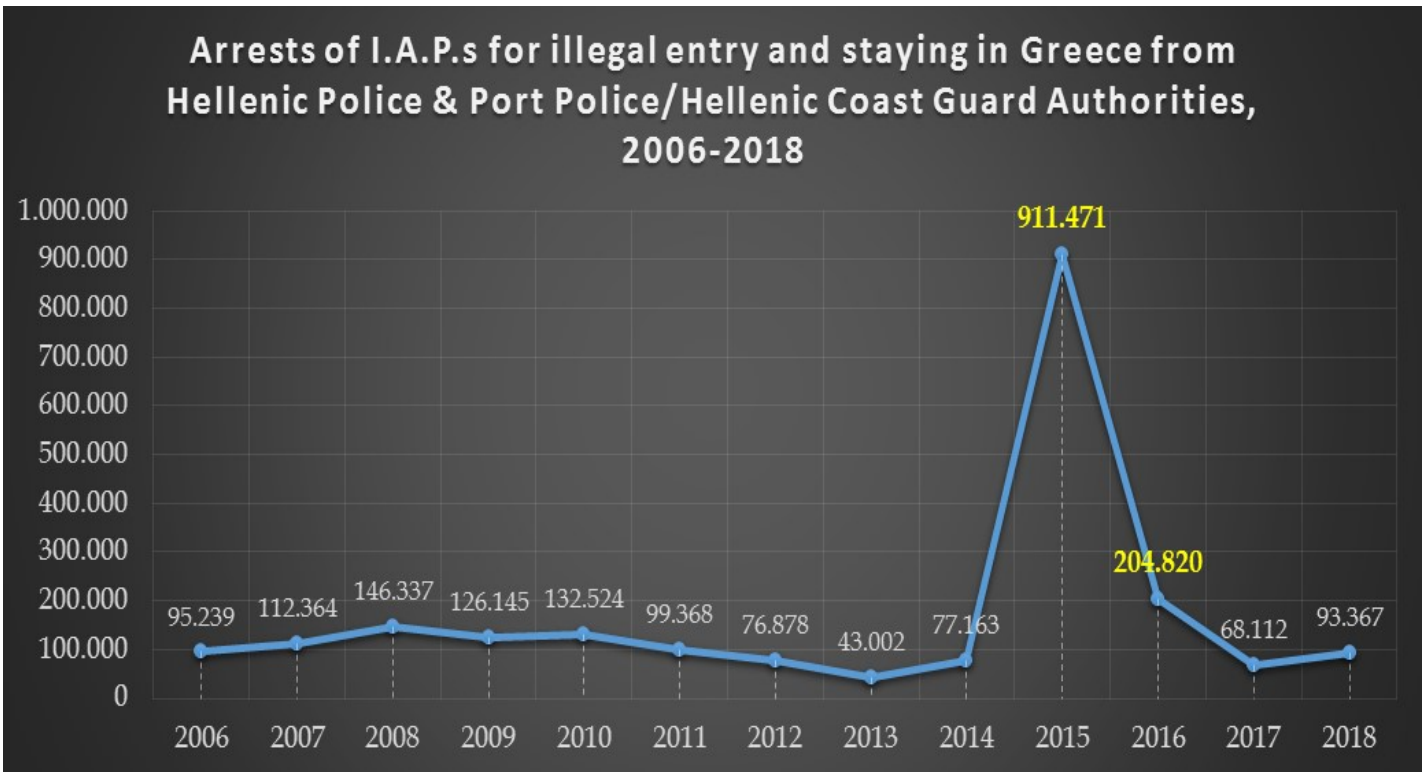

Figure 2
Source: Hellenic Police

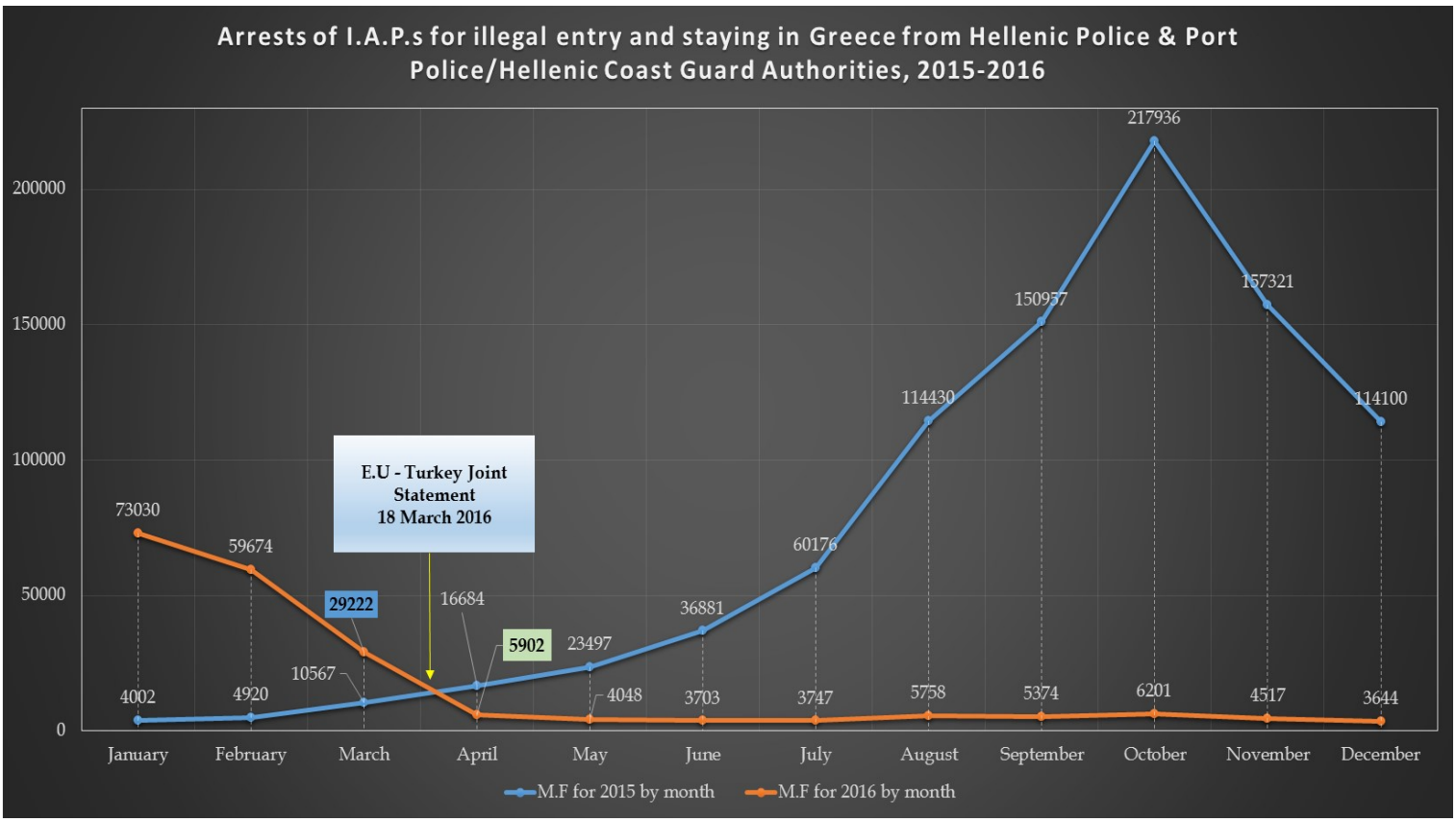

Figure 3
Source: Hellenic Police[219]

[219] http://www.data.gov.gr

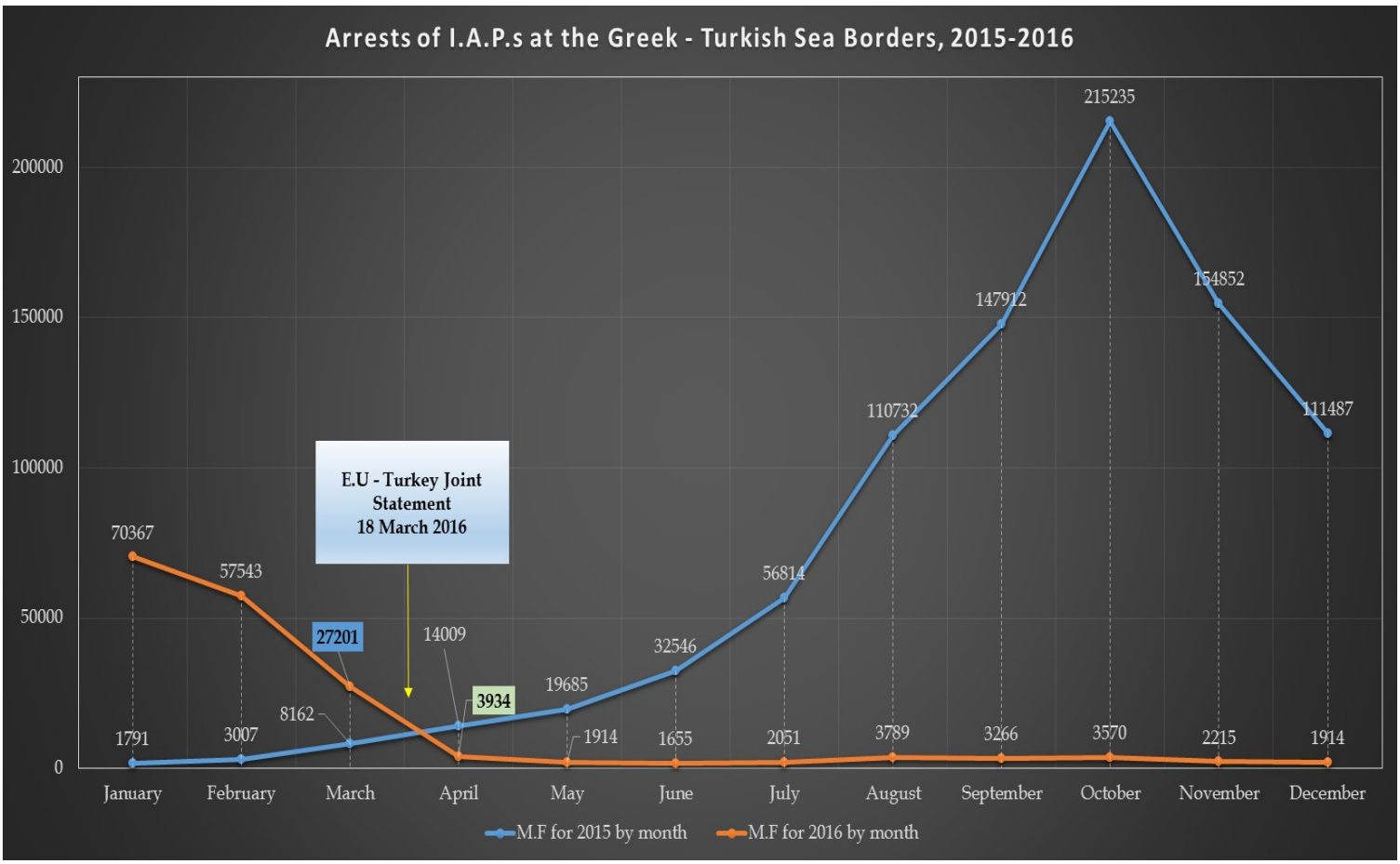

Figure 4
Source: Hellenic Police

It is noted that, when evaluating data related on migration flows, we must **also** take into account **qualitative parameters**, in particular: (a) the situation in the countries of origin of migrants, (b) the information on the accumulation of migrants in neighboring third countries; and (c) pull / push factors which may affect the flows.

The reporting period includes data from 01.04.2016 to 31.12.2018. These data were compiled and analyzed further in order to be used for assessing the vulnerability and the risk and to draw further conclusions. The data referring to the period from 01.01.2015 to 31.03.2016 were not included in the assessment period because they reflect an exceptional period, **especially the one between 01.01.2015 and 19.03.2016,** when immigration took the form of a refugee crisis. If these data were included and compiled with the rest of the

data, we would be lead to invalid conclusions that would affect the validity of the vulnerability assessed level, as well as the forecasting procedure.

The statistics used for the purposes of this research were compiled by the Hellenic Police. Those statistics are related to the arrests of the I.A.Ps for the aforementioned period by place of detection / arrest (Greek-Turkish land & sea borders), month and date.

The following diagrams (figures 5 – 20), show the actual values[220] of the mixed migration flows by place of detection / arrest[221], and in particular the total number of I.A.P.s arrests[222] as well as the **average** flows per month for the years 2016,2017 and 2018[223], calculated on the basis of the **daily** mixed migration flows.

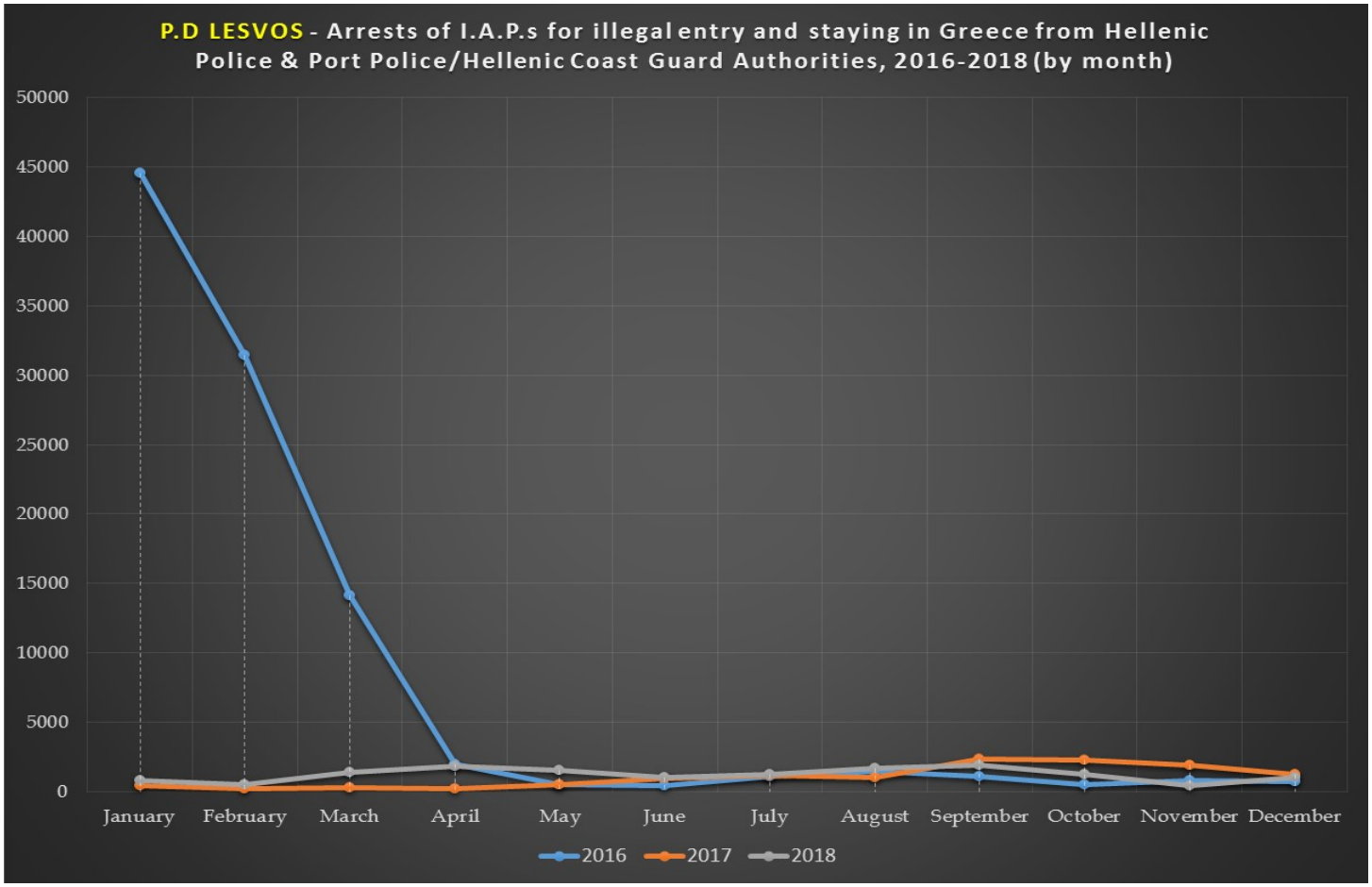

Figure 5
Source: Hellenic Police

[220] **It is noted that due to the sensitive type of information no numerical data will be presented.**
[221] **ANNEX 1**
[222] Total number of arrests of I.A.P.s for illegal entry and staying in Greece from Hellenic Police & Port Police/Hellenic Coast Guard Authorities.
[223] Detailed presentation follows in **ANNEX 2**

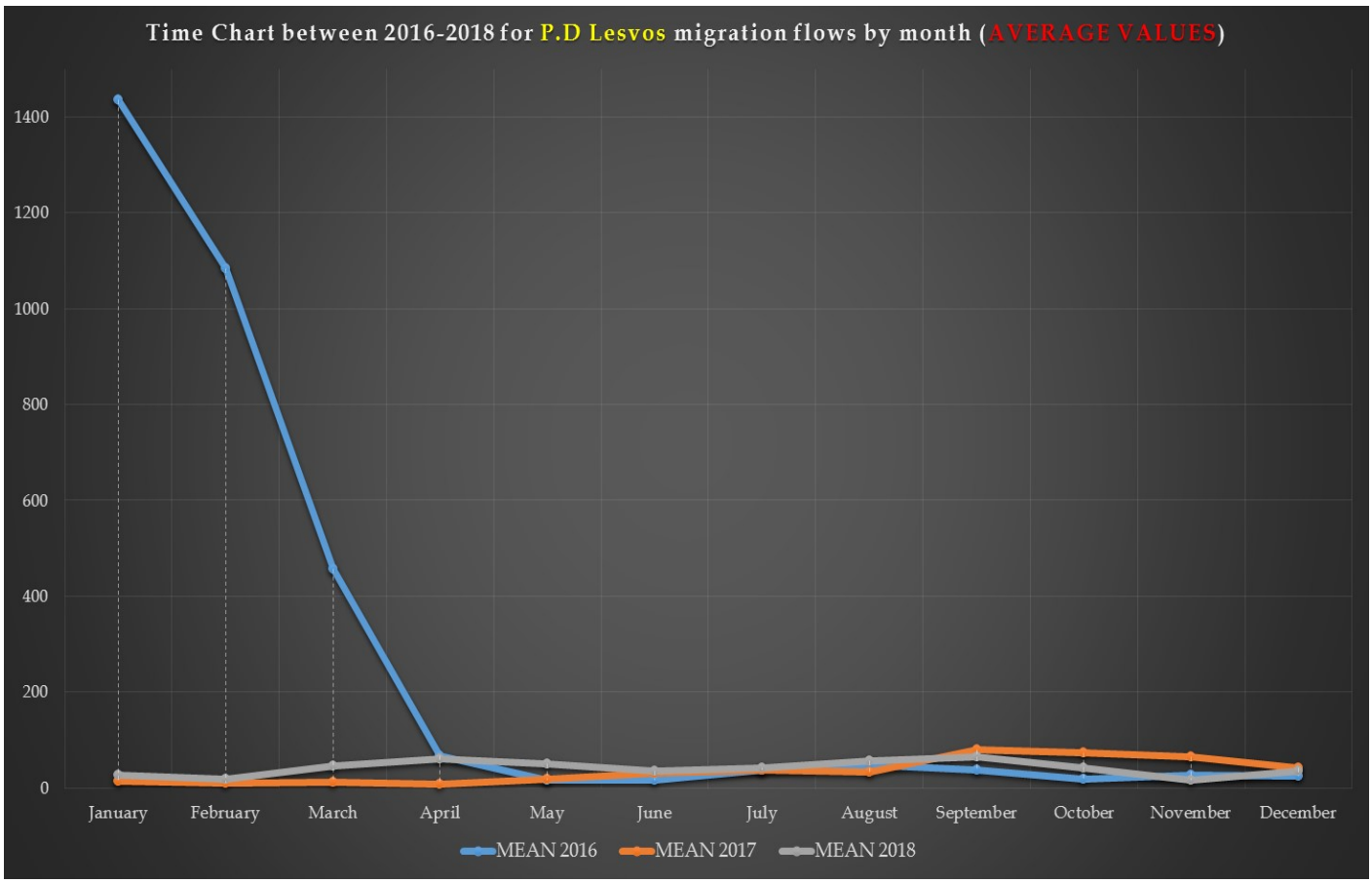

Figure 6
Source: Hellenic Police

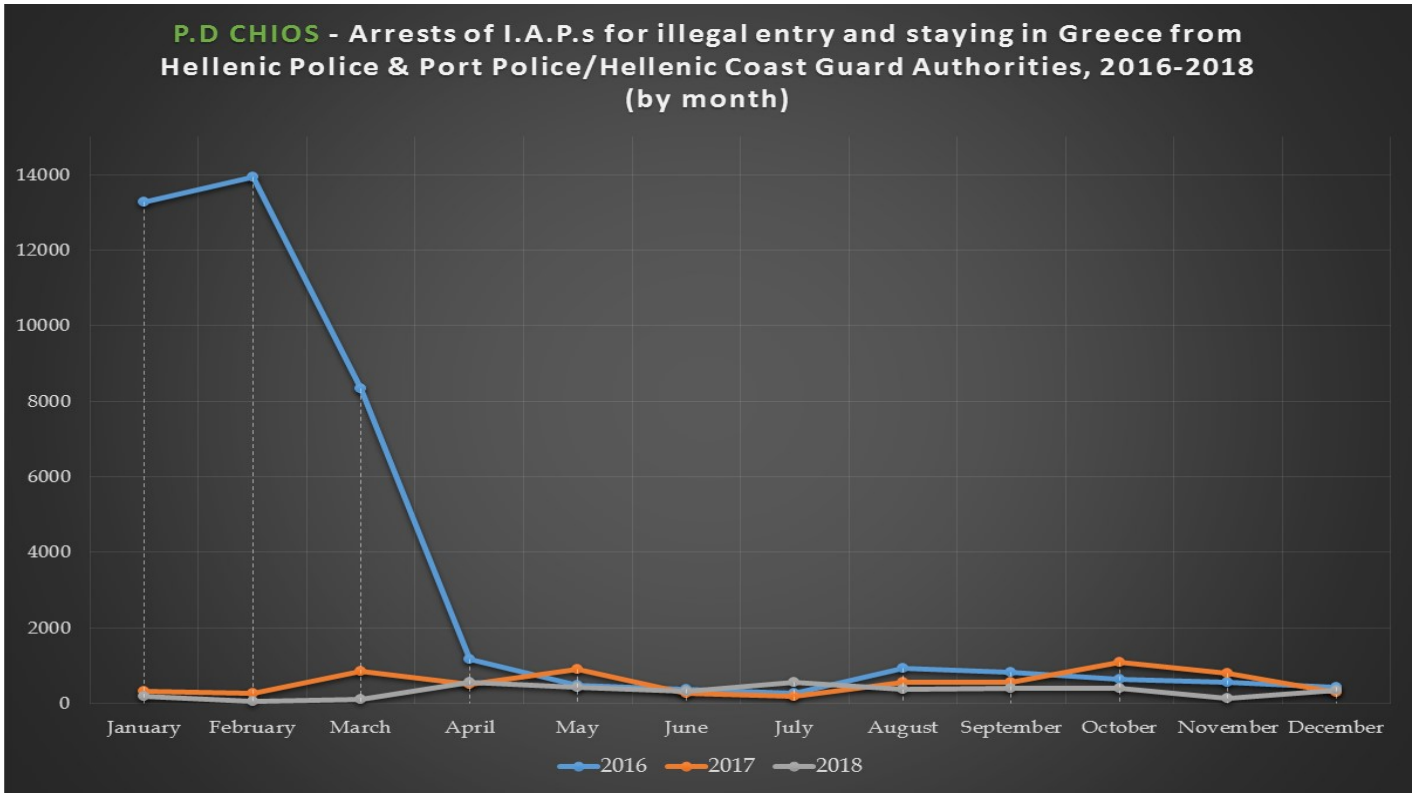

Figure 7
Source: Hellenic Police

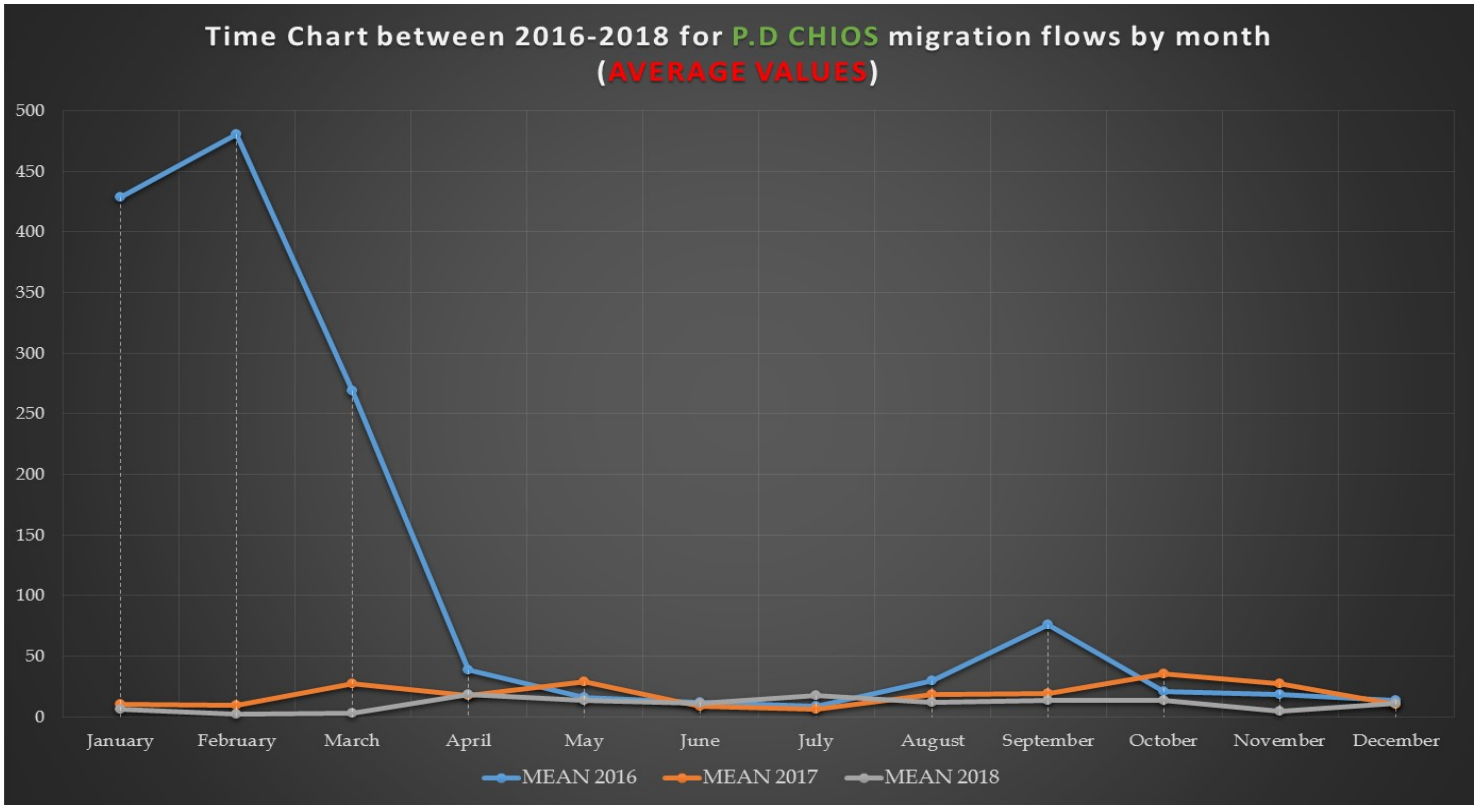

Figure 8
Source: Hellenic Police

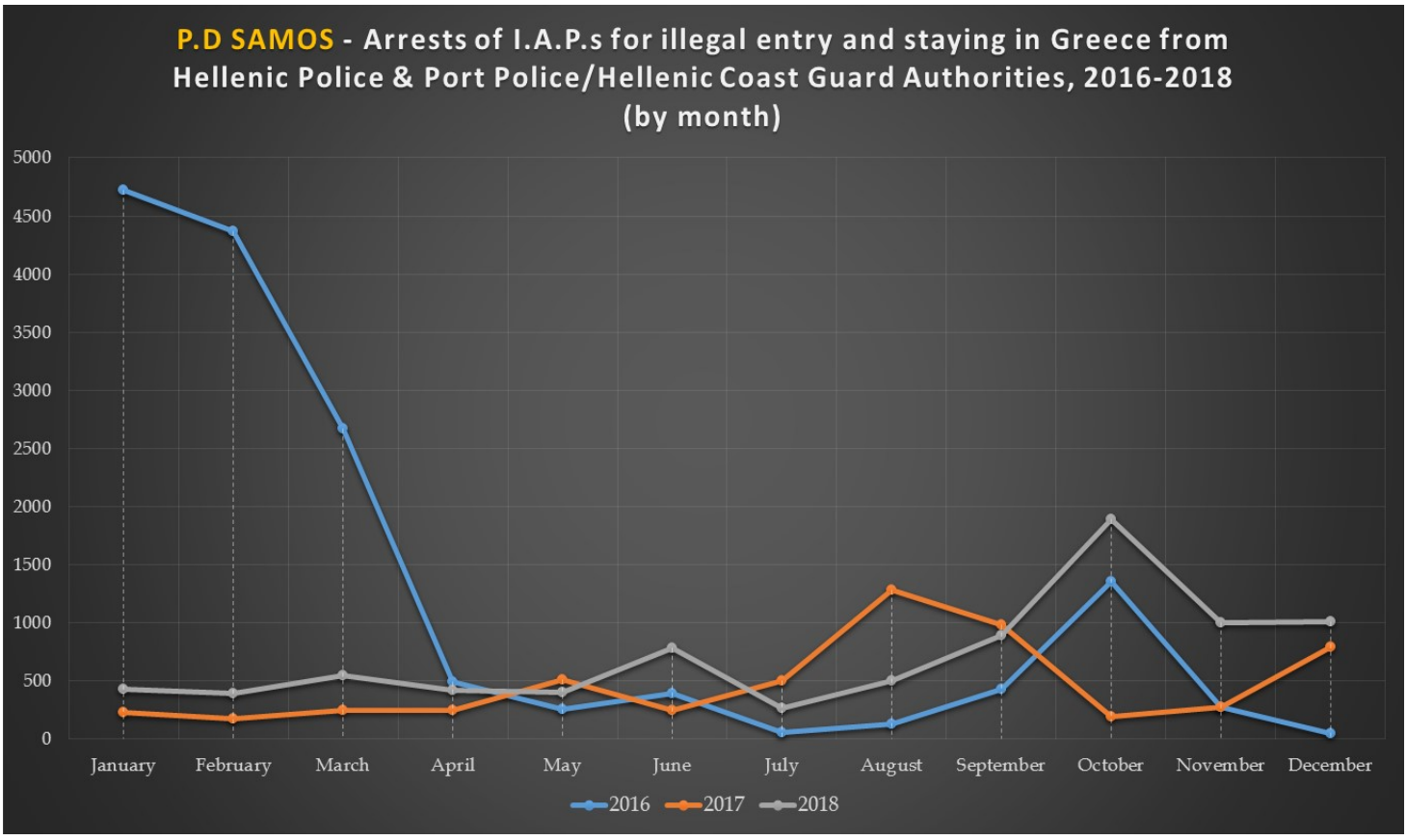

Figure 9
Source: Hellenic Police

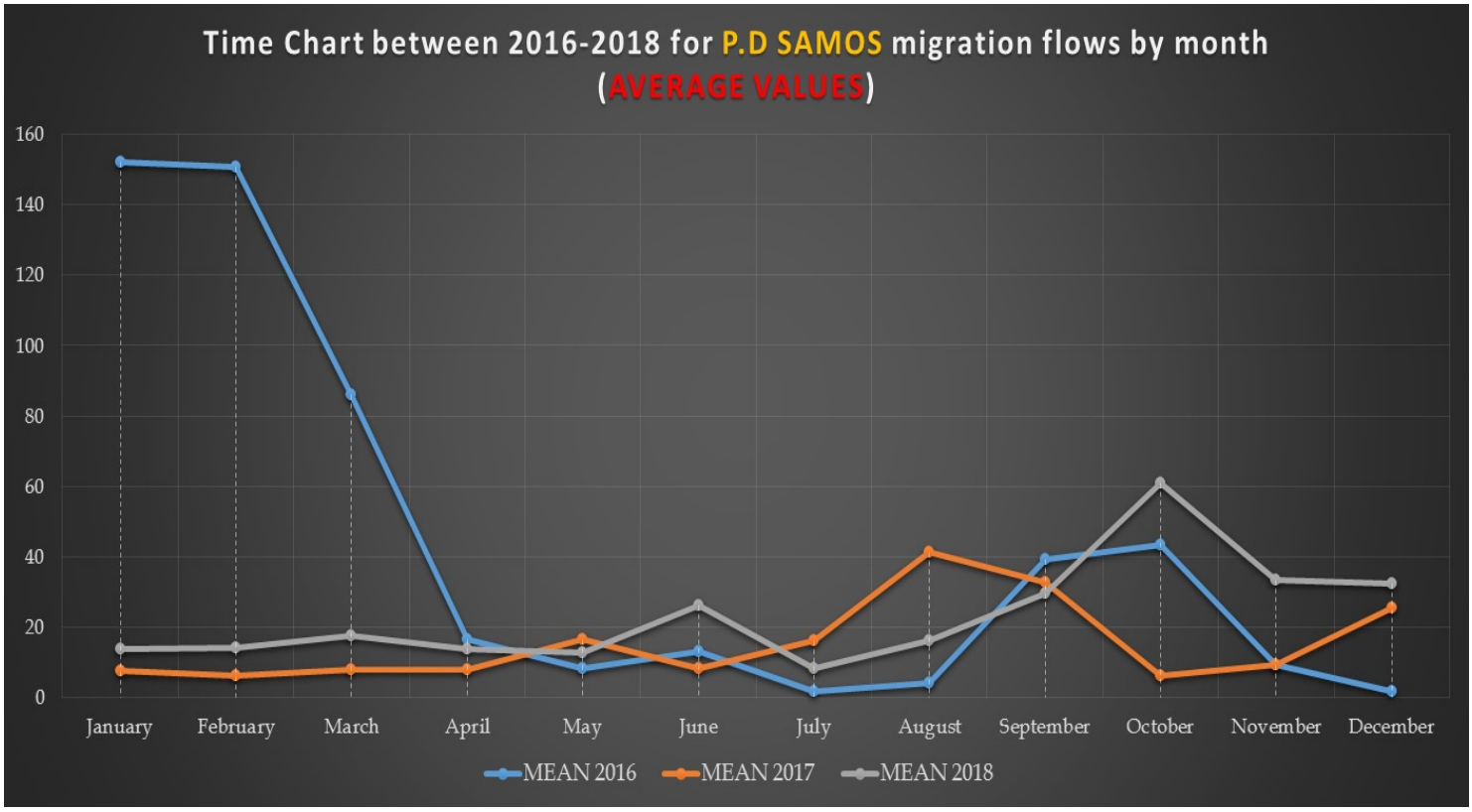

Figure 10
Source: Hellenic Police

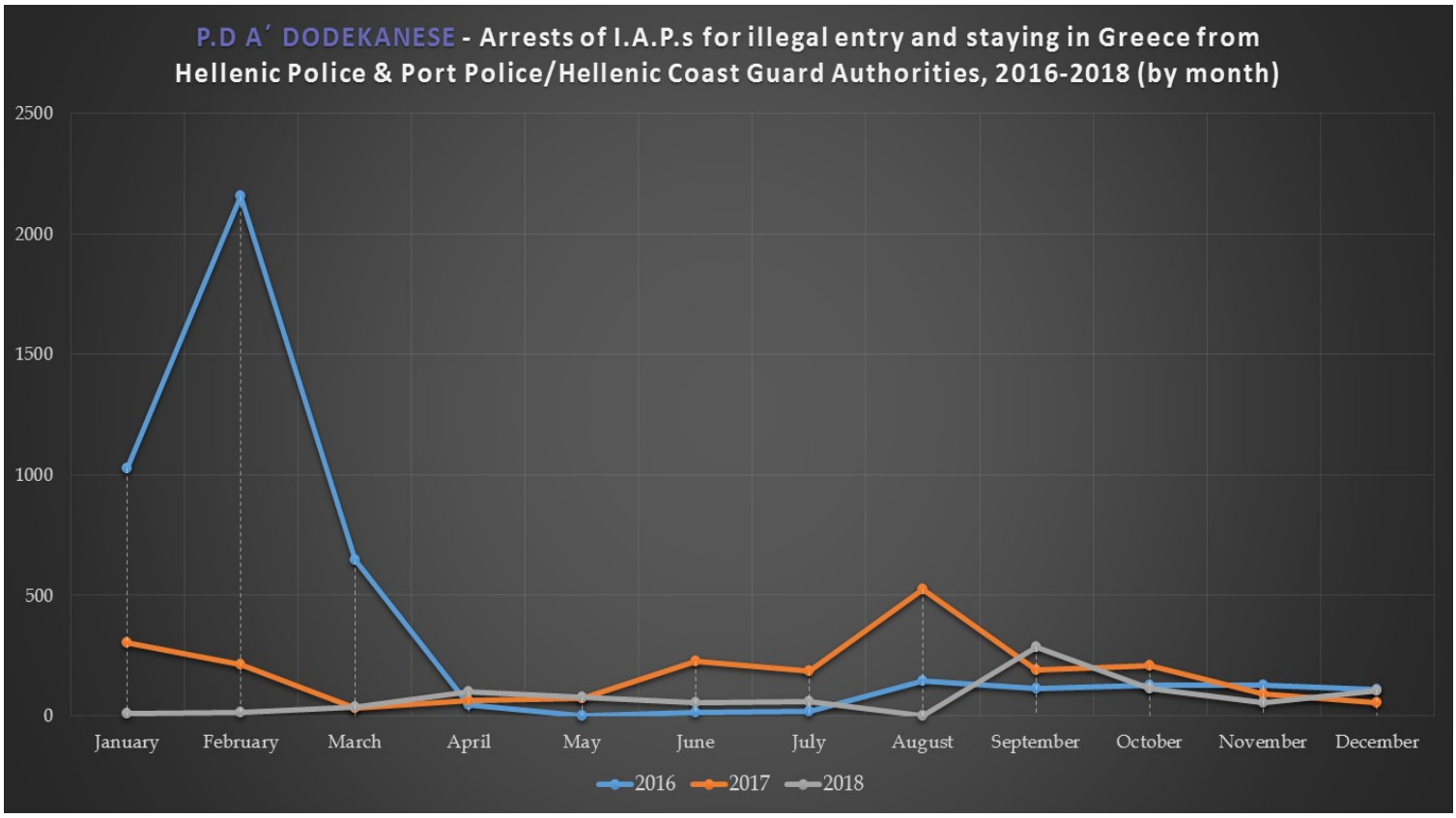

Figure 11
Source: Hellenic Police

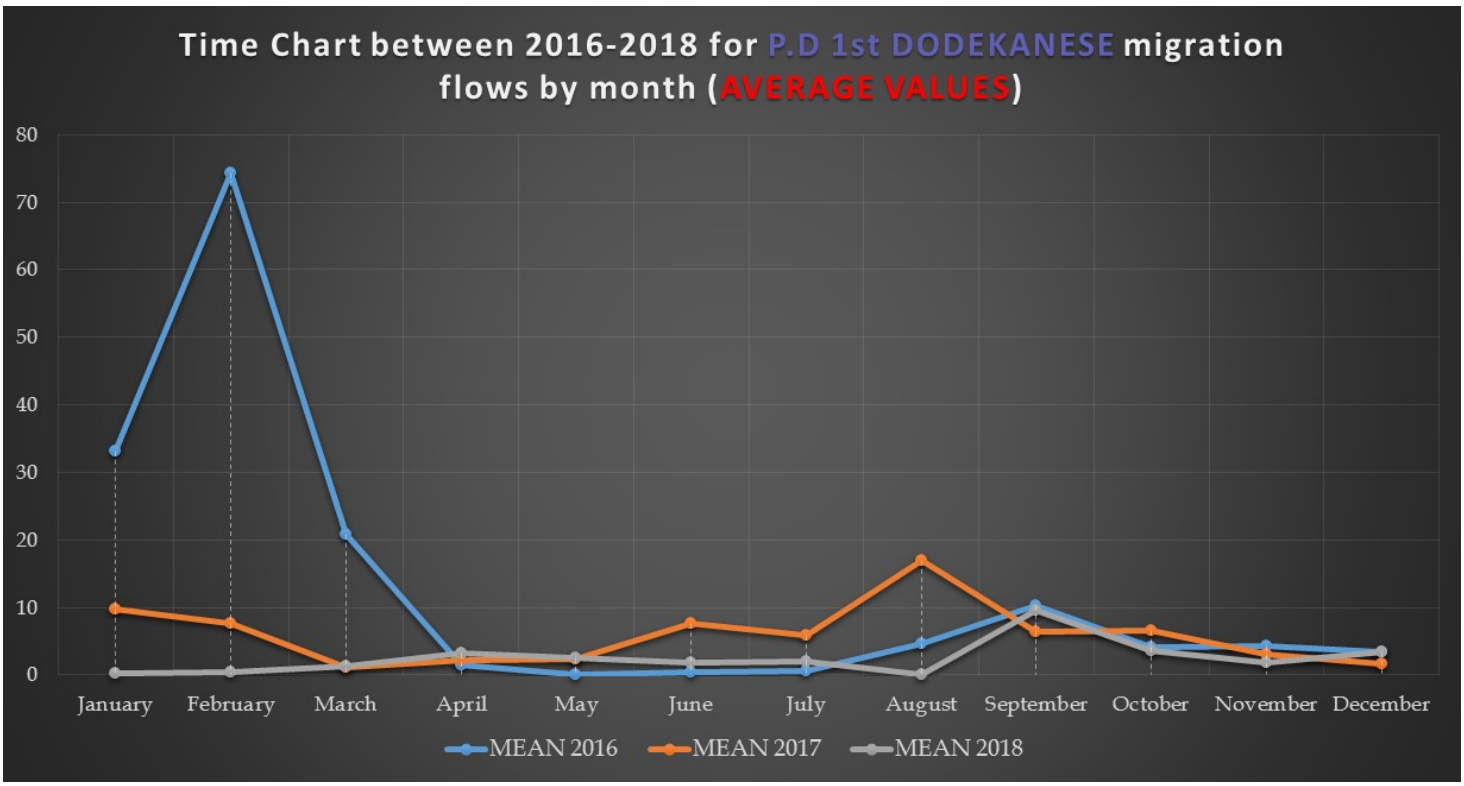

Figure 12
Source: Hellenic Police

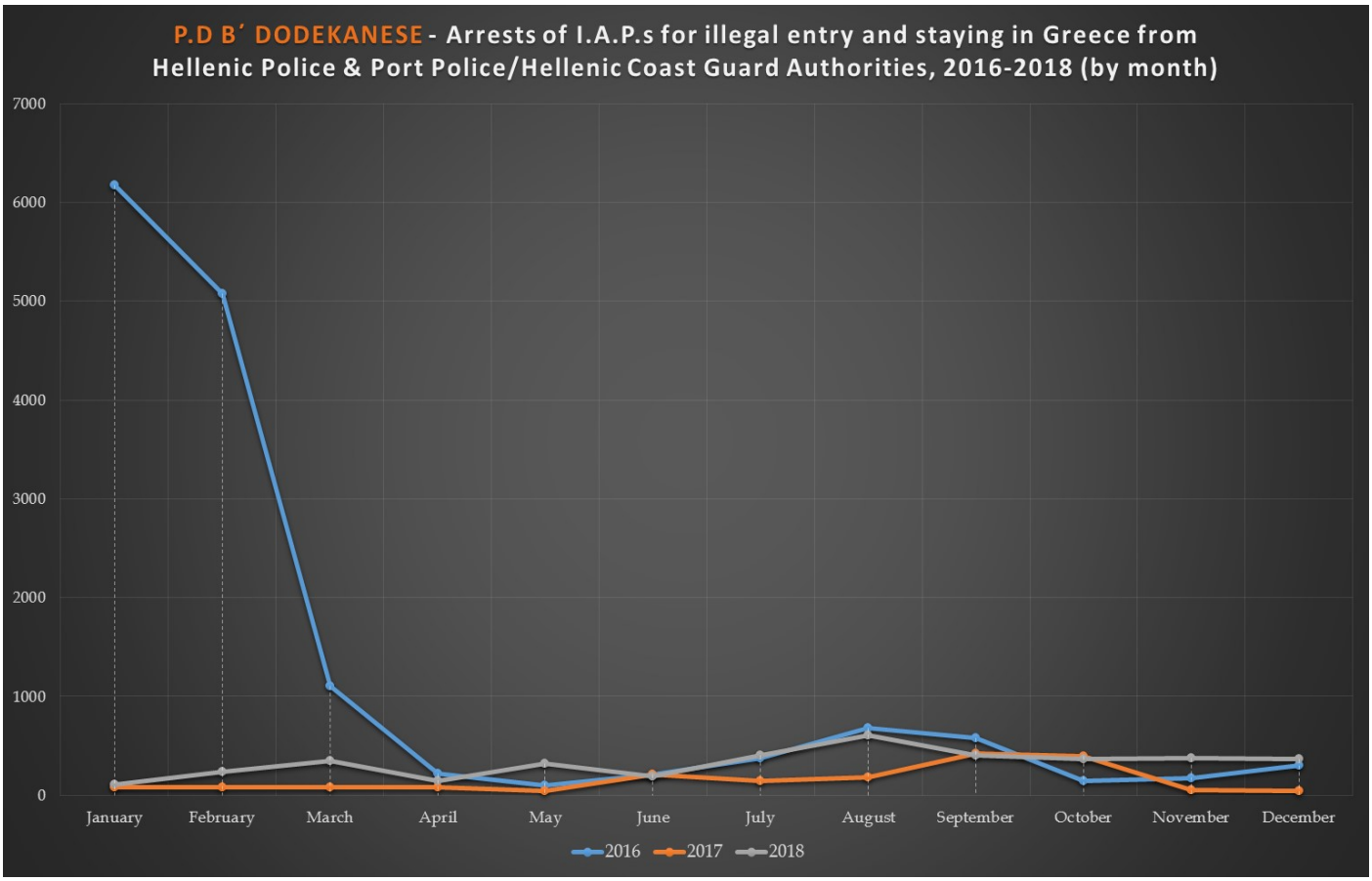

Figure 13
Source: Hellenic Police

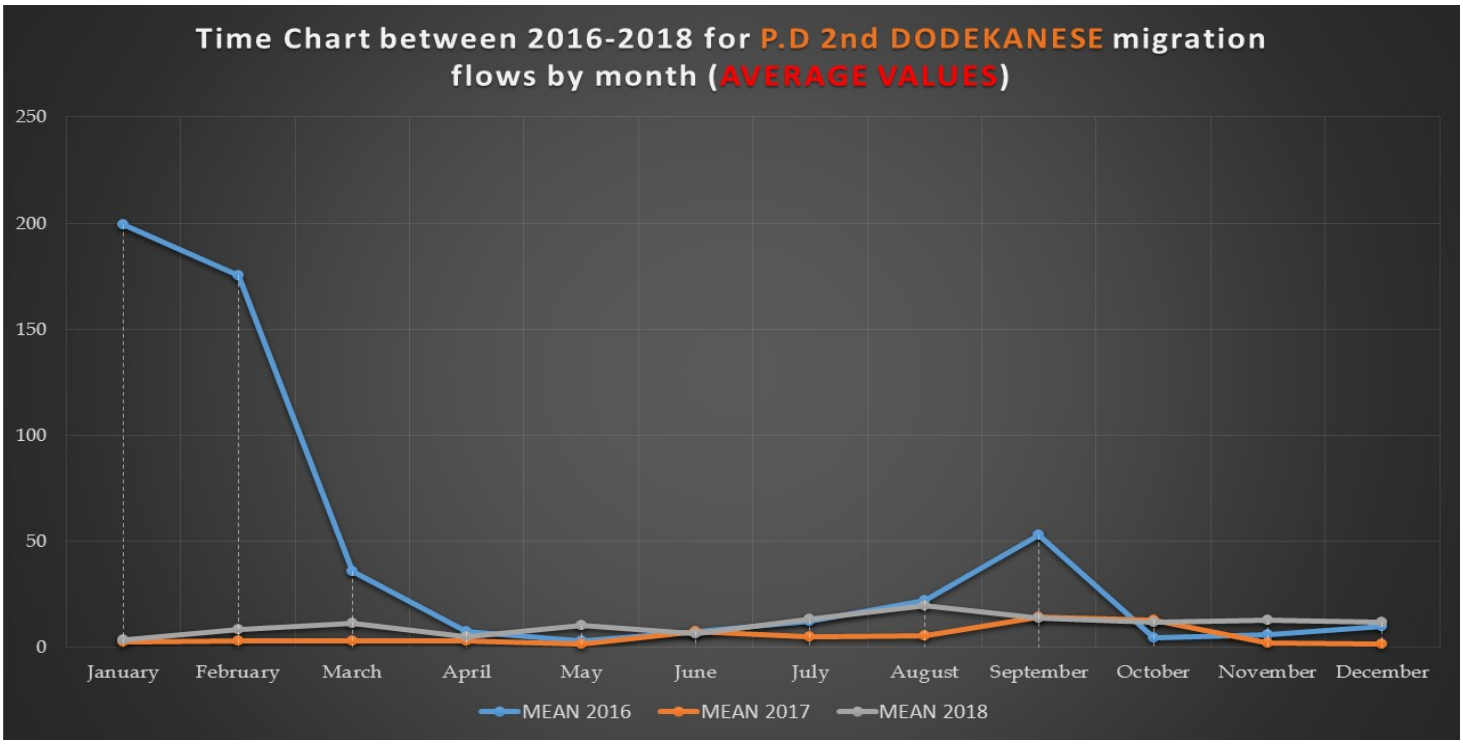

Figure 14
Source: Hellenic Police

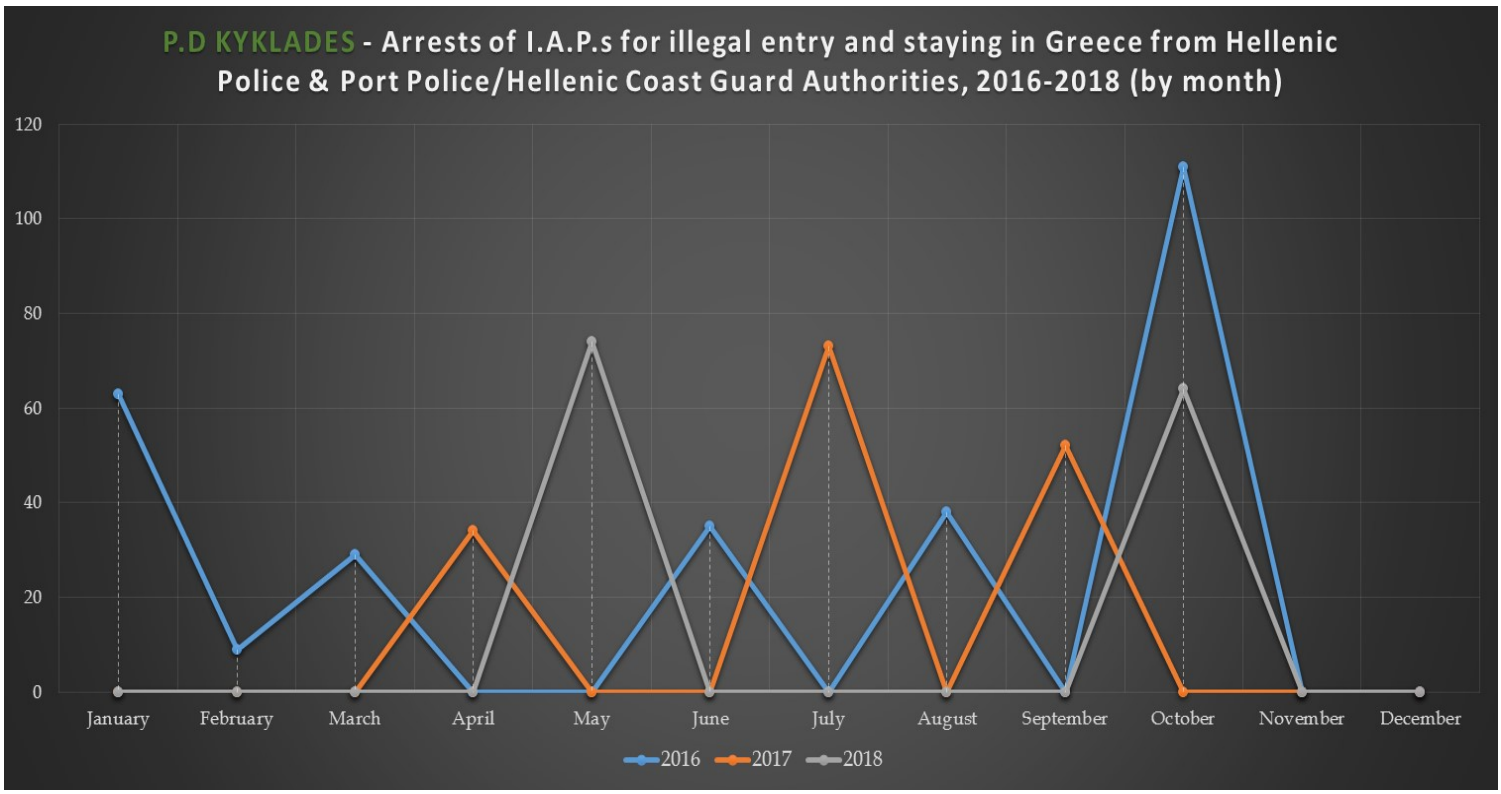

Figure 15
Source: Hellenic Police

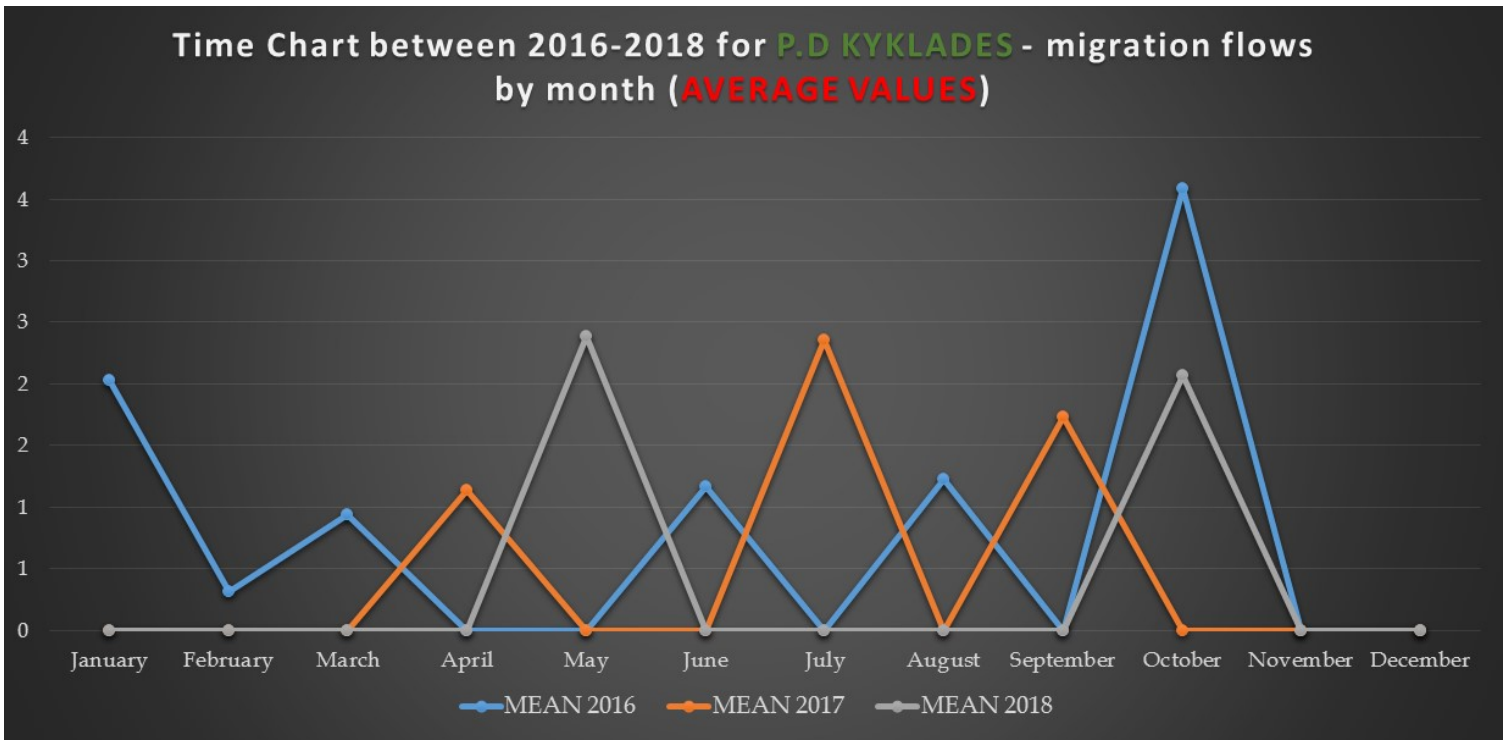

Figure 16
Source: Hellenic Police

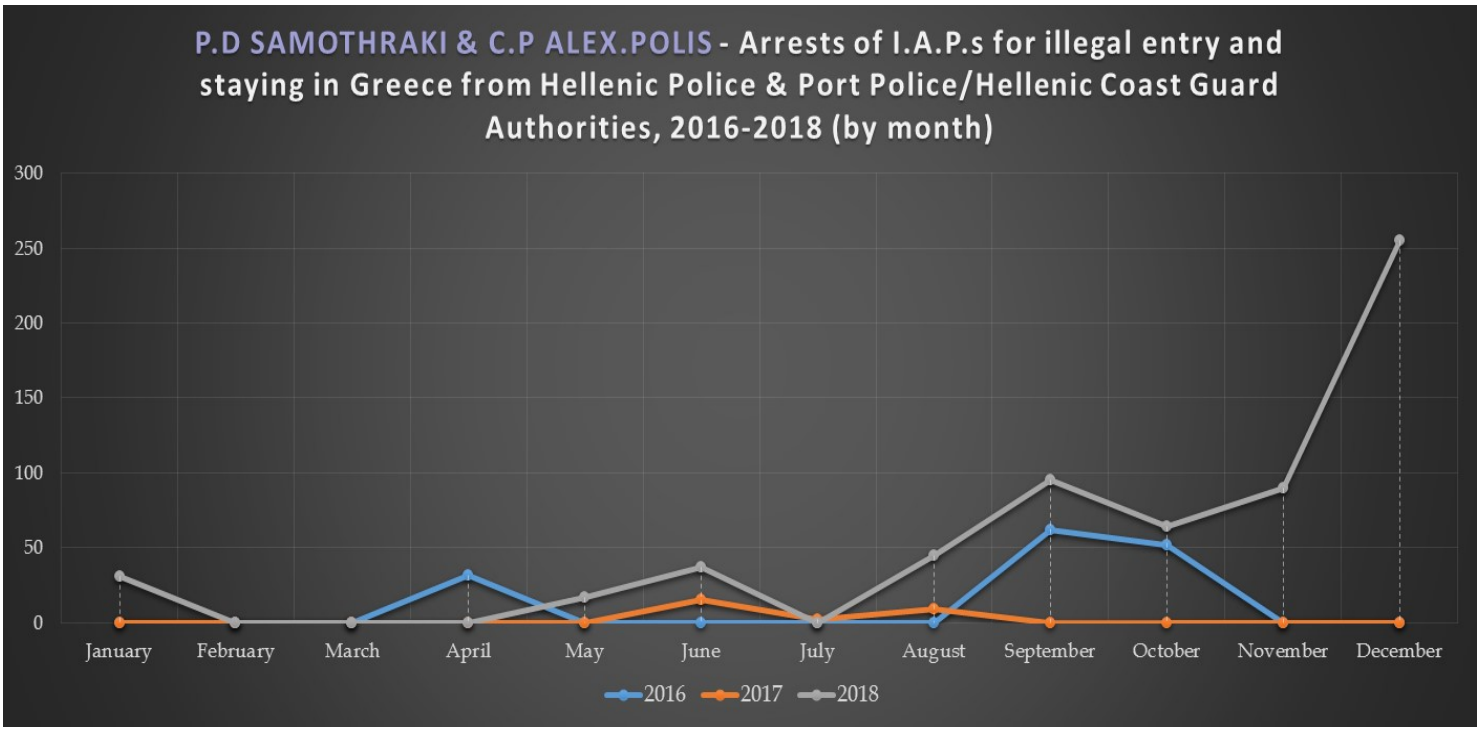

Figure 17
Source: Hellenic Police

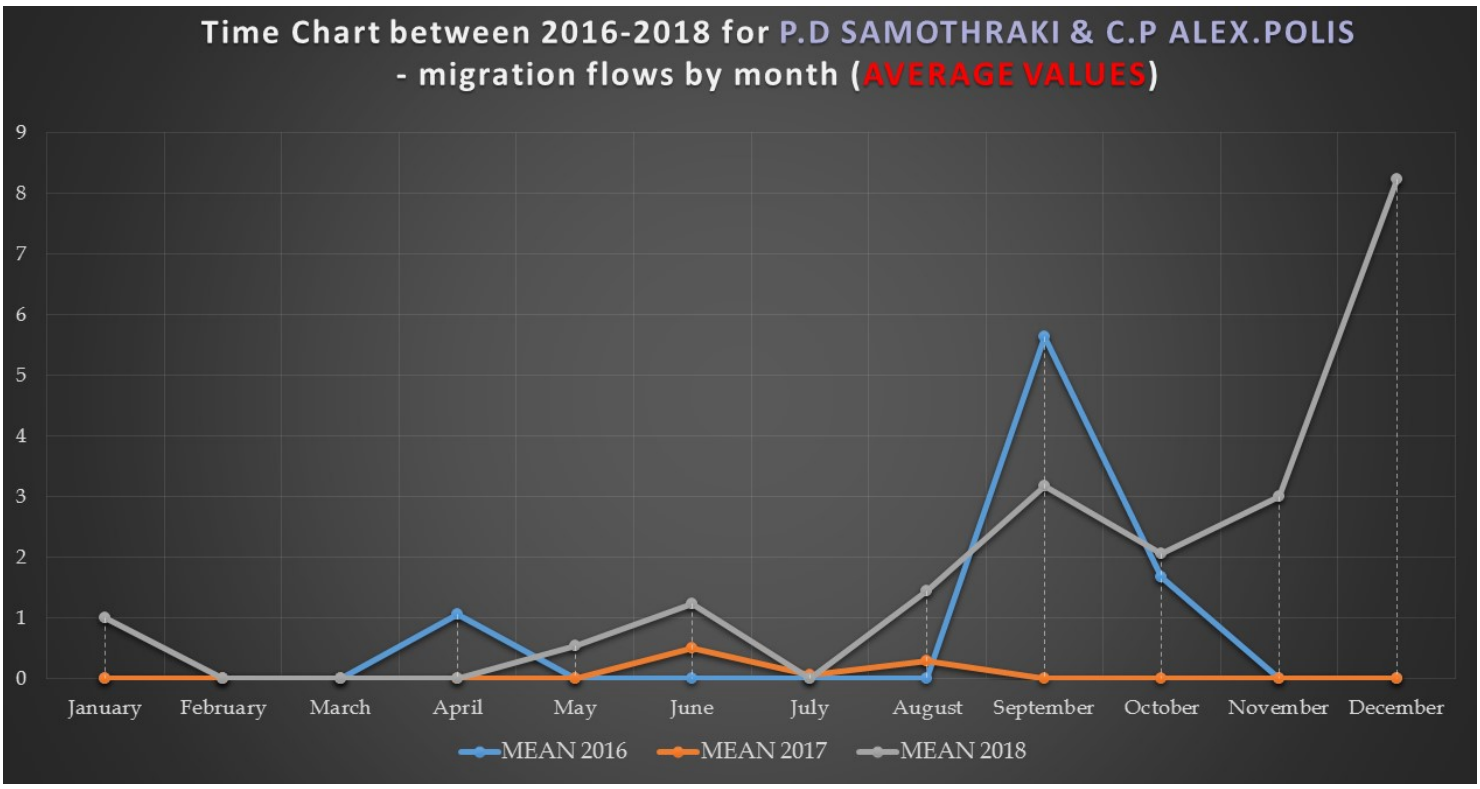

Figure 18
Source: Hellenic Police

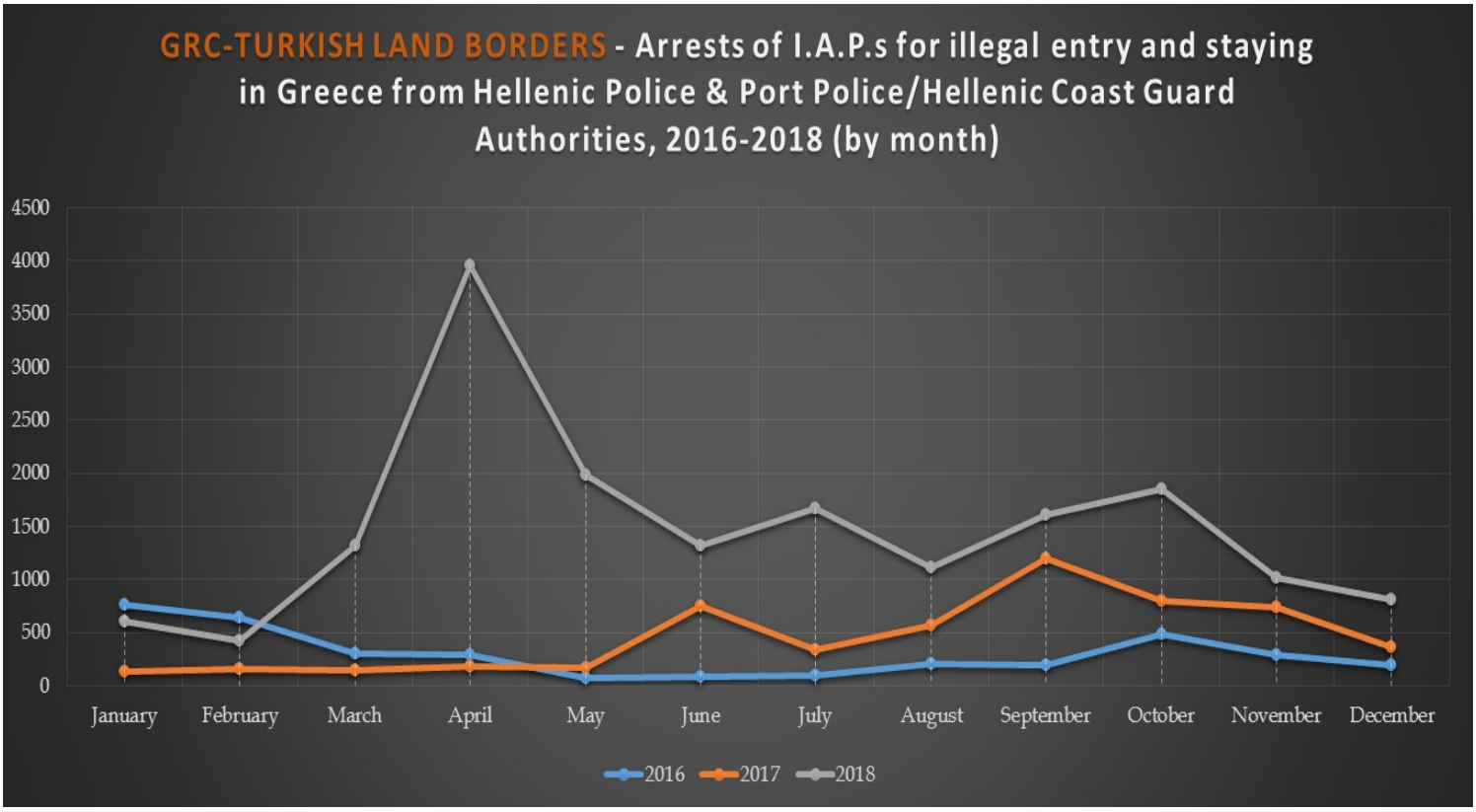

Figure 19
Source: Hellenic Police

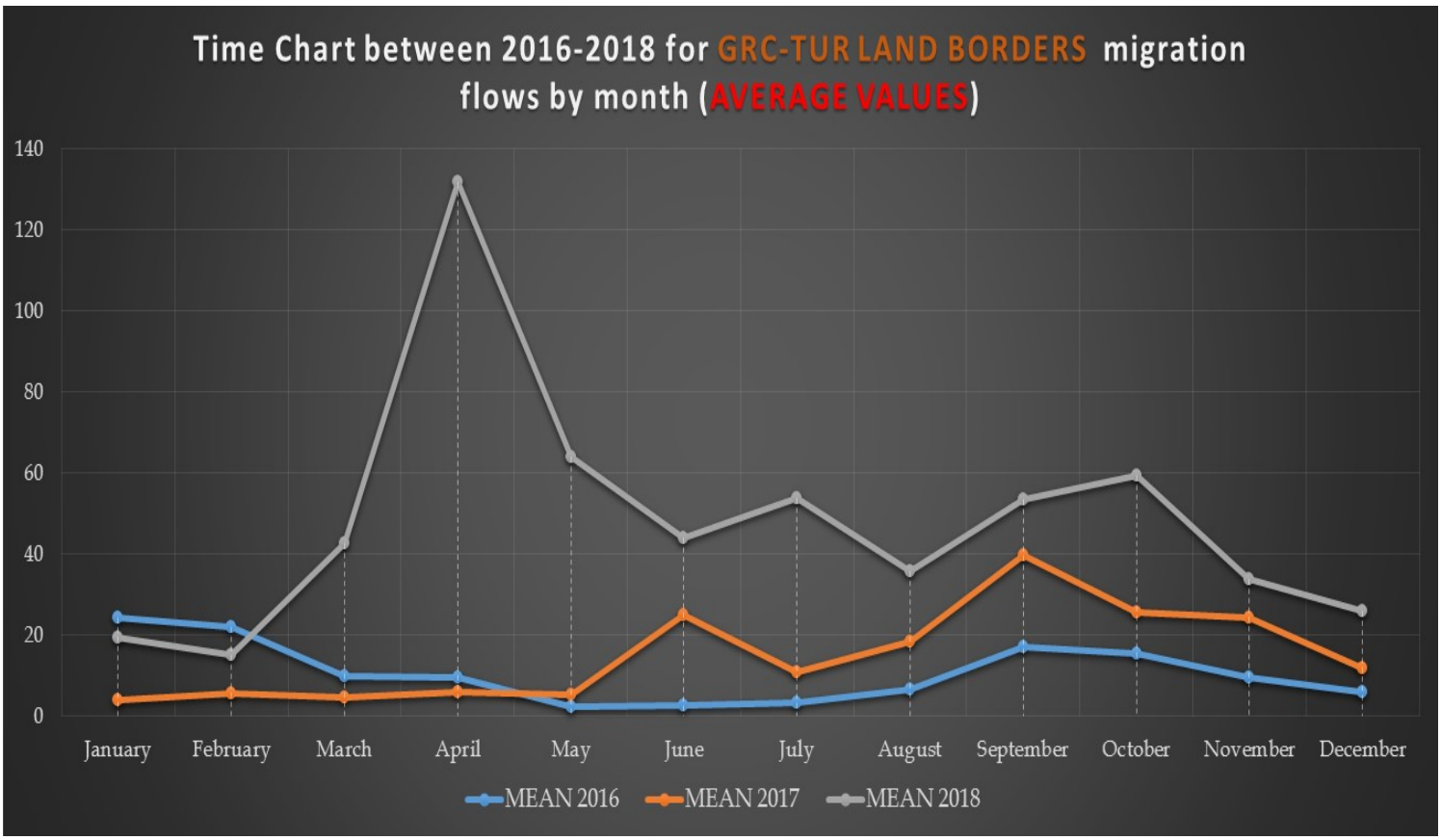

Figure 20
Source: Hellenic Police

Taking into consideration, the numerical data regarding mixed migration flows in Greece, as well as the related graphs (figures 5-20), we can conclude the following:

For the first quarter of 2016 and especially until 18 March 2016 (EU-Turkey Joint Statement), there was an increase in the migration flows, constituent an example of **extreme values** analysis.

In addition, increased migratory flows are observed in the Greek islands of the Northeast Aegean during the **summer period**. In particular, during the summer of 2017, there was an increase in mixed migration flows from Turkey to the Greek islands of the Northeast Aegean, in particular Chios and Lesvos.

Although not officially established, evidence so far leads us to conclude that the situation (flows increase) seems to become more noticeable during the summer months as good weather conditions[224], reduce river levels,

[224] **Climate change leads to changes weather conditions, resulting in an extended summer time from April to October.**

facilitating the access of migrants / refugees to both the mountainous areas of Greece and across sea borders.

The most intense migratory pressures are found at the eastern seaboard of Greece and in particular on the islands of Lesvos, Chios, Samos, Leros and Kos, but there are also rising trends, on occasion, at the Evros land border with Turkey.

In any case, the analysis of the flows should not only take into account the favorable weather conditions, but also observe them in conjunction with the political decisions taken[225], controls carried out[226] on Turkish land and sea borders and possible military conflicts[227].

[225] Turkey's attitude towards its agreement with the EU.
[226] Measures to guard maritime borders by Turkey.
[227]http://www.thenewhumanitarian.org/maps-and-graphics/2017/04/04/updated-mapped-world-war).

6.5.2 Qualitative variables - Analysis

In general, PESTLE[228] or PESTEL Analysis is an analytical tool for strategic business planning. It is a strategic framework for understanding external influences on a business.

For the purpose of this study, PESTLE Analysis will help us identify those external factors (qualitative variables)[229] that can affect migration flows.

It is noted, that the variables presented are indicative and not mandatory. Those variables have been identified only for the needs of the current simulation and does not necessarily reflect the situation on the ground.

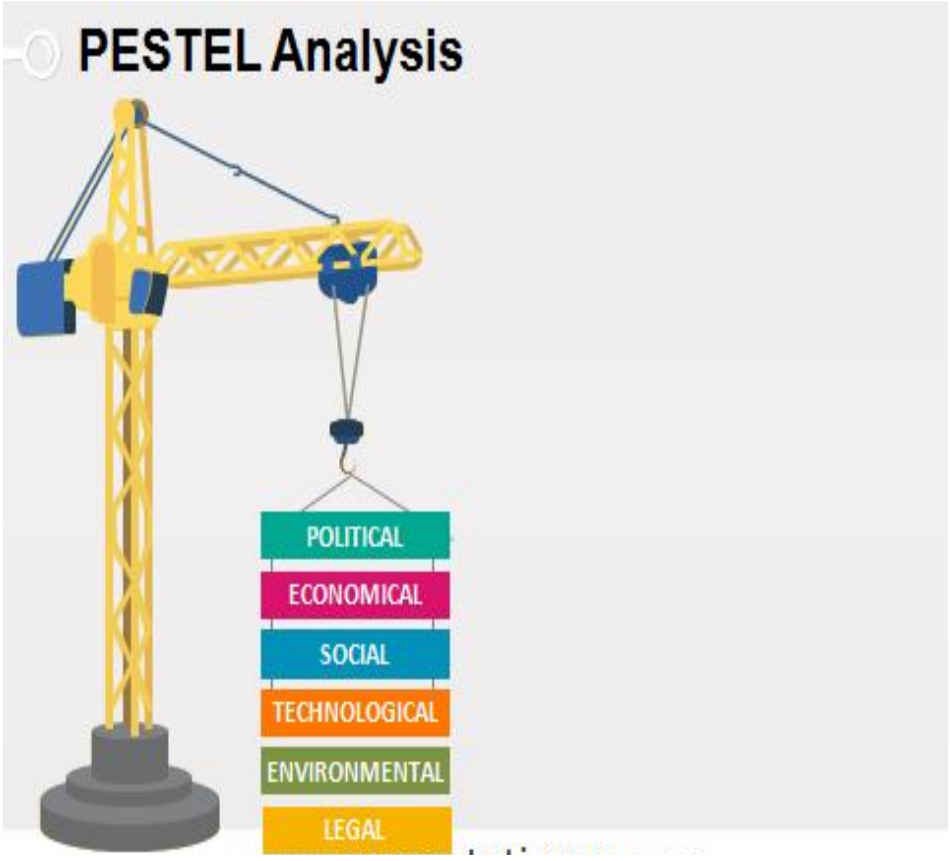

Image 19: PESTLE Analysis

[228] https://www.professionalacademy.com/blogs-and-advice/marketing-theories---pestel-analysis
https://pestleanalysis.com/what-is-pestle-analysis/

[229] **THE MEGA TRENDS**
https://ec.europa.eu/assets/epsc/pages/espas/chapter1.html
https://ec.europa.eu/knowledge4policy/foresight/about_en
https://www.europarl.europa.eu/RegData/etudes/STUD/2017/603263/EPRS_STU(2017)603263_EN.pdf

1. Political factors

- War conflicts in Africa, Middle East, Asia
- Opening & Closing of the Balkan route from Greece - Border closure in Idomeni[230]
- Internal political instability

Example: Turkey's coup attempt on 15 July 2016

- Elections
- Political authorities statements

Example: Angela Merkel's welcoming of Syrian refugees

2. Economical factors

Economically developed countries attract movement with immigrants trying to find employment or improve their financial circumstances.

Economic difference between developing and developed economies encourages the movement of people[231].

Standard criteria for evaluating a country's level of development should be taken into consideration in order for an economy to be considered either developing or developed.

3. Social factors

Rising communal violence, often as a result of ethnic or religious intolerance, has led to increased levels of migration.

States undergoing a political transition are at greater risk of instability and internal conflicts.

4. Technological factors

Technological advancement in transports and communications might favor migration increase.

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[230] http://bordermonitoring.eu/wp-content/uploads/reports/bm.eu-2017-idomeni.en.pdf
https://bordermonitoring.eu/berichte/2017-idomeni/

[231] https://ec.europa.eu/jrc/en/news/what-drives-international-migration

Technological change has facilitated migration along different geographical pathways, leading in travel cost reduction and economical communication, including the use of diverse applications that make easier the advertisement of migration services and the interaction between counter parts.

As reflected in relevant analysis products of International and European organizations (INTERPOL, EUROPOL, FRONTEX), due to advancements in technology, organized criminal networks of different forms, quickly adopt and integrate new technologies into their modi operandi or build brand-new business models around them.

The use of new technologies by OCGs, includes developments online, favourising encrypted communication channels, access to cheaper technology, and advanced printing technologies. Technology has afforded organized crime with an unprecedented degree of flexibility.

Technological advances may lead to significant information gaps that might complicate the activity of Law enforcement authorities.

5. Environmental factors

Changes in the ecological environment might worsen food and water supplies, pushing people to migrate to countries where these resources are more easily available.

It is noted that this factor will be a cause for concern in the near future, influencing migration over the 21th century.

6. Legal factors

- EU's migration policies

Example 1: EU - Turkey Statement [232,233] (18.03.2016)

Implementation of EU – Turkey statement in Greece since 20.03.2016.

[232] https://www.consilium.europa.eu/en/press/press-releases/2016/03/18/eu-turkey-statement/
https://www.consilium.europa.eu/en/meetings/european-council/2016/03/17-18/
https://www.consilium.europa.eu/en/press/press-releases/2016/03/18/european-council-conclusions/

[233] http://big.assets.huffingtonpost.com/SumfoniaEETourkias.pdf

Example 2: Asylum procedures

- EU Visa policy

Visa-free status for Iran nationals to Serbia - Decision to cancel visa-free entry for the citizens of the Islamic Republic of Iran[234]

- Launch of the European Border and Coast Guard Agency on 6 October 2016[235]

- Bilateral Agreements and International Cooperation

Cooperation with EU agencies and Organizations as well as other M-S, increase the possibility of sharing capabilities in human resource management, keep up with the latest security, technological developments and cross-border surveillance tools and in general design and implement an efficient migration policy, through the exchange of best practices and knowledge.

Example: EUROPOL and FRONTEX sign new Joint Action Plan (Press Release on 07 June 2019)[236]

[234] https://europa.eu/rapid/press-release_IP-18-6819_en.htm
https://www.rferl.org/a/serbia-abolishes-visa-free-travel-iranians-citing-abuses-by-some-migrants-to-eu-/29539329.html
https://www.schengenvisainfo.com/news/eu-forces-serbia-to-return-visa-regime-for-iranian-passport-holders/
[235] https://europa.eu/rapid/press-release_IP-16-3281_en.htm
[236] https://www.europol.europa.eu/newsroom/news/europol-and-frontex-sign-new-joint-action-plan

6.5.3 Variables correlation

Variables that affect the project must be identified and examine how much the outcome is influenced, for each period[237] that is analyzed.

The choice of methodology is required in order to see how the values of a variable change over time and thus predict its future values. These are mainly quantitative analysis methodologies in the field of Statistics and Econometrics, such as Regression, Time Series, LOGIT method, Discriminal Analysis, etc.

Regression Analysis[238], Time Series Analysis[239] and Analysis of Variance (ANOVA)[240] are widely used for prediction and forecasting.

The regression analysis attempts to understand how the expected mean value of a dependent variable changes when the value of one or more independent variables changes[241].

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[237] **For the needs of this research the period chosen for the correlation analysis was between April – October for the years 2016,2017 and 2018.**

[238] "Regression Analysis involves identifying the relationship between a dependent variable and one or more independent variables. A model of the relationship is hypothesized, and estimates of the parameter values are used to develop an estimated regression equation. Various tests are then employed to determine if the model is satisfactory. If the model is satisfactory, the estimates regression equation can be used to predict the value of the dependent variable given the values for the independent variables".
"Neither regression nor correlation analyses can be interpreted as establishing cause-and-effect relationships. They can indicate only how or to what extent variables are associated with each other. Any conclusions about a cause-and-effect relationship must be based on the judgment of the analyst".
http://abyss.uoregon.edu/~js/glossary/correlation.html

[239] Statistical technique that deals with trend analysis

[240] An analysis tool used in statistics that separates an observed aggregate irregularity found inside a data set into two parts: systematic factors and random factors.

[241] In some cases, the independent variable might be a qualitative one. It is noted then, that the qualitative variable needs to be quantified and an equivalent methodology needs to be applied, to proceed to analysis and forecasting.
For example: We want to check how weather conditions – seasonal trends (independent variable) influence migration flows (dependent variable) or how the flows were influenced from the construction of a preventive fence.
Bulgaria
The preventive fence at the Bulgaria-Turkey border is 201 kilometers and is only one of the multiple measures taken by the Bulgarian authorities to protect the Bulgaria-turkey which is also an external border of the E.U.
Republic of North Macedonia
On 28.11.2016, the construction of the first wire fence in the Greek-Republic of North Macedonia border area was completed.

The outcome of this procedure will consist a mathematical forecasting model[242].

Before any model evaluation, we need to find out the association between the variables x and y, therefore we will have to choose the method that will enable us to correlate the identified variables.

The XY-scatter plot, consists of a practical tool, in order to find the correlation between variables.

With the help of a chart, a graphical representation of the correlation of the values between the two (2) variables will be obtained and then we can compare them with the diagonal, on the basis of which the perfect linear correlation is managed.

Therefore, for the need of this research, we will proceed in finding the correlation between the places of arrest / detection (variables) regarding mixed migration flows.

First, we will use **Pearson** (also known as r, R, or Pearson's r)[243] correlation coefficient, which will measure the linear dependence between the two variables (y and x).

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[242] Build the mathematical relationships between the variables and their output.
How do you find the regression equation?
Explanation of the **Regression** Formula
The **equation** for a line is Y = a + bX. **Y** is the dependent variable in the formula which one is trying to predict what will be the future value if **X** an independent variable change by certain value.
We often see regression equations written: Y = a + bX + **ε**.
a = the y-intercept
b = the slope of the line
ε = error term is usually denoted as **ε**, or **epsilon**
Error term, notes that we might not have exactly the predicted price, since some values do not lie directly on the regression line.

[243] https://statistics.laerd.com/statistical-guides/pearson-correlation-coefficient-statistical-guide.php
https://www.statisticshowto.datasciencecentral.com/probability-and-statistics/correlation-coefficient-formula/

- |R| = 1, perfect linear relationship (or linear association)
- 0.8 ≤ |R| < 1, very powerful linear relationship
- 0.7 ≤ |R| < 0.8, powerful linear relationship
- 0.5 ≤ |R| < 0.7, average linear relationship
- 0.3 ≤ |R| < 0.5, weak linear relationship
- |R| < 0.3, very weak linear relationship

Our variables will be consisted of the places of arrest / detection regarding illegal migrants. We will calculate their correlation by two (2) and according to the result we will recognize their type of correlation.

Specifically, we will list the values[244] from the variable correlation and then we will observe / analyze those belonging to the "very powerful", "powerful" and "average" linear correlation type.

After the analysis, we will **focus on the variable correlation which is repeated three years in row** (2016,2017 and 2018) and will be illustrated in diagrams (Figure 27 – 29)[245]. Concurrently, the regression equation will be imprinted in those diagrams.

Firstly, correlation regarding **2016**

0,39	Weak (positive correlation) linear relationship between P.D Lesvos – P.D Chios
-0,21	Very Weak (negative correlation) linear relationship between P.D Lesvos – P.D Samos
0,16	Very Weak (positive) linear relationship between P.D Lesvos – 1st P.D Dodekanese
0,22	Very Weak (positive) linear relationship between P.D Lesvos – 2nd P.D Dodekanese
-0,40	Weak (negative) linear relationship between P.D Lesvos – P.D Kyklades
0,08	Very Weak (positive) linear relationship between P.D Lesvos – Samothraki & Central Port Authority of Alexandroupolis
0,16	Very Weak (positive) linear relationship between P.D Lesvos – GRC & TUR Land Borders
0,56	Average (positive) linear relationship between P.D Chios - P.D Samos
0,89	Very Powerful (positive) linear relationship between P.D Chios - 1st P.D Dodekanese
0,87	Very Powerful (positive) linear relationship between P.D Chios - 2nd P.D Dodekanese
-0,25	Very Weak (negative) linear relationship between P.D Chios - P.D Kyklades
0,91	Very Powerful (positive) linear relationship between P.D Chios - Samothraki & Central Port Authority of Alexandroupolis

[244] The **variable correlation** will derive by using mean migration flows values for each place of arrest / detection for the **followings periods**: **April – October 2016**, **April – October 2017**, **April – October 2018**.

The data referring to the period from January till March 2016 were not included in the correlation procedure, because they were considered extreme values (check pages 115-116, 124 of the current research). Therefore, data from equivalent months for year 2017 and 2018 were not, also, included in the correlation procedure, in order to insure valid conclusions and guarantee the forecasting procedure.

When we use regression to estimate the parameters of migration flows values = f (place of arrest/ detection), we are estimating the parameters of the line that connects the mean price at each location.

[245] **It is noted that due to the sensitive type of information no numerical data will be presented.**

0,76	Powerful (positive) linear relationship between P.D Chios - GRC & TUR Land Borders
0,67	Average (positive) linear relationship between P.D Samos - 1st P.D Dodekanese
0,37	Weak (positive) linear relationship between P.D Samos - 2nd P.D Dodekanese
0,51	Average (positive) linear relationship between P.D Samos - P.D Kyklades
0,77	Powerful (positive) linear relationship between P.D Samos - Samothraki & Central Port Authority of Alexandroupolis
0,91	Very Powerful (positive) linear relationship between P.D Samos - GRC & TUR Land Borders
0,90	Very Powerful (positive) linear relationship between 1st P.D Dodekanese - 2nd P.D Dodekanese
0,09	Very Weak (positive) linear relationship between 1st P.D Dodekanese - P.D Kyklades
0,90	Very Powerful (positive correlation) linear relationship between 1st P.D Dodekanese - Samothraki & Central Port Authority of Alexandroupolis
0,84	Very Powerful (positive) linear relationship between 1st P.D Dodekanese - GRC & TUR Land Borders
-0,29	Very Weak (negative) linear relationship between 2nd P.D Dodekanese - P.D Kyklades
0,90	Very Powerful (positive) linear relationship between 2nd P.D Dodekanese - Samothraki & Central Port Authority of Alexandroupolis
0,57	Average (positive) linear relationship between 2nd P.D Dodekanese - GRC & TUR Land Borders
-0,07	Very Weak (negative) linear relationship between P.D Kyklades - Samothraki & Central Port Authority of Alexandroupolis
0,36	Weak (positive) linear relationship between P.D Kyklades - GRC & TUR Land Borders
0,85	Very Powerful (positive) linear relationship between Samothraki & Central Port Authority of Alexandroupolis - GRC & TUR Land Borders

Table 20: Variables correlation values for **2016**

Following, for year 2017

0,30	Weak (positive) linear relationship between P.D Lesvos – P.D Chios
0,22	Very Weak (positive) linear relationship between P.D Lesvos – P.D Samos
0,20	Very Weak (positive) linear relationship between P.D Lesvos – 1st P.D Dodekanese
0,96	Very Powerful (positive) linear relationship between P.D Lesvos – 2nd P.D Dodekanese
0,16	Very Weak (positive) linear relationship between P.D Lesvos – P.D Kyklades
-0,20	Very Weak (negative) linear relationship between P.D Lesvos – Samothraki & Central Port Authority of Alexandroupolis
0,86	Very Powerful (positive) linear relationship between P.D Lesvos – GRC & TUR Land Borders
-0,10	Very Weak (negative) linear relationship between P.D Chios - P.D Samos
-0,15	Very Weak (negative) linear relationship between P.D Chios - 1st P.D Dodekanese
0,25	Very Weak (positive) linear relationship between P.D Chios - 2nd P.D Dodekanese
-0,53	Average (negative) linear relationship between P.D Chios - P.D Kyklades
-0,52	Average (negative) linear relationship between P.D Chios - Samothraki & Central Port Authority of Alexandroupolis
0,05	Very Weak (positive) linear relationship between P.D Chios - GRC & TUR Land Borders

0,70	Powerful (positive) linear relationship between P.D Samos - 1st P.D Dodekanese
0,14	Very Weak (positive) linear relationship between P.D Samos - 2nd P.D Dodekanese
0,09	Very Weak (positive) linear relationship between P.D Samos - P.D Kyklades
0,08	Very Weak (positive) linear relationship between P.D Samos - Samothraki & Central Port Authority of Alexandroupolis
0,32	Weak (positive) linear relationship between P.D Samos - GRC & TUR Land Borders
0,20	Very Weak (positive) linear relationship between 1st P.D Dodekanese - 2nd P.D Dodekanese
-0,28	Very Weak (negative) linear relationship between 1st P.D Dodekanese - P.D Kyklades
0,55	Average (positive correlation) linear relationship between 1st P.D Dodekanese - Samothraki & Central Port Authority of Alexandroupolis
0,93	Very Powerful (positive) linear relationship between 1st P.D Dodekanese - GRC & TUR Land Borders
0,08	Very Weak (positive) linear relationship between 2nd P.D Dodekanese - P.D Kyklades
-0,08	Very Weak (negative) linear relationship between 2nd P.D Dodekanese - Samothraki & Central Port Authority of Alexandroupolis
0,93	Very Powerful (positive) linear relationship between 2nd P.D Dodekanese - GRC & TUR Land Borders
-0,41	Weak (negative) linear relationship between P.D Kyklades - Samothraki & Central Port Authority of Alexandroupolis
0,05	Very Weak (positive) linear relationship between P.D Kyklades - GRC & TUR Land Borders
0,18	Very Weak (positive) linear relationship between Samothraki & Central Port Authority of Alexandroupolis - GRC & TUR Land Borders

Table 21: Variables correlation values for **2017**

Finally, for year **2018**

0,27	Very Weak (positive) linear relationship between P.D Lesvos – P.D Chios
-0,25	Very Weak (negative) linear relationship between P.D Lesvos – P.D Samos
0,52	Average (positive) linear relationship between P.D Lesvos – 1st P.D Dodekanese
0,20	Very Weak (positive) linear relationship between P.D Lesvos – 2nd P.D Dodekanese
-0,23	Very Weak (negative) linear relationship between P.D Lesvos – P.D Kyklades
0,26	Very Weak (positive) linear relationship between P.D Lesvos – Samothraki & Central Port Authority of Alexandroupolis
0,39	Weak (positive) linear relationship between P.D Lesvos – GRC & TUR Land Borders
-0,38	Weak (negative) linear relationship between P.D Chios - P.D Samos
0,10	Very Weak (positive) linear relationship between P.D Chios - 1st P.D Dodekanese
-0,30	Weak (negative) linear relationship between P.D Chios - 2nd P.D Dodekanese
-0,18	Very Weak (negative) linear relationship between P.D Chios - P.D Kyklades
-0,58	Average (negative) linear relationship between P.D Chios - Samothraki & Central Port Authority of Alexandroupolis
0,73	Powerful (positive) linear relationship between P.D Chios - GRC & TUR Land Borders
0,31	Weak (positive) linear relationship between P.D Samos - 1st P.D Dodekanese
0,00	NO linear relationship between P.D Samos - 2nd P.D Dodekanese

0,42	Weak (positive) linear relationship between P.D Samos - P.D Kyklades
0,64	Average (positive) linear relationship between P.D Samos - Samothraki & Central Port Authority of Alexandroupolis
-0,17	Very Weak (negative) linear relationship between P.D Samos - GRC & TUR Land Borders
-0,09	Very Weak (negative) linear relationship between 1st P.D Dodekanese - 2nd P.D Dodekanese
-0,05	Very Weak (negative) linear relationship between 1st P.D Dodekanese - P.D Kyklades
0,66	Average (positive correlation) linear relationship between 1st P.D Dodekanese - Samothraki & Central Port Authority of Alexandroupolis
0,12	Very Weak (positive) linear relationship between 1st P.D Dodekanese - GRC & TUR Land Borders
-0,04	Very Weak (negative) linear relationship between 2nd P.D Dodekanese - P.D Kyklades
0,38	Weak (positive) linear relationship between 2nd P.D Dodekanese - Samothraki & Central Port Authority of Alexandroupolis
-0,03	Very Weak (negative) linear relationship between 2nd P.D Dodekanese - GRC & TUR Land Borders
0,02	Very Weak (positive) linear relationship between P.D Kyklades - Samothraki & Central Port Authority of Alexandroupolis
-0,03	Very Weak (negative) linear relationship between P.D Kyklades - GRC & TUR Land Borders
-0,46	Weak (negative) linear relationship between Samothraki & Central Port Authority of Alexandroupolis - GRC & TUR Land Borders

Table 22: Variables correlation values for **2018**

Indicatively, "very powerful", "powerful" and "average" linear correlation types between the analyzed variables will be illustrated on the following figures 21 - 26.

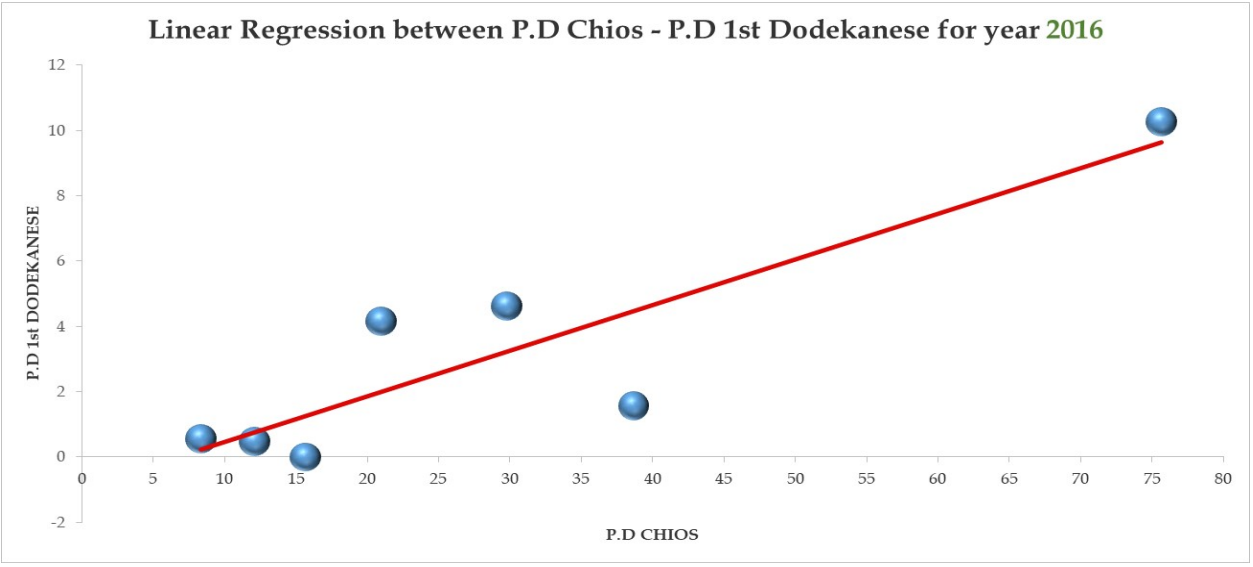

Figure 21: Very Powerful (positive correlation) linear relationship between P.D Chios & P.D 1st Dodekanese for year 2016
Source: Hellenic Police

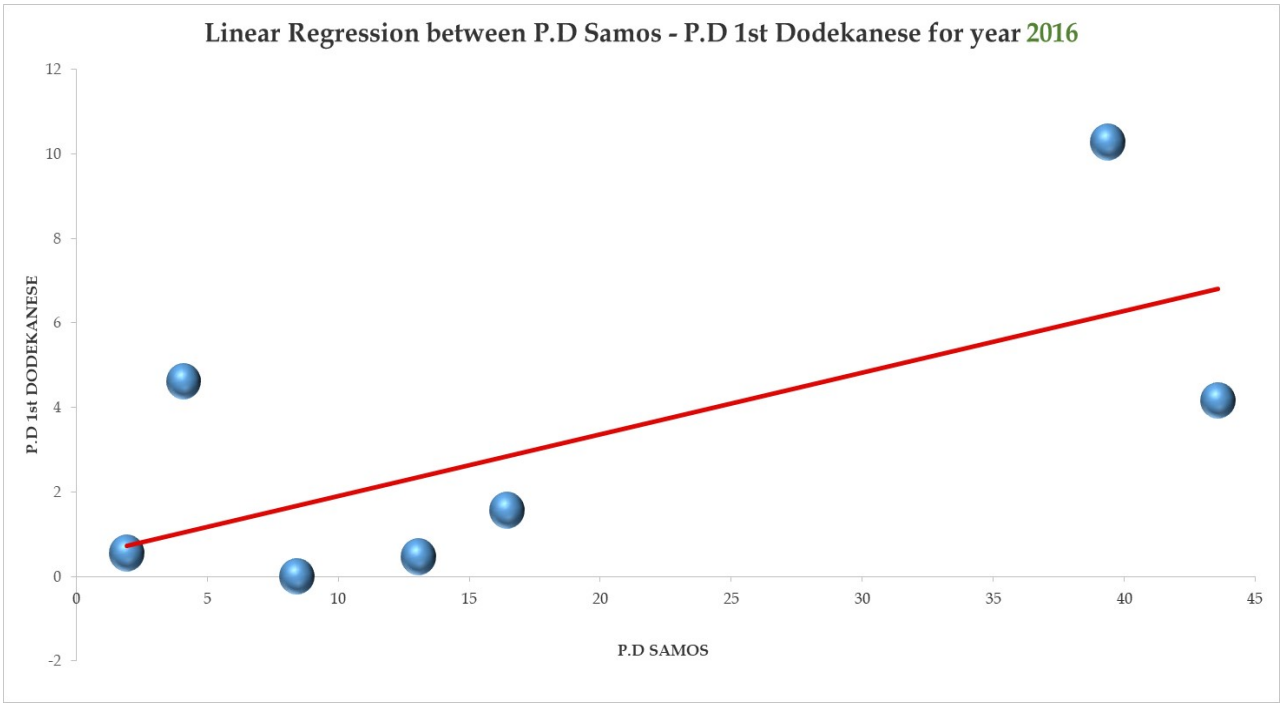

Figure 22: Average (positive correlation) linear relationship between P.D Samos & P.D 1st Dodekanese for year 2016
Source: Hellenic Police

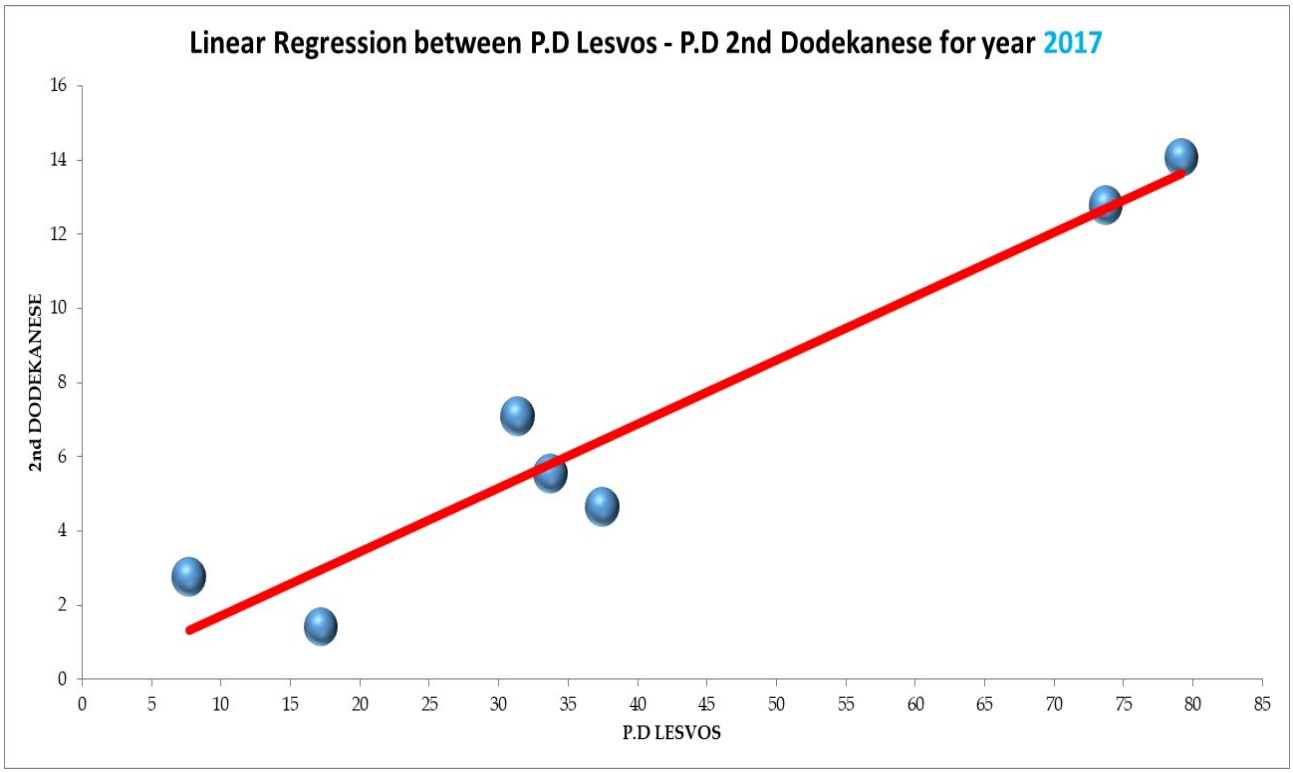

Figure 23: Very Powerful (positive correlation) linear relationship between P.D Lesvos & P.D 2nd Dodekanese for year 2017
Source: Hellenic Police

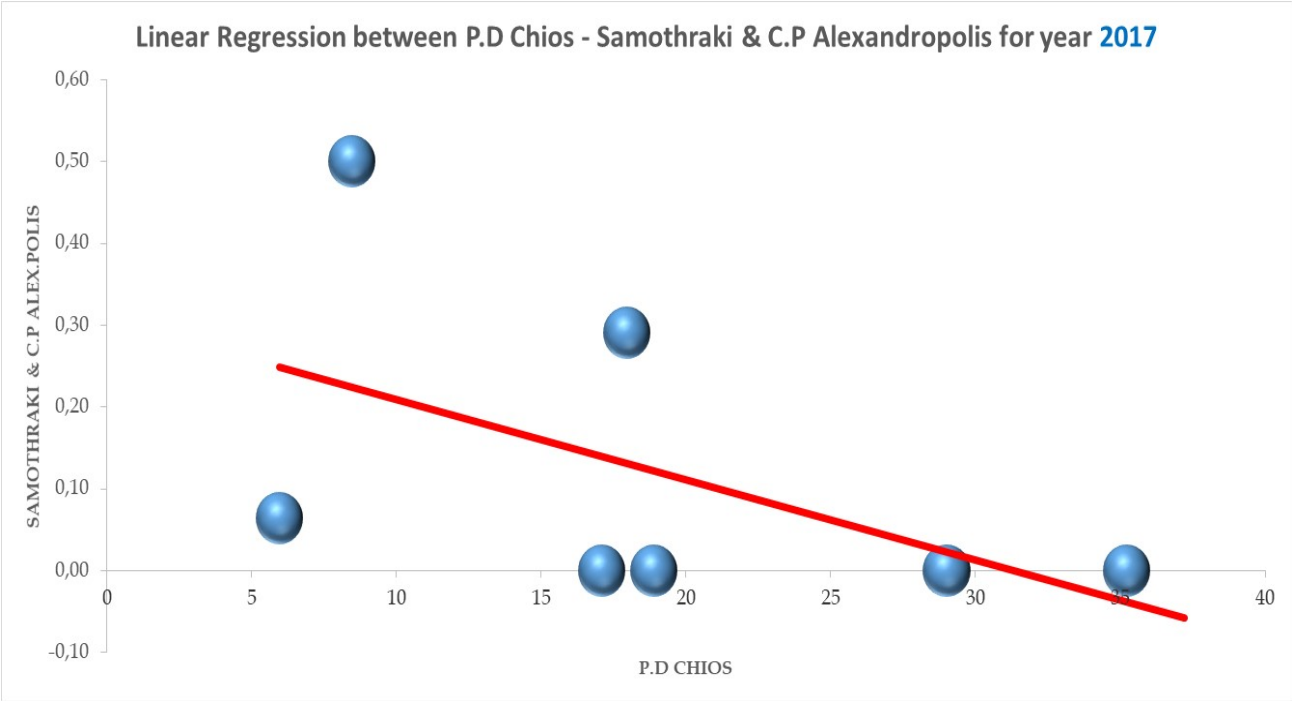

Figure 24: Average (negative correlation) linear relationship between P.D Chios & Samothraki – C.P Alexandropolis for year 2017
Source: Hellenic Police

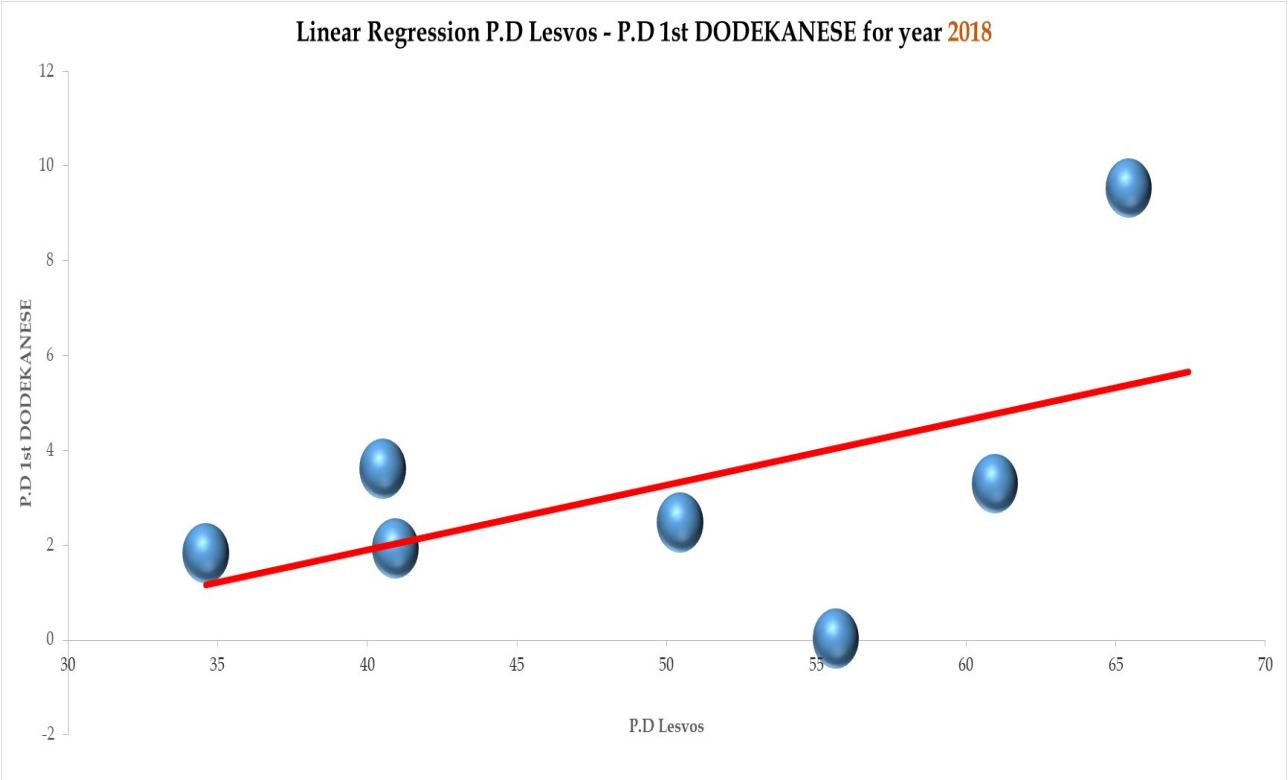

Figure 25: Average (positive correlation) linear relationship between P.D Lesvos & 1st P.D Dodekanese for year 2018
Source: Hellenic Police

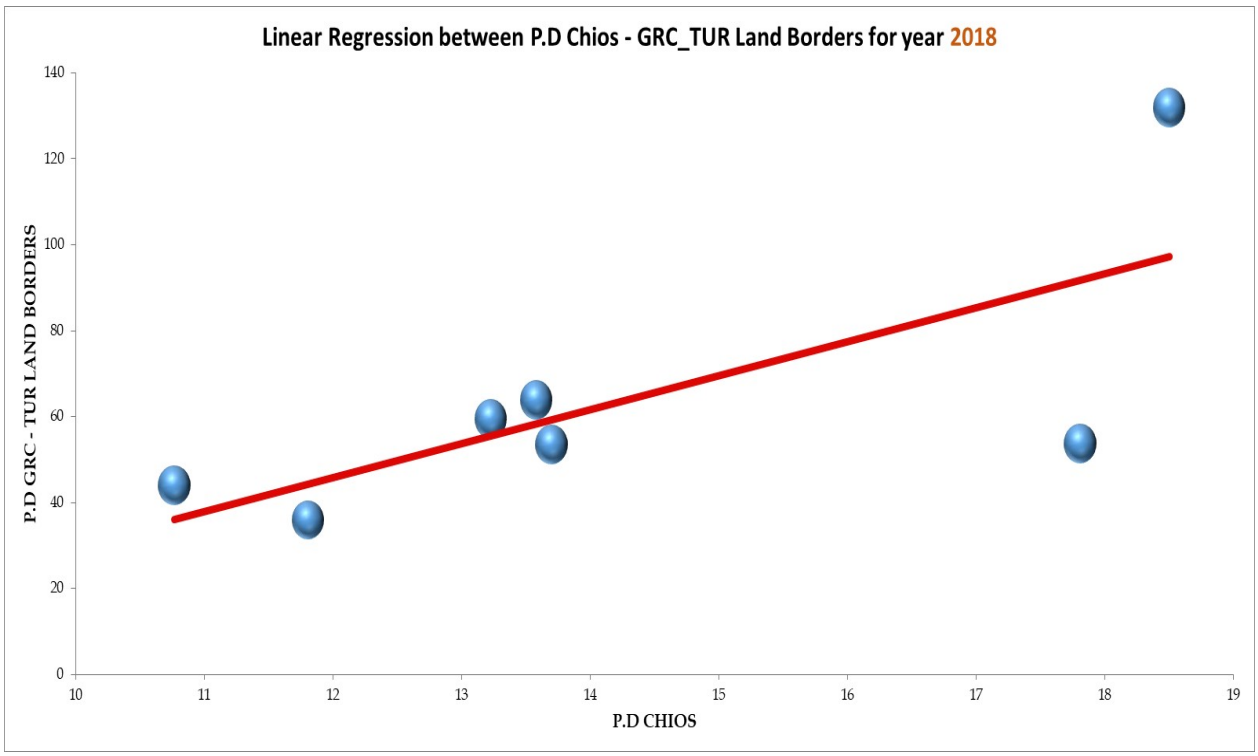

Figure 26: Powerful (positive correlation) linear relationship between P.D Chios & GRC-TUR Land Borders for year 2018
Source: Hellenic Police

Finally, variable correlation which is repeated three years in row (2016,2017 and 2018) will be illustrated in the following diagrams (Figure 27 – 29)[246].

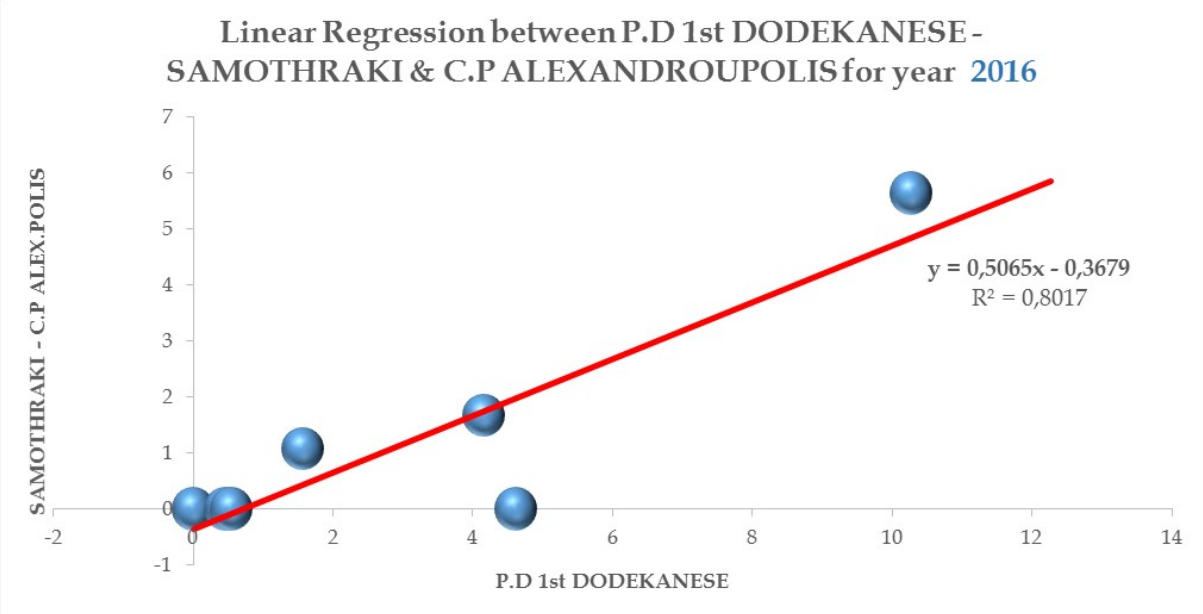

Figure 27

[246] Linear Regression was obtained from data (mean values from arrests of I.A.P.s for illegal entry and staying in Greece from Hellenic Police & Port Police/Hellenic Coast Guard Authorities) focused on the period April – October for each analyzed year.

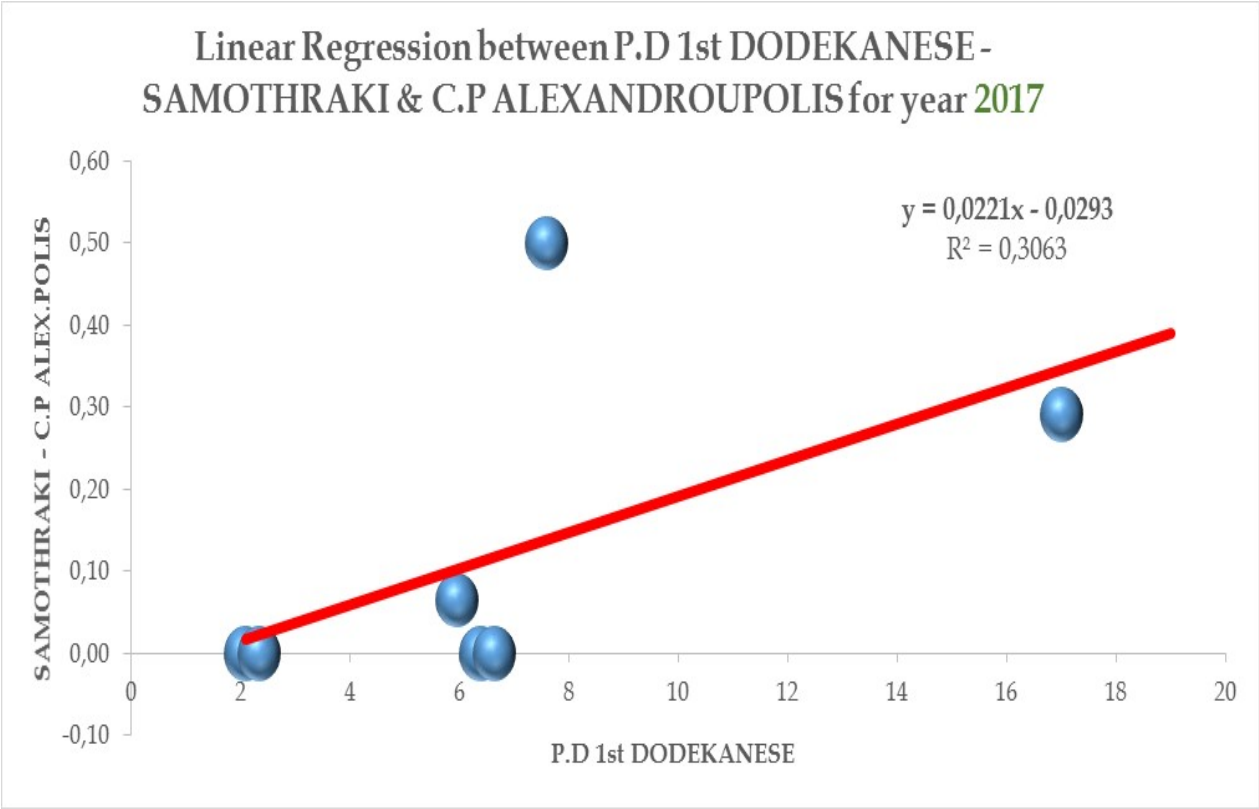

Figure 28

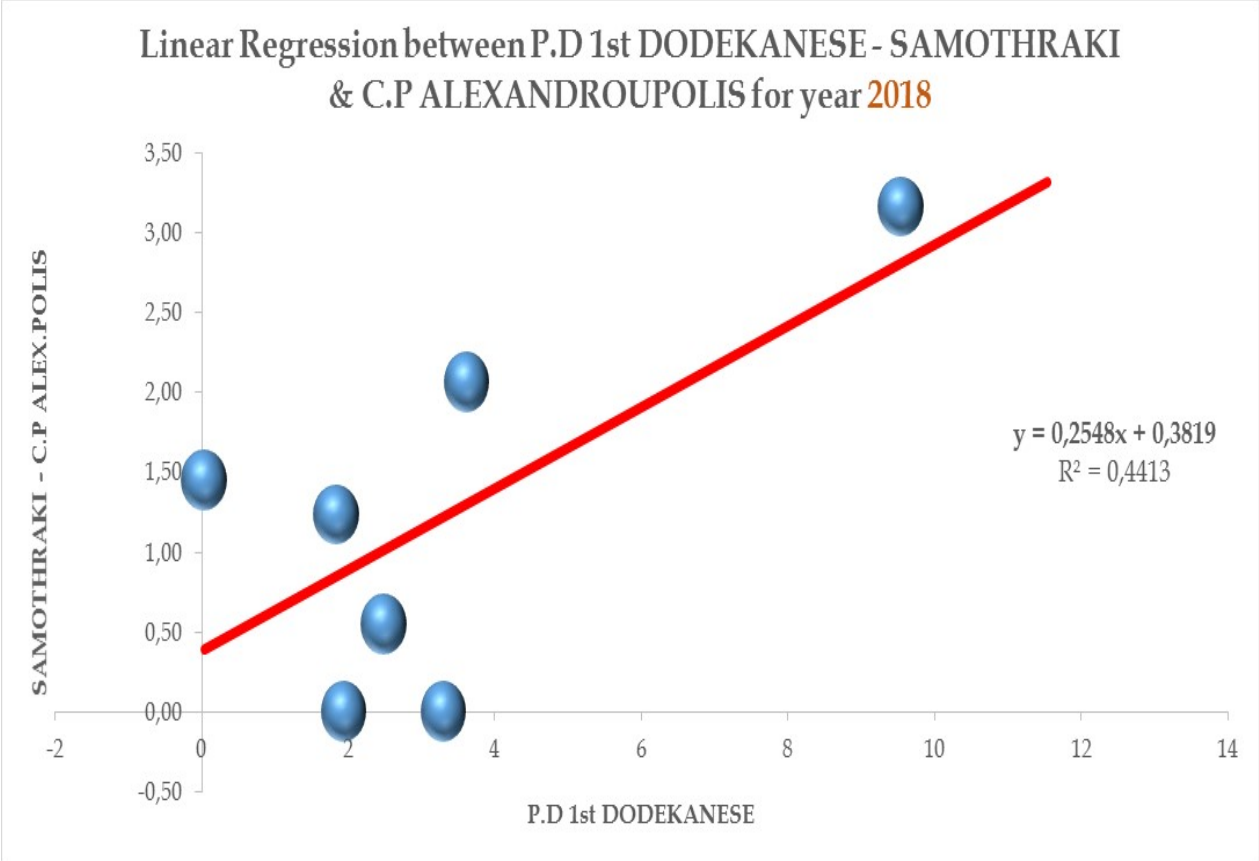

Figure 29

Correlation analysis[247]

Question: To what extent is the size of the migration flows in the P.D 1st Dodecanese related to the migration flows in Samothraki & C.P Alexandroupolis.

As we mentioned before, correlation analysis can measure the degree of correlation between two variables and determine the direction of the relationship between them. We might observe that as migration flows increase to P.D 1st Dodecanese, they could decrease in Samothraki & C.P Alexandroupolis (negative relationship) or as flows increase to P.D 1st Dodecanese, an increase is also observed for Samothraki – C.P Alexandroupolis (negative relationship).

Therefore, taking into consideration the above diagrams (figures 27-29), we conclude that:

In Figure 27, a very strong linear relationship between the two variables is shown, while in Figures 28 and 29, the average linear relationship between the same variables is being illustrated.

It should be noted that the linearity between the two (2) variables is influenced by the existence of extreme values (a factor to be taken into account during the process of the mathematical prediction model verification).

[247] ANNEX 3: **Comments on the correlation coefficient**

6.6 Simulation

Simulation process, will include two (2) stages.

Firstly, simulation based on the forecasting mathematical model, in order to check its effectiveness and reliability.

Secondly, the impact of N.C.A factors change on vulnerability and risk level, which first has to be determined (see subchapter 6.7).

Specifically,

As has been reported, for the purposes of the present research, the **mathematical forecasting model** will be an estimation of the variation of future migration flows.

Effective forecasting is not just numbers deriving from applying a mathematical model. It is a complex object, for which we have to collect a great deal of information about the direct and indirect context of the forecast object.

To predict future migration flows, we use either quantitative[248] / statistical methods based on historical data or qualitative[249] methods or even a combination of these two categories of methods.

Whichever method is chosen[250], we should at regular intervals (eg every month) feedback our forecast with new data (resulting information).

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[248] The quantitative method refers to the systematic investigation of a phenomenon by statistical methods and numerical data. A representative sample of observations is usually used in order to generalize the results to the population in total.

[249] A qualitative method is an essentially explanatory method.

[250] The most suitable method is chosen based on specific criteria.

- ❖ Forecasting period (short-term, long-term)
- ❖ Trend, seasonality, circularity

In this way, we are able to update the accuracy of the forecasts and minimize their errors.

Regardless of the model we will choose, we will assess[251] its effectiveness.

In a dynamically developmental environment, we need to take into consideration the factors that might have an impact on mixed migration flows.

Specifically, we identify the internal or external factors[252], as well as their degree of influence, with regard to mixed migration flows.

Taking into account the above mentioned and based on the initial forecasting, we will evaluate this compared to the actual fluctuation of mixed migration flows.

This process can initially lead us to an understanding of the causes of possible forecasting errors[253]. In the case of deviances, apart from the existence of possible errors, we will note that in a **dynamic environment** the **factors[254]** that might have an **impact** on mixed migration flows vary and most of the time these factors **cannot be depicted into a mathematical correlation**.

Therefore, the mathematical forecasting should be adjusted based on the particular knowledge and information we have about these factors.

- ✓ Trend (increasing gradually or decreasing)
- ✓ Circularity (fluctuate movements, which are repeated for a very long time)
- ✓ Seasonality (cyclical movements of high or low demand, which are repeated
- ✓ Trend seasonality
- ✓ Random movement

❖ Accuracy
❖ Data availability
❖ Easy for implementation

[251] For this assess, we calculate the **statistical errors**, which compare how the model's forecasting results are converged to the actual values .
We usually set some thresholds for error values.
The most well-known **indicators** are:

- Average error
- Median absolute deviation (MAD)
- Mean squared error (MSE)
- Mean absolute percentage error (MAPE)

[252] Internal: Defined by the Organization
External: Political, Economic, Social, Technological

[253] Essential element of a reliable forecasting is forecasting errors, which can help us analyze the effectiveness of a forecasting model.

[254] ANNEX 4: Indicatively, a timeline for 2019, related to external factor will be imprinted.

Therefore, we will begin with stage 1 – Mathematical model assess.

1st scenario: Long term forecasting

Forecasting period for migration flows, between January till October 2019

The above mentioned forecasting period will be focused in the following areas: P.D 1st Dodekanese - Samothraki & C.P Alexandroupolis, for which as noted in sub-chapter 6.5 (pg 136), it consists a repeated variable correlation which fulfill a good correlation degree.

The model verification will be performed using the linear regression equations as illustrated in the relevant diagrams.

During simulation process, we will first use the linear equation that emerged between the two variables for year 2018, where in the place of the independent variable (x), we will put the actual mean[255] value corresponding to the 1st Dodekanese and compare the results with the actual mean value of the dependent variable (y), where in our case is Samothraki – C.P Alexandroupolis, for the corresponding time period.

Taking into consideration the results deriving after applying the above mentioned procedure, we observed a deviation between the actual and the predicted values for variable (y).

It is noted, that the deviation observed was expected due to the differential fitting equations with each passing time.

Using 2018 Linear Regggresion				
	Predicted values for variable (y)	**Actual values for variable (x) (P.D 1st Dodekanese)**		**Actual values (y) for 2019**
May 2019	**1,17**	**3,77**		**7,97**

Table 23: Indicatively forecasting result for May 2019, focused on P.D 1st Dodekanese – Samothraki & C.P. Alexandroupoli.

2nd scenario: Long term forecasting (without extreme values)

Forecasting period for migration flows: January to October 2019

[255] Mean values by month, deriving from the daily arrests of I.A.Ps for illegal entry & staying from Hellenic Police & Hellenic Coast Guard Authorities.

In this case outliers are removed (Initial r: 0,66 / **NEW r**: 0,81) from the linear regression (NEW regression type: y = 0,349 * x – 0,1516).

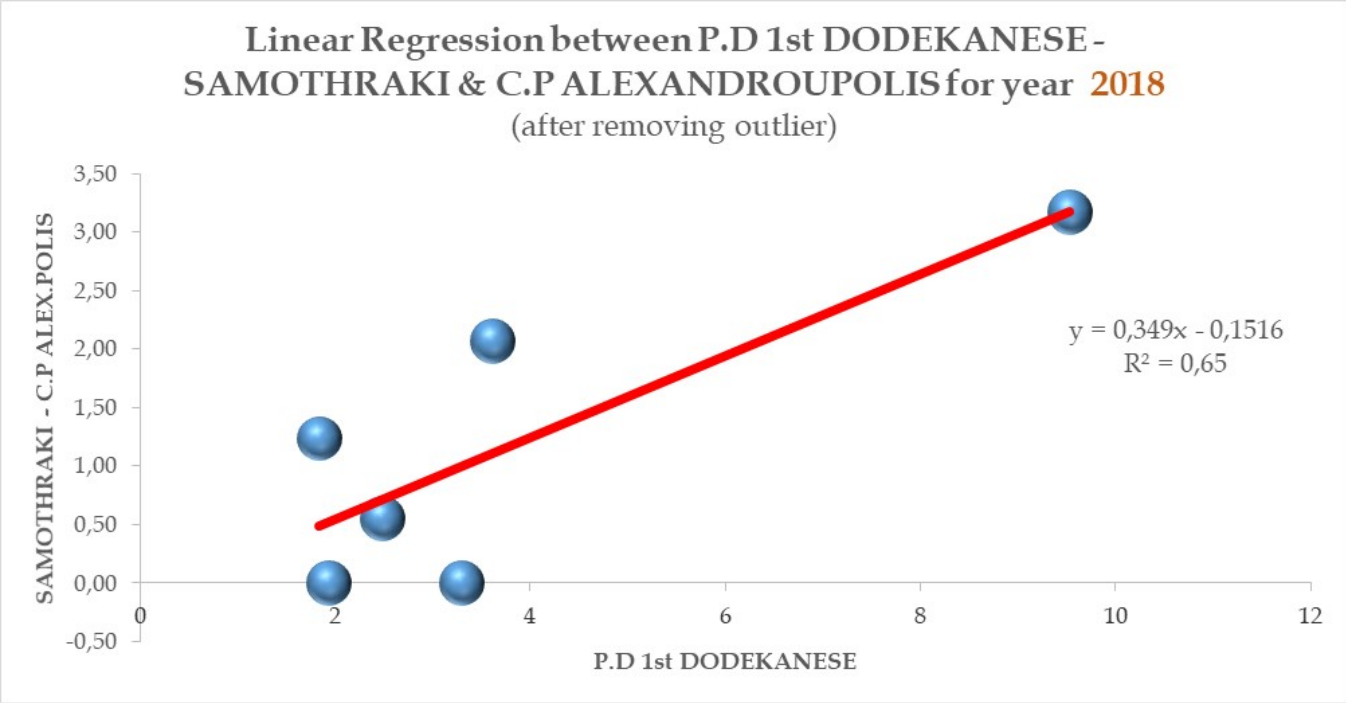

Figure 30

	Predicted values of variable (y) for May-Oct 2019	**Actual values of variable (x) for May-Oct 2019 (P.D 1st Dodekanese)**		**Actual values of variable (y) for May-Oct 2019**
June 2019	**2,05**	**6,30**		**22,27**

Table 24: Indicatively forecasting result for June 2019, focused on P.D 1st Dodekanese – Samothraki & C.P. Alexandroupoli (using linear regression, without outliers).

Even, after removing outliers, results remain the same. There is still divergence between the actual and the predicted values for variable (y).

3rd scenario: Short term forecasting (without extreme values, where necessary)

We will repeat the same procedure like in the previous scenarios, only this time we will shorten the forecasting period.

More specific, we will use linear regression equation emerging from data related to period from April till September for each year (2016, 2017 and 2018) and we will attempt to forecast the mean value for October 2016, October 2017, October 2018.

	X variable (EXPLANATORY)	Y variable (RESPONSE)
	MEAN Migration Flows VALUES for 1st P.D DODEKANESE	**MEAN Migration Flows VALUES for SAMOTHR. - C.P ALEX.POLI**
Apr-16	1,57	1,07
May-16	0,00	0,00
Jun-16	0,47	0,00
Jul-16	0,55	0,00
Aug-16	4,61	0,00
Sep-16	10,27	5,64

Table 25

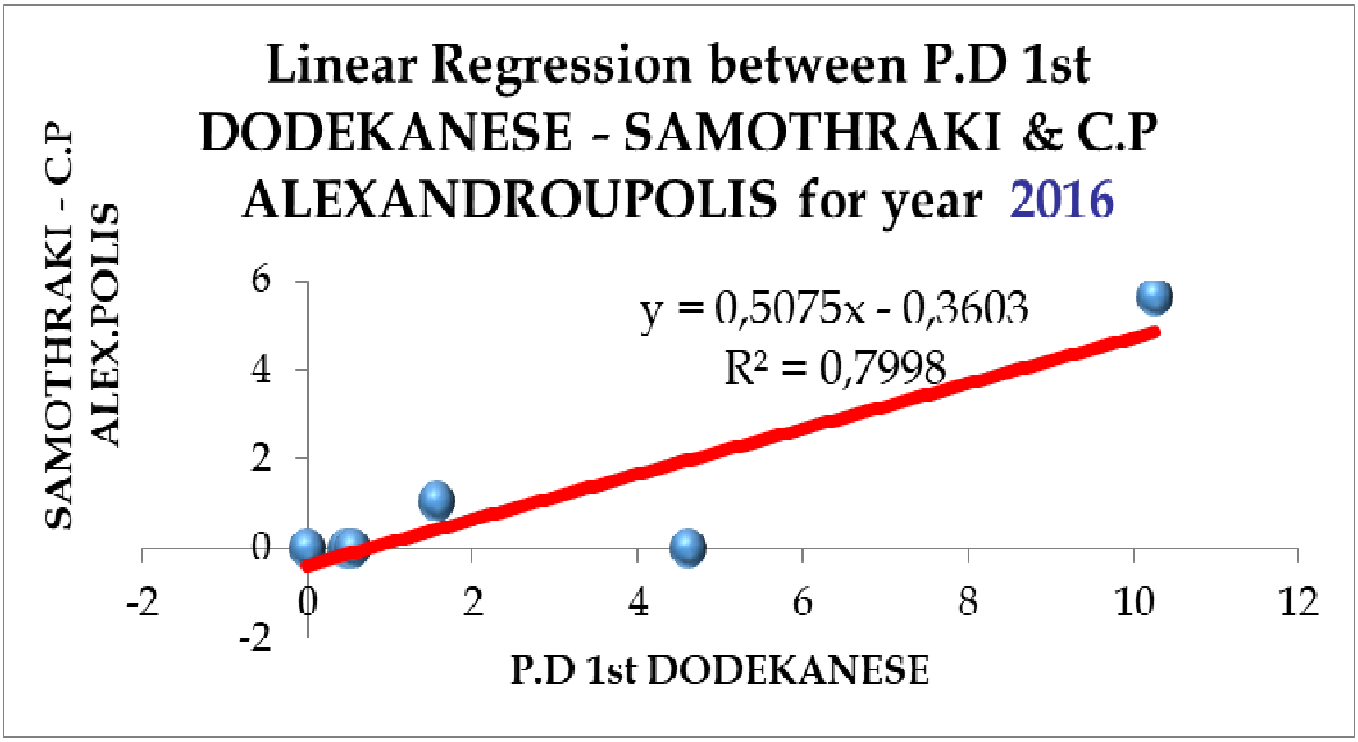

Figure 31

Using 2016 Linear Regggresion (y = 0,5075x - 0,3603)				
	Predicted value of variable (y) for October 2016	**Actual value of variable (x) for October 2016 (P.D 1st Dodekanese)**		**Actual value of variable (y) for October 2016**
October 2016	**1,75**	**4,16**		**1,68**

Table 26

From what we can observe, based on the above results[256], the deviation between the actual and the predicted values of variable (y), is only 0,04%.

Regarding forecast for October 2017

In this case, we have removed the outlier (Initial r: 0,55 / **NEW r**: 0,96).

	X variable **(EXPLANATORY)**	Y variable **(RESPONSE)**
	MEAN Migration Flows VALUES for 1st P.D DODEKANESE	**MEAN Migration Flows VALUES for SAMOTHR. - C.P ALEX.POLI**
Apr-17	2,10	0,00
May-17	2,35	0,00
Jul-17	5,97	0,06
Aug-17	17,00	0,29
Sep-17	6,40	0,00

Table 27

[256] Numerical data correspond to number of people.

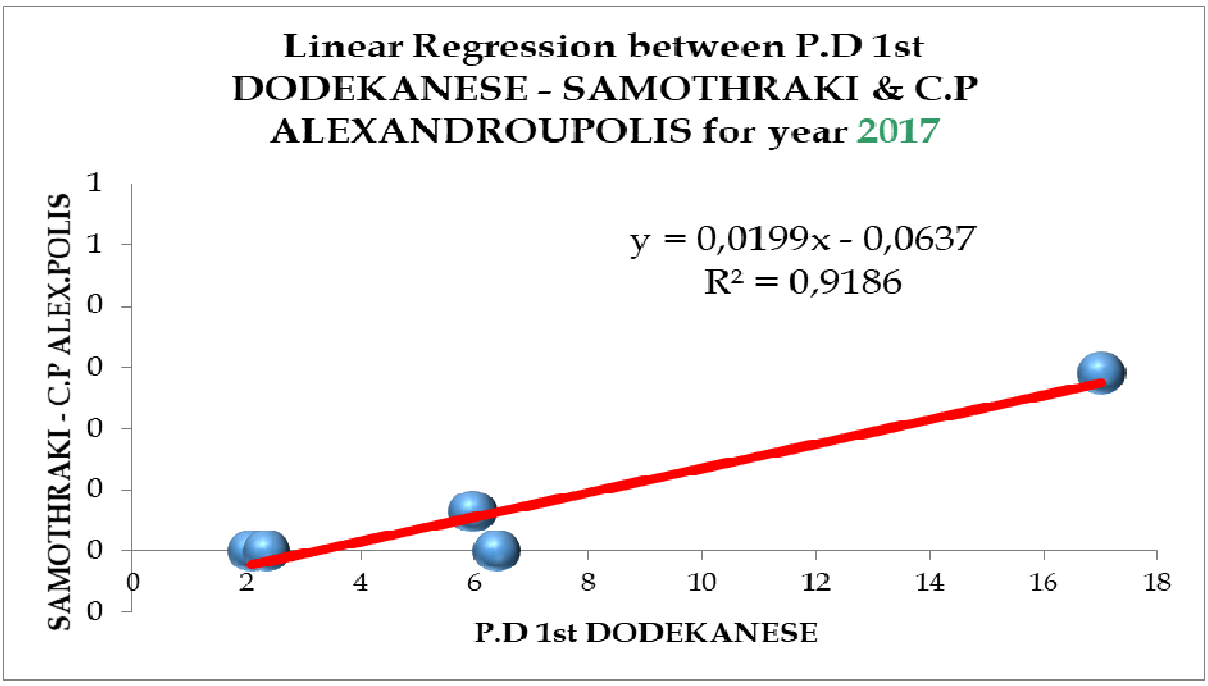

Figure 32

Using 2017 Linear Regggresion (y = 0,0199x - 0,0637)

	Predicted value of variable (y) for October 2017	**Actual value of variable (x) for October 2017 (P.D 1st Dodekanese)**		**Actual value of variable (y) for October 2017**
October 2017	**0,07**	**6,65**		**0,00**

Table 28

Note: The predicted value of variable (y) is close to the actual one.

Regarding forecast for October 2018

	X variable **(EXPLANATORY)**	Y variable **(RESPONSE)**
	MEAN Migration Flows VALUES for 1st P.D DODEKANESE	**MEAN Migration Flows VALUES for SAMOTHR. - C.P ALEX.POLI**
Apr-18	3,30	0,00
May-18	2,48	0,55
Jun-18	1,83	1,23
Jul-18	1,94	0,00
Aug-18	0,03	1,45
Sep-18	9,53	3,17

Table 29

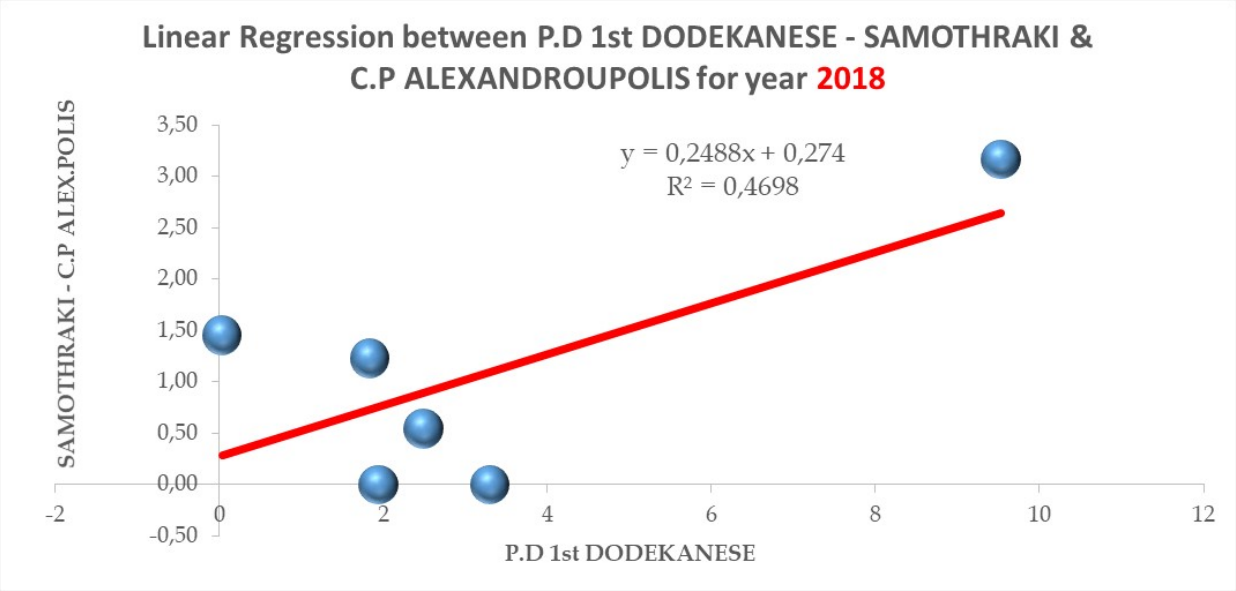

Figure 33

Using 2018 Linear Regggresion (y = 0,2488x + 0,274)				
	Predicted value of variable (y) for October 2018	**Actual value of variable (x) for October 2018 (P.D 1st Dodekanese)**		**Actual value of variable (y) for October 2018**
October 2018	**1,28**	**3,61**		**2,06**

Table 30

Note: There is no big difference between the actual, observed value and the predicted one.

We will also simulate the procedure, for this case, by removing the outlier (Initial r: 0,69 / **NEW r**: 0,87).

	X variable (EXPLANATORY)	Y variable (RESPONSE)
	MEAN Migration Flows VALUES for 1st P.D DODEKANESE	**MEAN Migration Flows VALUES for SAMOTHR. - C.P ALEX.POLI**
Apr-18	3,30	0,00
May-18	2,48	0,55
Jun-18	1,83	1,23
Jul-18	1,94	0,00
Sep-18	9,53	3,17

Table 31

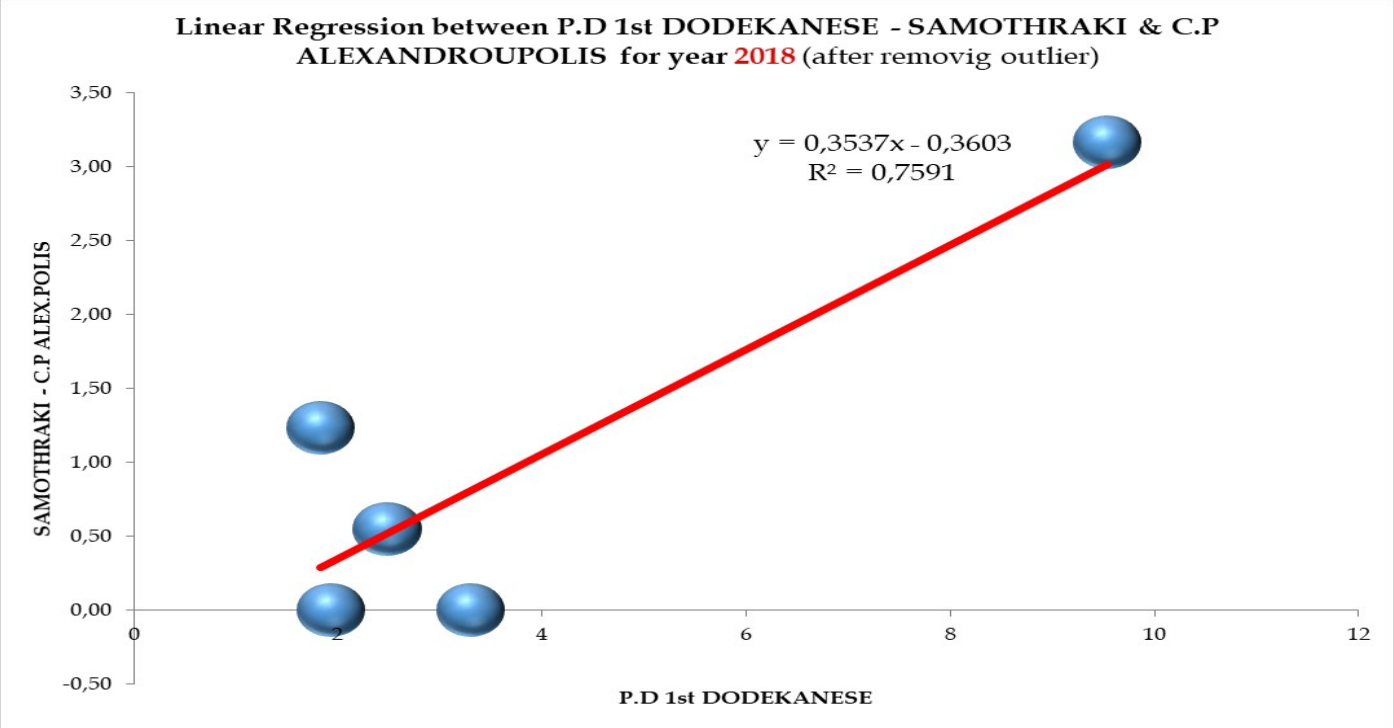

Figure 34

Using 2018 Linear Regggresion (y = 0,3537x - 0,3603)				
	Predicted value of variable (y) for October 2018	**Actual value of variable (x) for October 2018 (P.D 1st Dodekanese)**		**Actual value of variable (y) for October 2018**
October 2018	**0,92**	**3,61**		**2,06**

Table 32

Note: The actual mean value observed of variable (y) is close to the predicted one.

Taking into account, the above occurred results, we can observe that short term forecast produced more accurate predicting observations.

6.7 Vulnerability Assessment

As described in the beginning of sub-chapter 6.6, before we proceed to the second simulation stage, we first have to determine vulnerability level.

Particularly, according to Chapter 6, we noted that vulnerability will be the sum of two categories:

V = Pull Factors + National Combating Ability (6.1)

At this point we will explain why equation (6.1) will be amended to calculate the country's level of vulnerability in the area of border security.

Particularly,

The higher the vulnerability, the higher are the gaps that the country will have to mitigate.

National Combating Ability category reflects the opposite. Therefore, in order to take into account its score, equation (6.1) will be modified as follows:

V = Pull Factors + (1 - National Combating Ability) (6.2)

At this point, there are two (2) options, either replacing equation (6.2) with the numerical data as calculated, assuming both factors have equal weight, or re-weighting each factor separately.

The method that will be followed depends on the analyst's judgment.

For the purposes of the current analysis, National Combating Ability factor is considered to be the most important factor in determining the level of vulnerability and should therefore be weighted differently from the Pull factors[257].

Therefore, equation (6.2) is modified as follows:

V = Pull Factors * Weigh + [(10[258] – National Combating Ability) * weight] (6.3)

---

[257] We are unable to control pull factors that attract migration, because they change over time and sometimes are unclear and unpredictable.
The enhancement of a country's ability to deal with migration flows, is more feasible. Strenghtening measures and improving strategies that can affect border management ability may mitigate the risk.

[258] The scale we choose for the purpose of this research is 0-10.
If the scale was 0-1, then equation (6.2) would be the following: V = Pull Factors * Weigh + [(**1** – National Combating Ability) * weight]

Specifically the weights for the two (2) factors are defined

- **Pull Factors Weigh = 0,35**
- **National Combating Ability weight = 0,65**

V = Pull Factors * 0,35 + [(10 – National Combating Ability) * 0,65] = 7,62 * 0.35 + [(10- 6.14) * 0,65] = 3,81 + (3.86 * 0.65) = 2.56 + 2.51 = **6,32**

Given the above result and in conjunction with the measurement scale[259] set by the analyst, the level of vulnerability is assessed as **Medium-High**[260]**.**

In addition, for the purpose of the research and according to various assessments and reports by International Organizations[261], the level of threat to the issue of migration is taken as **Medium-High.**

Based on the level of threat and vulnerability, we will calculate the level of risk for the migration issue.

This can take place with a new matrix table 5X5[262], that will be created and which will have the following form:

[259] Vulnerability score

Vulnerability level	Score
Low	0 – 2.00
Medium Low	2.01 – 4.00
Medium	4.01 – 6.00
Medium High	6.01 – 8.00
High	8.01 – 10.00

[260] The level of vulnerability is **INDICATIVE**, in order to serve the purpose of the current analysis research.

[261] National Money Laundering and Terrorist Financing Risk Assessment Report. October 2018 http://financialservices.govmu.org/English/Documents/2019/NRA%20Report/Public%20Report%202019-compressed.pdf

[262] The new table that is created differs from the classical table as described in Chapter 3 for the following reason: when laying weights, the effects of vulnerability are incorporated, so the basic 5X5 matrix table cannot be used (Chapter 3, page 33). This basic table is used in cases where no weights are set and so we have to calculate the impact of vulnerability separately.

		National Vulnerability Level				
		0 – 2.00	2.01 – 4.00	4.1 – 6.00	6.01 – 8.00	8.01 – 10.00
National Threat Level	0 – 2.00					
	2.01 – 4.00					
	4.1 – 6.00					
	6.01 – 8.00					
	8.01 – 10.00					
National Risk Level						

Risk	**Blue** Low	**Light Blue** Medium Low	**Yellow** Medium	**Orange** Medium High	**Red** High risk

Table 33: 5X5 Matrix table – National Threat, Vulnerability & National Risk Level

Then, based on the above mentioned table, we will note the point at which the level of national threat and the level of national vulnerability converge and that specific point will consist the level of national risk.

Particularly,

		National Vulnerability Level				
		0 – 2.00	2.01 – 4.00	4.1 – 6.00	6.01 – 8.00	8.01 – 10.00
National Threat Level	0 – 2.00					
	2.01 – 4.00					
	4.1 – 6.00					
	6.01 – 8.00					
	8.01 – 10.00					
National Risk Level						

Risk	**Blue** Low	**Light Blue** Medium Low	**Yellow** Medium	**Orange** Medium High	**Red** High risk

Table 34: 5X5 Matrix table – National Threat, Vulnerability & National Risk Level (illustrated point of national risk level)

Therefore, the level of national risk is defined as **Medium - High**.

Next, we will run simulation scenarios to see if changes in the national vulnerability ability of Greece[263] have an effect in the country's national combating ability level, and thus the level of risk.

The evaluation of the variables in order to complete the simulation process should be based on Greece's unique data.

Taking into account the results, we will see that with the use of effective risk management[264], decision makers can make more rational use of the available tools to deal with the migration phenomenon more decisively.

Risk management models are created to fit each unique project that arises. So, we must be prepared to create a new model when planning a project and make a provisional assessment of the risk.

The main objective of migration flows management is to coordinate and control all the available resources to the stakeholder in such a way as to maximize the efficiency of the system and the response / management to be achieved without delay.

[263] **Scenarios are indicative and can be applied in case we want to examine the results of a change in both the pull factors and the national vulnerability ability of Greece.**

[264] **Risk Management:**

i. Identify precautionary measures in order to avoid risk or to decrease its effect
ii. Create alternative or emergency plans to deal with risks if they should occur
iii. Set off more thorough research through better information
iv. Set off alternative plans on cost estimations, educational programmes and allocation of resources.

6.7.1 Risk Management scenarios – Cost Risk Analysis

In case of Greece, we will proceed to a risk management scenario by improving **National Combating Ability factor**, with the aim of reducing the level of vulnerability and thus the risk level.

Indicatively, it is noted that human resources and logistical equipment are part of the above mentioned factor. Therefore, a change in these elements will affect the level of vulnerability and risk.

Nevertheless, we should take into consideration that each activity (reallocation of human resources and equipment, new supplies, staff growth) under normal conditions, requires time and money, which are quintessentially scarce resources.

More specifically,

Scenario 1

Organizational Cooperation – Cooperation with M-S	Weight ranking	Rating	Organizational Cooperation – Cooperation with M-S rating
Europol - Interpol	0,3	6	1,8
Frontex	0,5	6	3
Cooperation with E.U M-S or Third countries	0,2	6	1,2
Total	1	-	6

Table 35: Organizational Cooperation – Cooperation with M-S variable – initial weight ranking & rating

Frontex element

As part of the implementation of the Integrated Border Management Program to manage illegal immigration, it is envisaged to strengthen border

control through the use of additional human resources and advanced technology tools.

Therefore, in order to reduce the national cost (budget and staff) to overcome the challenges of migration issue and securing borders, we could utilize the capabilities provided by FRONTEX[265] and in particular taking advantage of technical support which includes coordination of additional technical equipment (vessels, planes, patrol cars etc.), as well as providing specially trained personnel[266] capable of providing targeted assistance on land and sea borders[267].

Cooperation with E.U M-S or Third countries, Europol - Interpol elements

The existing international and regional geopolitical context has made the movements of people in certain states and regions necessary or even violent. The 2015 migrant-refugee crisis has highlighted the need for EU support regarding the implementation of more efficient policies.

In addition, it has become apparent that migration management cannot be addressed by individual MS, but it requires continuous cooperation, and avoid unilateral actions, taking into account the common challenges of cross-border flows, in particular among frontline MS.

At the same time, the interconnection between illegal immigration and other forms of organized crime (eg. illegal movement of migrants – human

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[265] **Press release 18.11.2019**
European Border and Coast Guard (FRONTEX): Council adopts revised regulation
https://www.consilium.europa.eu/en/press/press-releases/2019/11/08/european-border-and-coast-guard-council-adopts-revised-regulation/
"The European Border and Coast Guard Agency (Frontex) is being strengthened in terms of staff and technical equipment. It is also being given a broader mandate to support member states' activities, especially on border control, return and cooperation with third countries."
https://data.consilium.europa.eu/doc/document/PE-33-2019-INIT/en/pdf

[266] Provide training opportunities to the personnel involved in migration management, directly in the operational field, without the need for travel or any additional costs, but with the ability to apply what is learned in practice. At the same time, the knowledge gained will be multiplied, as future national trainings will enable participants to transfer their acquired know-how to the rest of the staff involved in relevant tasks.

[267] Frontex has the ability, in case of emergency at the external borders, to provide specialized human resources and technological equipment, to create a reserve in the form of European Border and Coast Guard Teams (EBCGT), as well as a wide base of equipment available.
https://frontex.europa.eu/training/ebcgt-training/

trafficking, use of false / falsified travel documents), as well as the steady increase in the number of legal travelers, reinforce the importance of the effectiveness of border controls.

Given the above, it is noted that co-operation both among the MS with international organizations[268] and EU institutions as well as bilaterally between the MS, is essential and the results can be of added value.

In is mentioned, that Greece accredits special emphasis on activities, that could improve the effectiveness of surveillance and control at land, sea and air borders. In particular, it provides continuous training of police personnel, cooperation with competent authorities at national level, cooperation with the EU institutions and agencies, as well as with neighboring third countries.

In addition, current geopolitical developments in the Eastern Mediterranean, coupled with the ever-evolving regional security challenges in the region, highlight the need to consolidate Greece's role as an important pivotal state and pillar of stability in the Eastern Mediterranean and the Balkans.

Moreover, the continuous enlargement of the bilateral relations between Greece and E.U[269] is a common objective, a direct result of the common interests in security and migration management, as well as effective operational cooperation with third countries[270].

---

[268] Example: https://frontex.europa.eu/search-results/?q=serbia
https://www.consilium.europa.eu/en/press/press-releases/2019/11/19/border-management-eu-signs-agreement-with-serbia-on-european-border-and-coast-guard-cooperation/
https://ec.europa.eu/commission/presscorner/detail/en/IP_19_6008
https://www.consilium.europa.eu/en/press/press-releases/2019/10/07/border-management-eu-signs-agreement-with-montenegro-on-european-border-and-coast-guard-cooperation/
http://statewatch.org/analyses/no-309-frontex-third-countries-agreements.pdf

[269] Example: Cooperation between Greece – United Kingdom
https://brexit.gov.gr/%CF%83%CF%85%CE%BD%CE%AC%CE%BD%CF%84%CE%B7%CF%83%CE%B7-%CE%B1%CE%BD%CE%B1%CF%80%CE%BB%CE%B7%CF%81%CF%89%CF%84%CE%AE-%CF%85%CF%80%CE%BF%CF%85%CF%81%CE%B3%CE%BF%CF%8D-%CE%B5%CE%BE%CF%89%CF%84%CE%B5/

[270] Necessity to maintain and enhance mutually beneficial cooperation between Greece and other E.U MSs as well as third countries in the field of education, in order to improve border guard management.

The exchange of useful experiences and knowledge in order to better meet the current challenges, makes it necessary to continue and intensify the implementation of educational actions in order to enhance the existing know-how[271]. After all, education can be a powerful tool in confronting illegal immigration phenomenon, as well as conformation of effective preventive strategies.

Taking into consideration the above mentioned, **the new table will be formed as followed.**

Organizational Cooperation – Cooperation with M-S	Weight ranking	Rating	Organizational Cooperation – Cooperation with M-S rating
Europol - Interpol	0,3	~~6~~ **7**	~~1,8~~ **2,1**
Frontex	0,5	~~6~~ **7**	~~3~~ **3,5**
Cooperation with E.U M-S or Third countries	0,2	~~6~~ **7**	~~1,2~~ **1,4**
Total	1	-	~~6~~ 7

Table 36: Organizational Cooperation – Cooperation with M-S variable – amended weight ranking & rating

Comment

Elements interaction

Taking into account the above mentioned, we note that there is an interaction between the elements, meaning that the exchange of know-how, the utilization of more sophisticated equipment and the continuous training

[271] The know-how can enrich national infrastructures to meet the contemporary challenges of the migration phenomenon. In particular, the continuation and intensification of the implementation of educational actions may further enhance the co-operation of KM in the management of migration and the fight against the cross-border threat. Providing access to existing expertise and other law enforcement agencies in the areas of data collection / processing / intelligence. The possibility of trainings actualization (border security - cross-border threats – collect data), for which implementation is not always feasible due to costs.

will enhance the operational capacity and readiness of the existing staff and the more efficient management of migration phenomenon.

Therefore,

Operational Activities	Weight ranking	Rating	Operational Activities rating
National Operational Activities	0,25	7	1,75
Personnel	0,25	6	1,5
Amenity (equipment)	0,25	7	1,75
Training	0,25	6	1,5
Total	1	-	6,5

Table 37: Operational Activities variable – initial weight ranking & rating

Operational Activities	Weight ranking	Rating	Operational Activities rating
National Operational Activities	0,25	~~7~~ **9**	~~1,75~~ **2,25**
Personnel	0,25	~~6~~ **6,5**	~~1,5~~ **1,63**
Amenity (equipment)	0,25	~~7~~ **9**	~~1,75~~ **2,25**
Training	0,25	~~6~~ **8**	~~1,5~~ **2**
Total	1	-	~~6,5~~ **8,13**

Table 38: Operational Activities variable – amended weight ranking & rating

Scenario 2

Maintaining the results from **Scenario 1**, we will proceed to the second one, modifying the rating on the following elements:

- **Asylum Procedure**
- **Expulsion, Return or readmission procedures**

In particular, Greek government attaches great importance to the more effective management of immigration, taking into consideration the asylum proposed legislation[272], which passed a law on 31/10/2019.

A key aspect of the bill, is asylum procedures to be more strict as well as to speed up the procedures.

Greece's right-wing New Democracy government argues that faster procedures will accelerate the return to Turkey of migrant's whose asylum claims are rejected.

Greek Prime Minister Kyriakos Mitsotakis has committed to protect Greek and E.U. borders and increase deportation.

The new asylum law could act dissuasive, whereas it might make it more difficult for people to access protection decreasing the possibilities for refugees and migrants in Greece, to improve their situation.

Additionally, the new E.B.C.G.A. regulation, amongst other things, will reinforce return procedures, it will contribute positively to the management of the migration issue, strengthening the N.C.A factor.

Consequentially,

Effectiveness of countermeasures	Weight ranking	Rating	Effectiveness of countermeasures rating
Schengen Borders Code	0,1	6	0,6
Asylum Procedure	0,25	4	1
Vulnerability Assessment	0,15	7	1,05

[272] Law 4636/2019 (Official Government Gazette 169/A'/1.11.2019) – «International Protection Law»
https://www.asylumineurope.org/news/29-10-2019/greece-new-restrictions-rights-and-procedural-guarantees-international-protection
Greek government passed a new asylum law on 31 October 2019, aimed at speeding up procedures concerning asylum requests and facilitating the returns to Turkey under the terms of the EU – Turkey Agreement signed in March 2016.
The new law makes the process of appealing a rejection more difficult.

Expulsion, Return or readmission procedures	0,25	5	1,25
Security checks	0,15	7	1,05
Total	1	-	~~4,95~~

Table 39: Effectiveness of countermeasures variable – initial weight ranking & rating

Effectiveness of countermeasures	Weight ranking	Rating	Effectiveness of countermeasures rating
Schengen Borders Code	0,1	6	0,6
Asylum Procedure	0,25	~~4~~ **7**	~~1~~ **1,75**
Vulnerability Assessment	0,15	7	1,05
Expulsion, Return or readmission procedures	0,25	~~5~~ **7**	~~1,25~~ **1,75**
Security checks	0,15	7	1,05
Total	1	-	~~4,95~~ **6,2**

Table 40: Effectiveness of countermeasures variable – amended weight ranking & rating

Taking into account the results deriving from scenario 1 & 2, the final vulnerability and risk analysis level, will be reformed as follows:

National Combating Ability	Rating
Border permeability	7,1
Operational Activities	~~6,5~~ **8,13**
Effectiveness of countermeasures	~~4,95~~ **6,2**
Organizational Cooperation – Cooperation with M-S	~~6~~ **7**
Total	~~24,55~~ **28,43**/ 4 = 6,14 **7,11**

Table 41: National Combating Ability factor rating – amended

Equation for vulnerability assessment level is modified as follows:

V = Pull Factors * 0,35 + [(10 – National Combating Ability) * 0,65] = 7,62 * 0.35 + [(10- 7.11) * 0,65] = 3,81 + (2.89 * 0.65) = 2.56 + 1.88 = **4,44**

Given the above result and in conjunction with the measurement scale[273] set by the analyst, the level of vulnerability is assessed as **Medium**[274]**.**

As mentioned, for the purpose of the research and according to various assessments and reports by International Organizations, the level of threat to the issue of migration is taken as **Medium-High.**

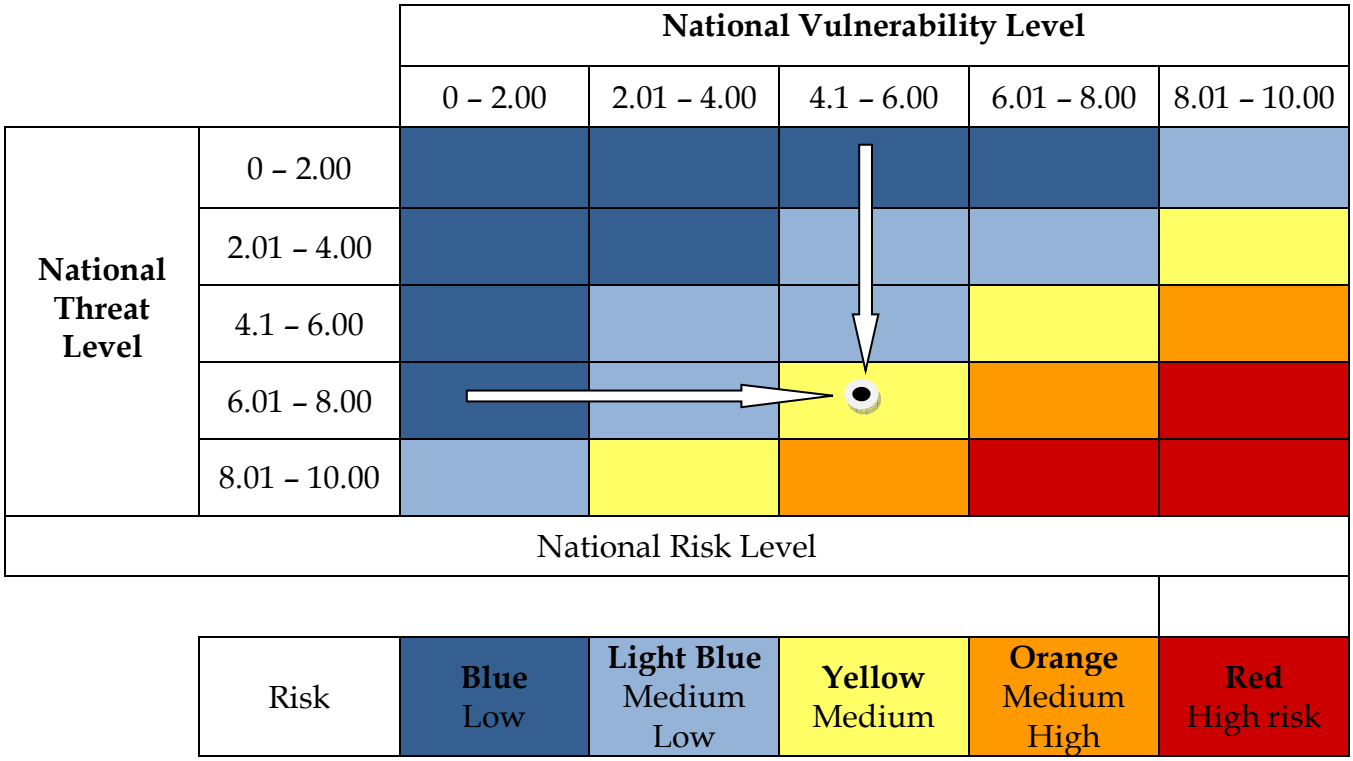


Table 42: National Risk Analysis level – amended (illustrated point of national risk level)

Therefore, the **amended** level of national risk is defined as **Medium** from Medium - High.

[273] Vulnerability score

Vulnerability level	Score
Low	0 – 2.00
Medium Low	2.01 – 4.00
Medium	4.01 – 6.00
Medium High	6.01 – 8.00
High	8.01 – 10.00

[274] The level of vulnerability is INDICATIVE, in order to serve the purpose of the current analysis research.

Therefore, we found out that the **enhancement of the N.C.A factor led to the abatement not only of the vulnerability level but also the risk.**

The broad sense of vulnerability can also be interpreted as the indicator of the qualitative and quantitative determination of the weak points of a given simple or complex system, in relation to its ability to function effectively when faced with any form of risk.

A system is considered to be vulnerable if it has a significantly reduced ability to design reaction measures or even preventive one, during a risk event.

Vulnerability assessment is one of the risk assessment process constituents. The liaison between them does not necessarily contain alternatives: decreased vulnerability does not always lead to a decreased level of risk as it depends on the level of threat and the impact. Also a lower level of risk does not necessarily mean a decreased vulnerability as the risk decrease may have resulted from the reduction of the threat level. A **targeted intervention** in the country's system taking into consideration, contextually, the **risk assessment report** may lead to a reduction in the level of vulnerability and the level of threat, as well.

Based on the **simulation scenarios**, we **identified** the **vulnerabilities** and then **minimized** the **weaknesses** by **optimizing** the available **resources** as well as the **change** in the **legal framework** regarding the asylum procedure.

These changes, taking into account the results, have led to country's **vulnerability reduction**, as well **as risk level degression**. That means that the **system** has the opportunity to **respond** more **effectively** to problems and **enhance** its performance.

It is noted that, at **regular intervals**, the **level** of vulnerability should be **reviewed** / **rechecked** / re-**evaluated** in order to better understand the risk or threat in real time, while **identifying** their acceptable levels and **proceed** to decision making in order to **abatement** the detected vulnerability.

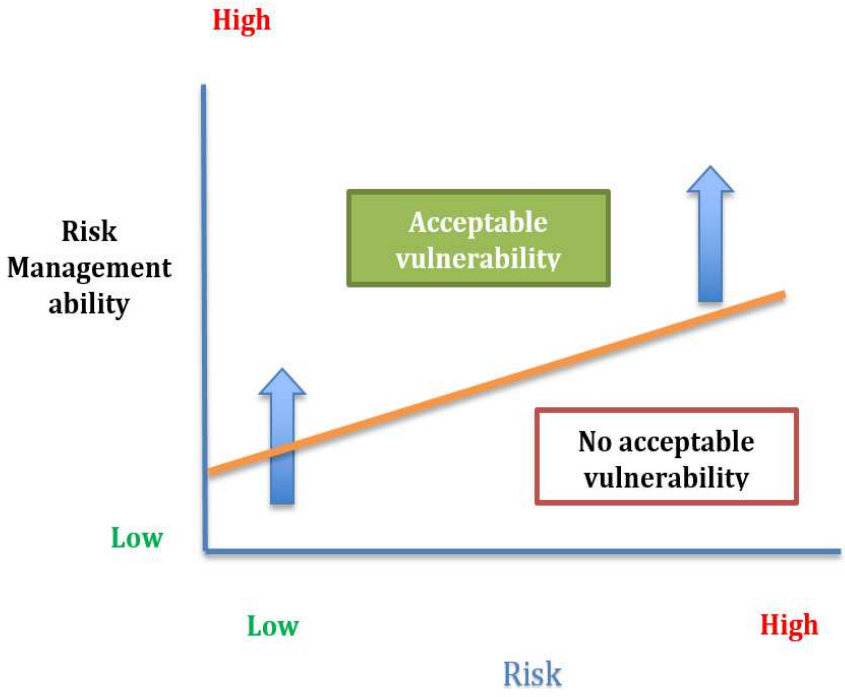


Image 20: Liaisons among risk level, risk management ability and vulnerability[275]

[275] http://www.securitymanager.gr/sub_site/arxeio/contents_article/management_1_3_2007.php

CHAPTER 7 – Conclusion

Immigration has become a vital issue throughout Europe and globally around the world, because of the massive immigration flows in 2015. Conflicts, persecution, human rights violation, or inequality forced people to leave their homes and families with the hope to improve their quality of life. One of many concerns raised, was the security of E.U. borders, in general. A new challenge for the countries involved was not only the efficient confrontation of illegal border crossing but also the arising challenges deriving from the surges in cross-border crime. In response, countries and competent Organizations employed additional Border Patrol agents, deployed new technologies at the border, and erected physical barriers.

The objective of this research was to develop a statistical model for monitoring and evaluating qualitative and quantitative data related to migratory flows and the related available resources, applied in the study of the vulnerability of the internal and external borders of Greece. The first step, was to analyze and proceed to a general presentation of existing methodologies on risk analysis, describing in general their basic steps and techniques, as well as their advantages and disadvantages.

A new methodology was proposed in an attempt to consolidate all the requirements for vulnerability assessment that this study has identified. The implementation of this methodology could be a valuable key for stakeholders involved in border security, which could help them to adopt an action plan, ensuring a consistent and controlled operation of an entity. Additionally, it could improve decision-making programming and prioritization through a broad and structured understanding of needs, instability and opportunities / threats, allocating the available resources according to the needs. Moreover, for the needs of this research we focused on simulation and the development of a migration model, through the process of forecasting.

Taking into consideration all the information outlined for the purpose of this research, we concluded that forecasting process involves specific steps: we determined what the object of the forecast is to be, we analyzed the

available data, we selected a forecasting model, we proceeded to its application and we tested also its effectiveness and reliability. In addition, external factors that could affect the subject in question, were defined and were taken into account.

In particular, we identified sources of information that were directly or indirectly related to mixed migration flows and collected the necessary historical data. Then, when analyzed the data, we took advantage of those that best reflected the past course of flows and subtracted those that distort it. This step was very important, because if using historical data, for example, during a time when mixed migration flows were in flux, then we would have a distorted future estimate.

Then we proceeded to a (initial) forecast, taking into account specific statistical indicators. In case of a forecasting model, outliers should be removed. The existence of values, which their output differentiate from the average output of other values may adversely affect the forecasting model. Therefore, it is advisable to locate and remove those data. There should also be availability of sufficient data over time, which can be combined and form relationships between factors. A combination of qualitative and quantitative methods increases the forecast accuracy. Specifically, using a combination of qualitative and quantitative data can improve an evaluation by ensuring that the limitations of one type of data are balanced by the strengths of another.

On the basis of this data, a strong linear correlation should be found, where there is a mathematical formula, but it is noted that the linear correlation equations are likely to change even with a strong coefficient. Forecasting is about predicting the future with as much precision as possible, given all of the data available, including historical data and information of any future occurrence that might affect the forecasts. Forecasting types are: long term (1-5 years), medium term (1-12 months) and short term (1-4 weeks).

- Long-term forecasts, which are used for strategic planning. The decisions taken based on long terms forecasts should also include other factors such as: environmental factors and internal resources.

- Medium-term forecasts, which are used to determine resource requirements, in order to hire or allocate personnel and to buy machinery or equipment.
- Short term forecasts, which play a vital role in the allocation of resources and operation management.

Therefore, it is difficult to make a long-term forecast as there are external factors (in our case, push factors) that influence the outcome. Forecasting trends in the long term may lack accuracy. The situation changes when it comes to short-term forecasts, in which the outcome is more accurate.

Every organization needs to develop a forecasting system that involves several approaches to predict uncertain events, in order to inform and support decision makers. Such forecasting systems need special knowledge in identifying forecasting problems, applying a variety of forecasting methods, selecting suitable methods for each problem, and evaluating and improving forecasting methods over time. It is also important to have strong organizational support for the use of formal forecasting methods if they are to be used successfully.

To this end, our research has the objective of giving a general presentation of existing methodologies on risk analysis, to give a comprehensive overview but also developing a statistical model that will enable us to forecast the migration flows in Greece. Many external uncertain factors affect the migration flows, such as political, environmental, economical. Our statistical model was based on the collection of historical daily/monthly data, which were analyzed. Pearson correlation indicator was used, to provide possible correlation between variables. Finally, linear regression was used in order to perform the forecasting.

In order to confront the phenomenon of illegal migration, we need to address the root causes of forced migration more effectively and at the same time look for appropriate long lasting solutions[276]. The fluidity of migratory flows and the dynamic change in the characteristics of the phenomenon

[276] Example: voluntary returns, resettlement and integration.

therefore necessitate operational vigilance as well as comprehension of the added value of international cooperation and joint approaches, based on exchange of good practice and experience, in migration management. We must also consider, that provable legal and policy framework in the field of migration, provides necessary conditions to cope with excessive migration situations, ensuring efficiently system reaction and combating the operations of criminal groups involved in smuggling of migrants or trafficking in persons.

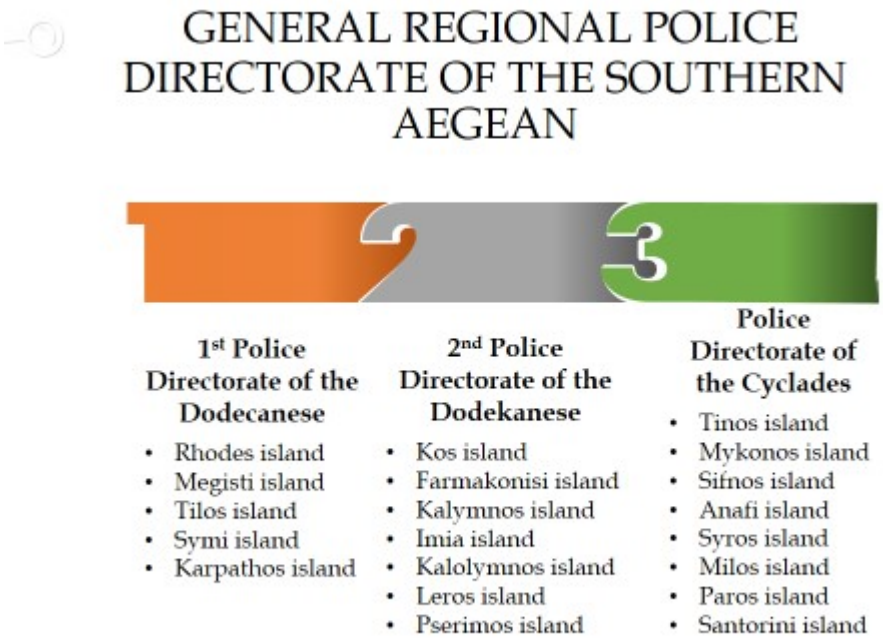
Countries and other stakeholders should adopt strategies, management mechanisms and allocation of additional resources, in order to sufficiently monitor and manage situations that could involve to crisis. Additionally, situations that erected in crisis should be resolved with concrete management plans that are comprehensive and part of the migratory management mechanism of the country. In this regard a strong data management system and intelligence analysis process, are important for raising awareness regarding the dangers of migration that might occur. Risk management is at the core of any organization's strategic management. It refers to the process by which border security management units approach methodically their activity-related risks in order to increase the likelihood of success of the objectives set and to reduce the uncertainty of achieving them.

Combatting of criminal networks involved in trafficking in persons and smuggling of migrants should also be a priority, for states and local governments, because of the risks posed not only to immigrant's but also to internal security[277] and the security of citizens.

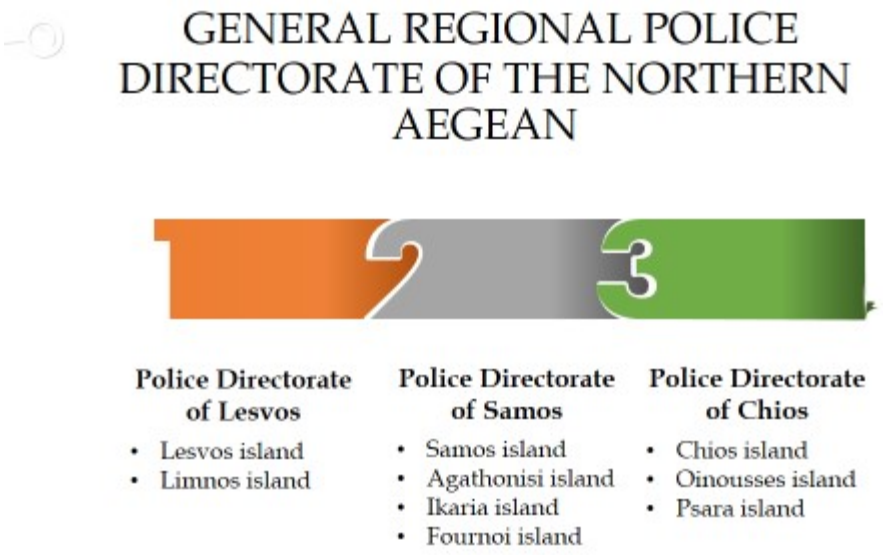
[277] Example: organized criminal activities, money laundering, terrorism financing etc.

ANNEX 1

Places of detection / arrest



Source: Hellenic Police Headquarters Organizational Chart
http://www.astynomia.gr/images/stories//2015/organogramma_en.png



Source: Hellenic Police Headquarters Organizational Chart
http://www.astynomia.gr/images/stories//2015/organogramma_en.png

It is noted that when statistics are applied those related to Samothraki or the island of Samothrace and Central Port authority of Alexandroupolis, belong to the category of General Regional Police Directorate of the Northern Aegean.

ANNEX 2

The following diagrams (figures 35 – 58), show the actual values[278] of the mixed migration flows by place of detection / arrest[279], and in particular the **average** flows per month for the years 2016,2017 and 2018, calculated on the basis of the **daily** mixed migration flows and the **trend line** corresponding to them.

We will depict the trend line with an equation of the form y = ax + b. In case of *simple* linear *regression* model, to the extent of finding the linear regression equation we assume that the values of a & b must be such as to minimize the sum of squares of errors where the difference between the actual price and the approximate one that is captured by the straight equation line.

It is noted that the regression line would not go through every point and the reason is the not perfectly deterministic environment, therefore we cannot talk about perfect prediction or explanation of every observation.

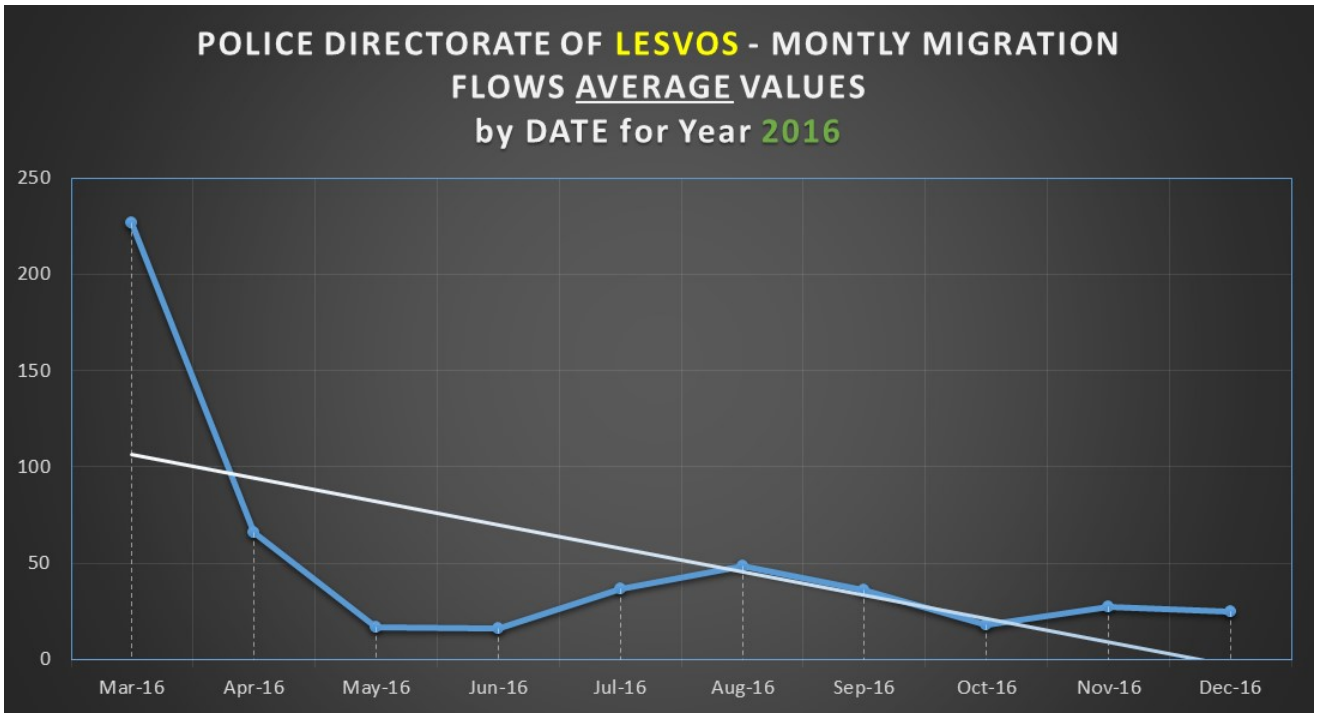


Figure 35

[278] **It is noted that due to the sensitive type of information no numerical data will be presented.**

[279] **ANNEX 1**

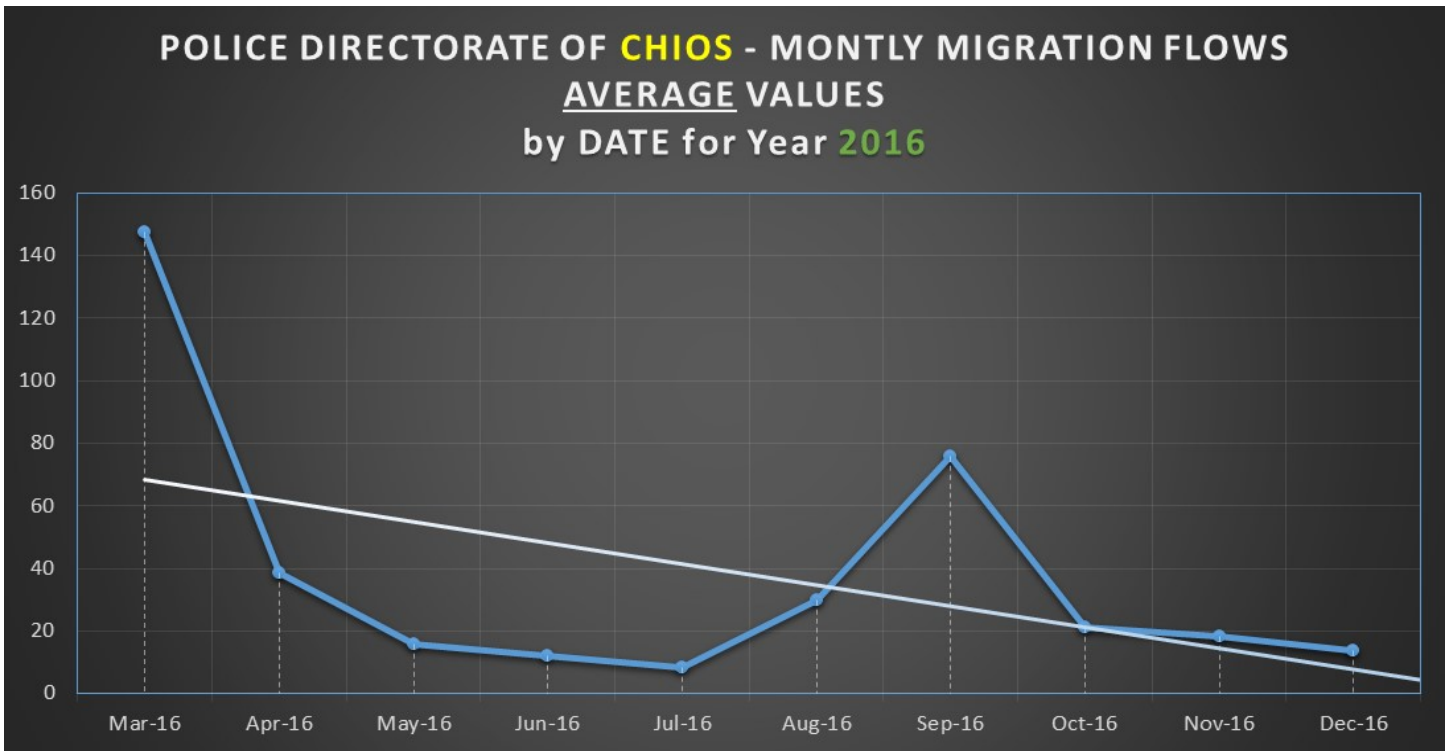


Figure 36

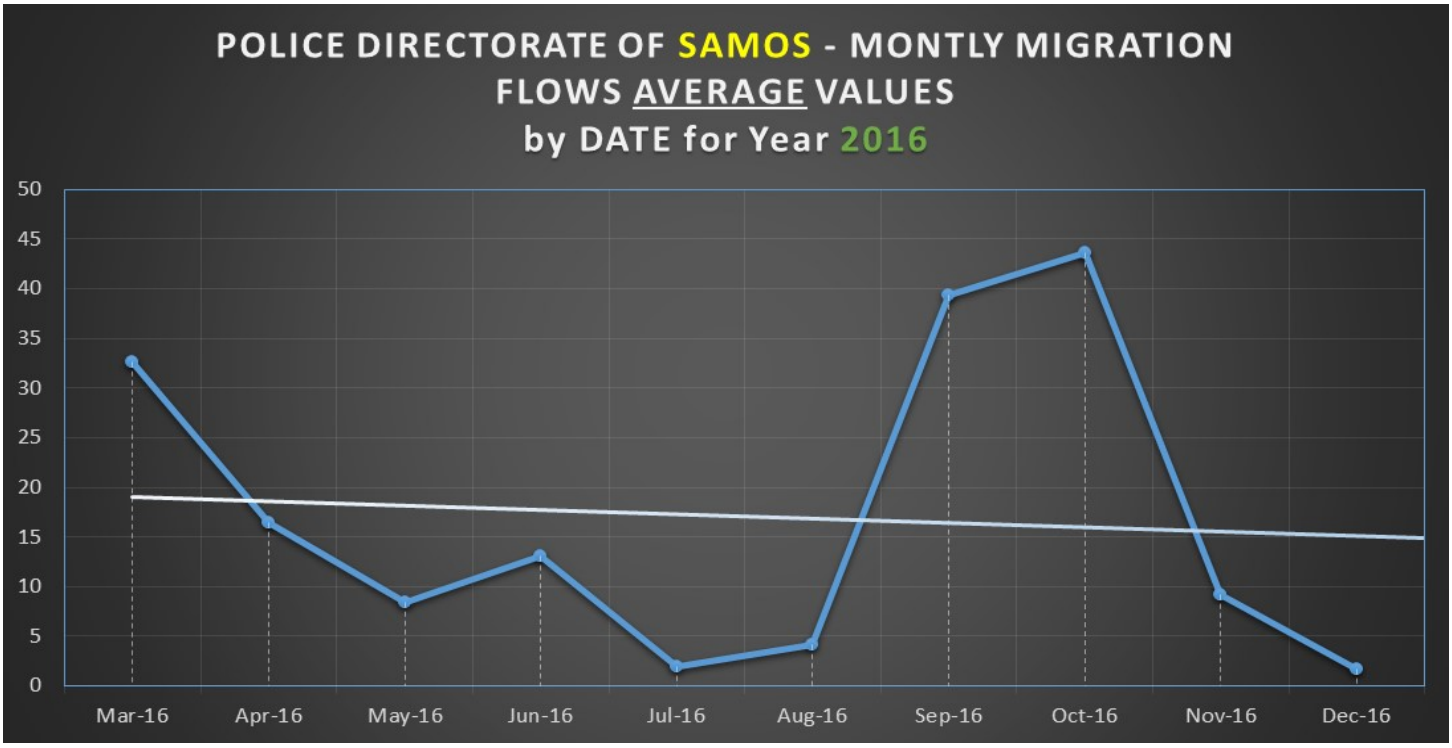


Figure 37

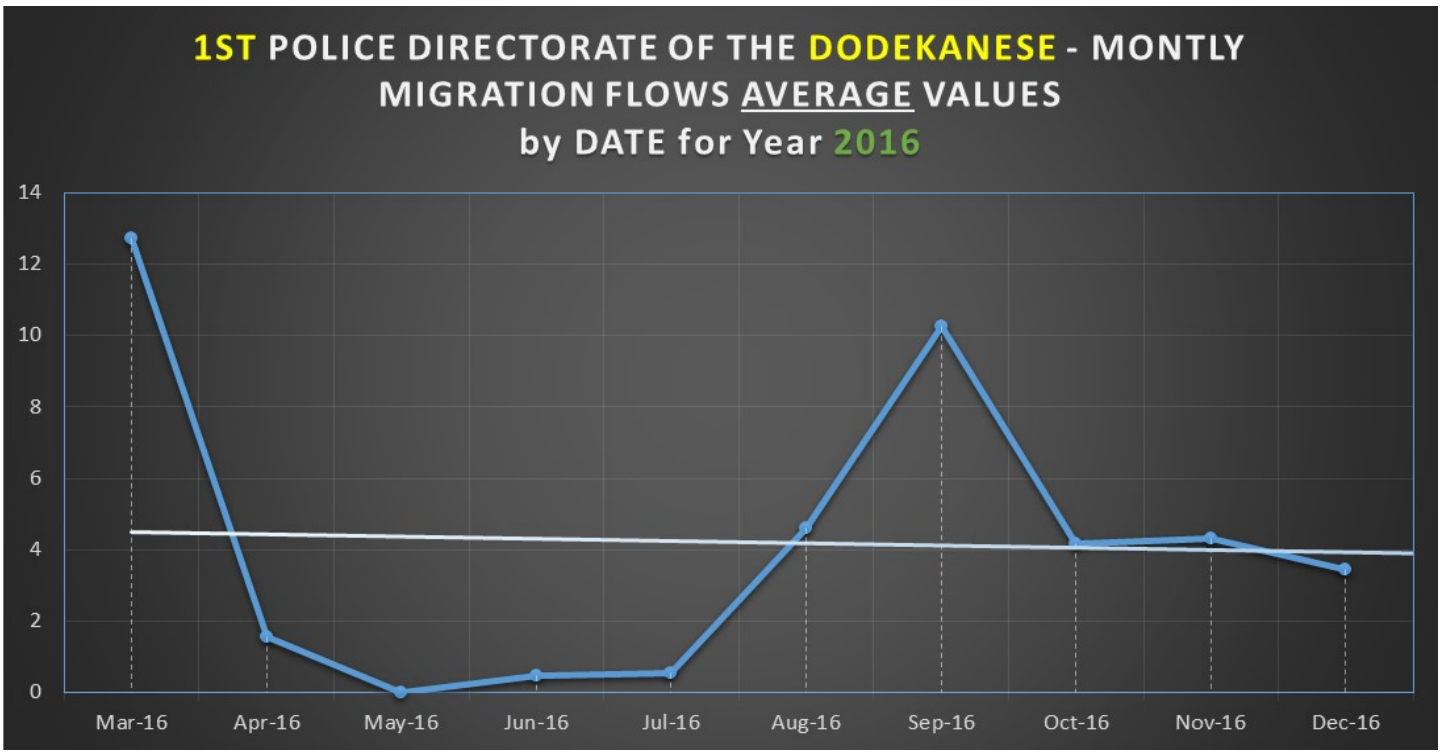


Figure 38

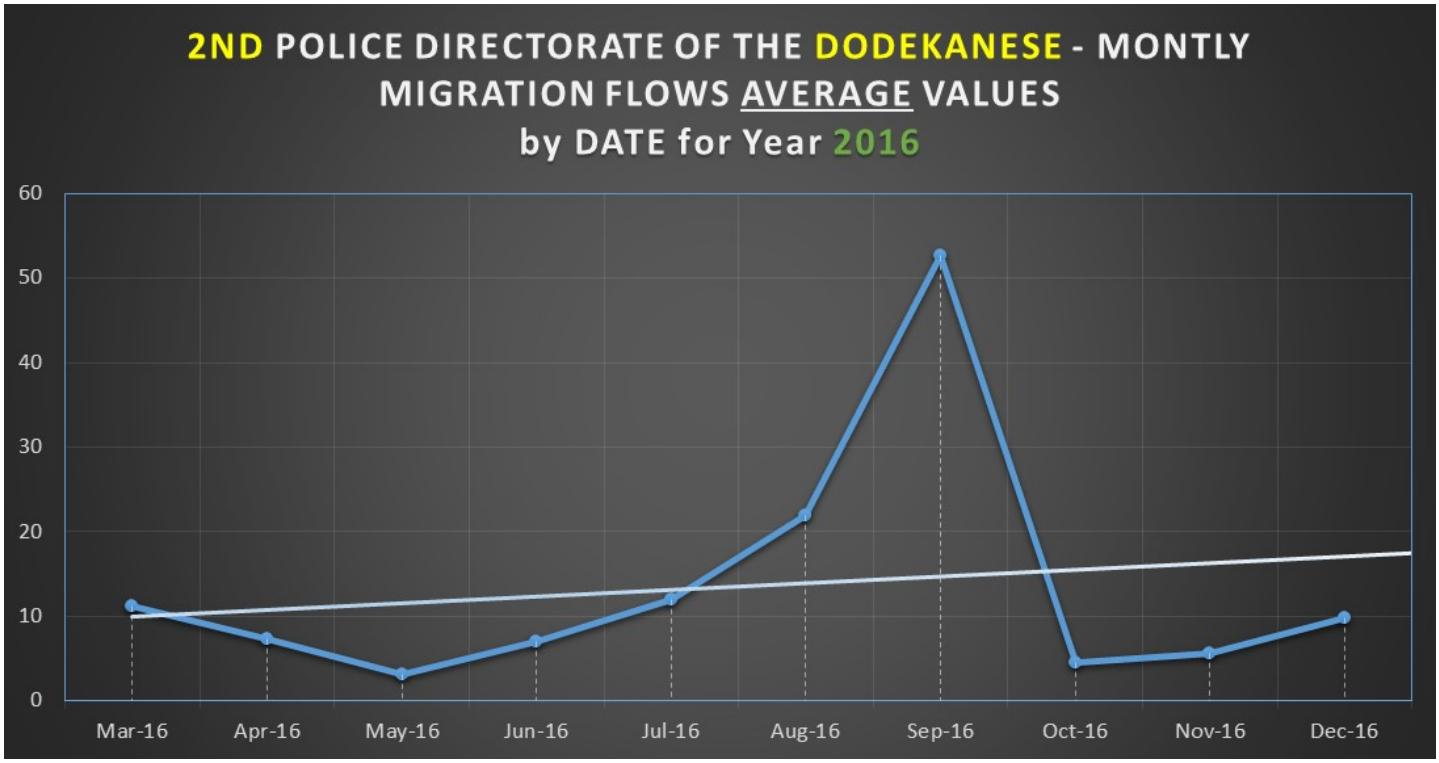


Figure 39

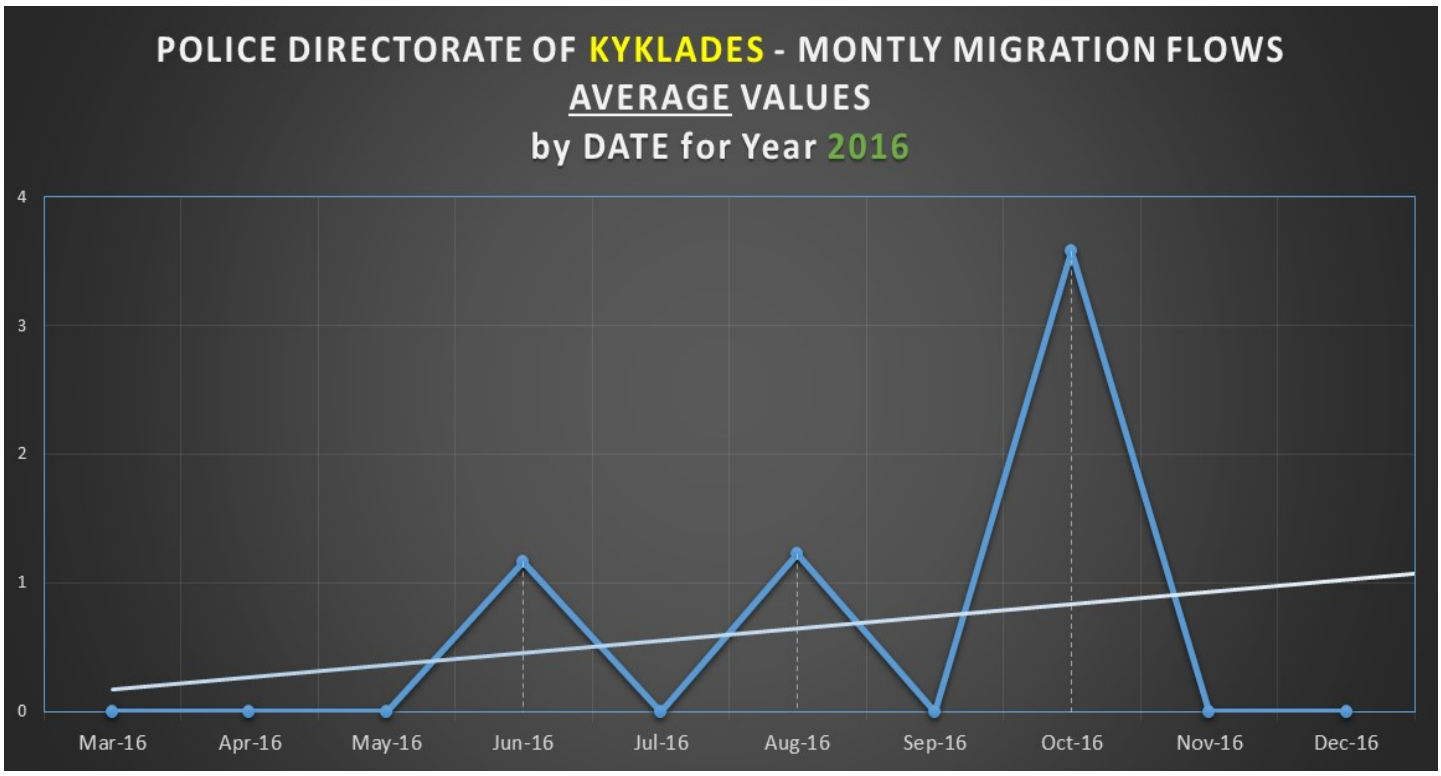


Figure 40

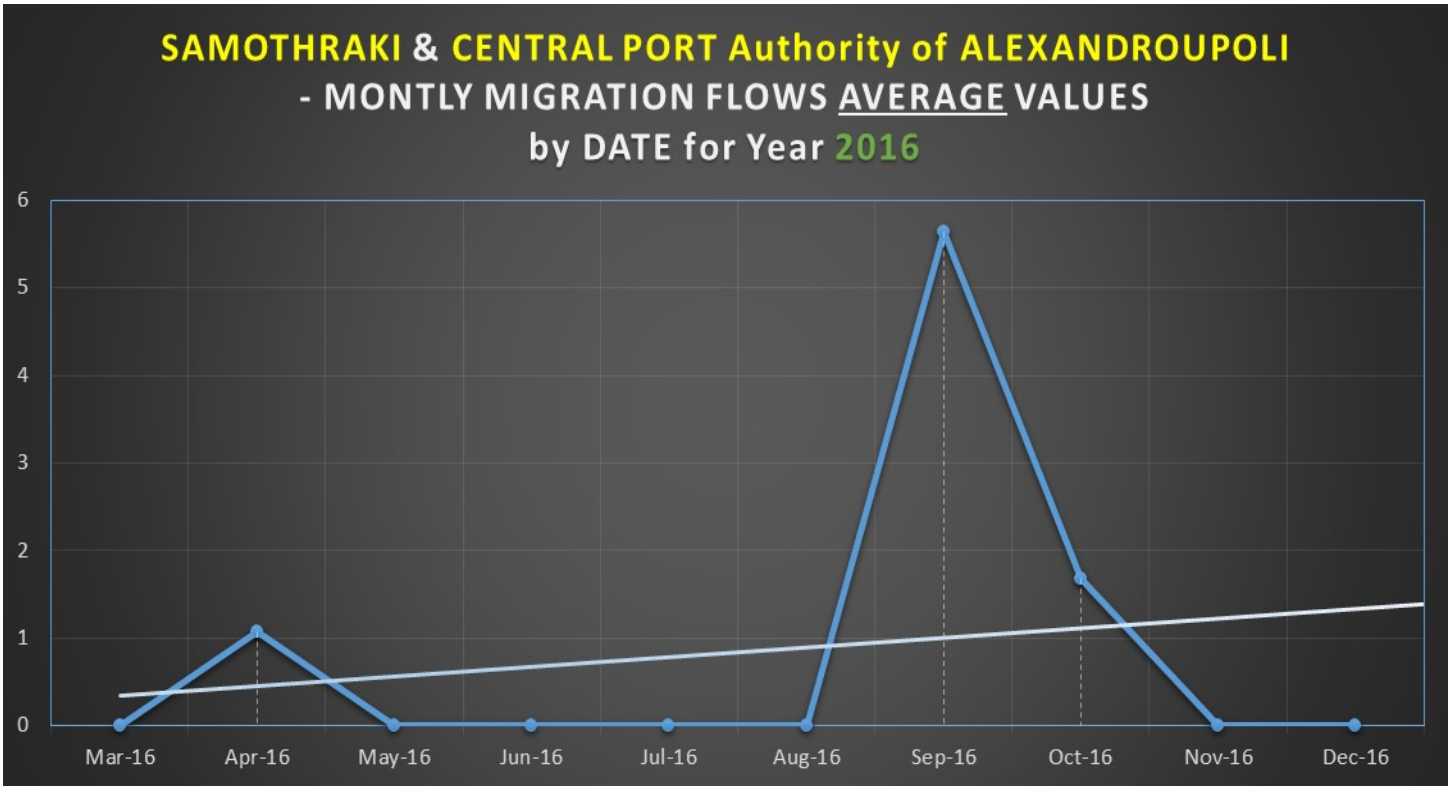


Figure 41

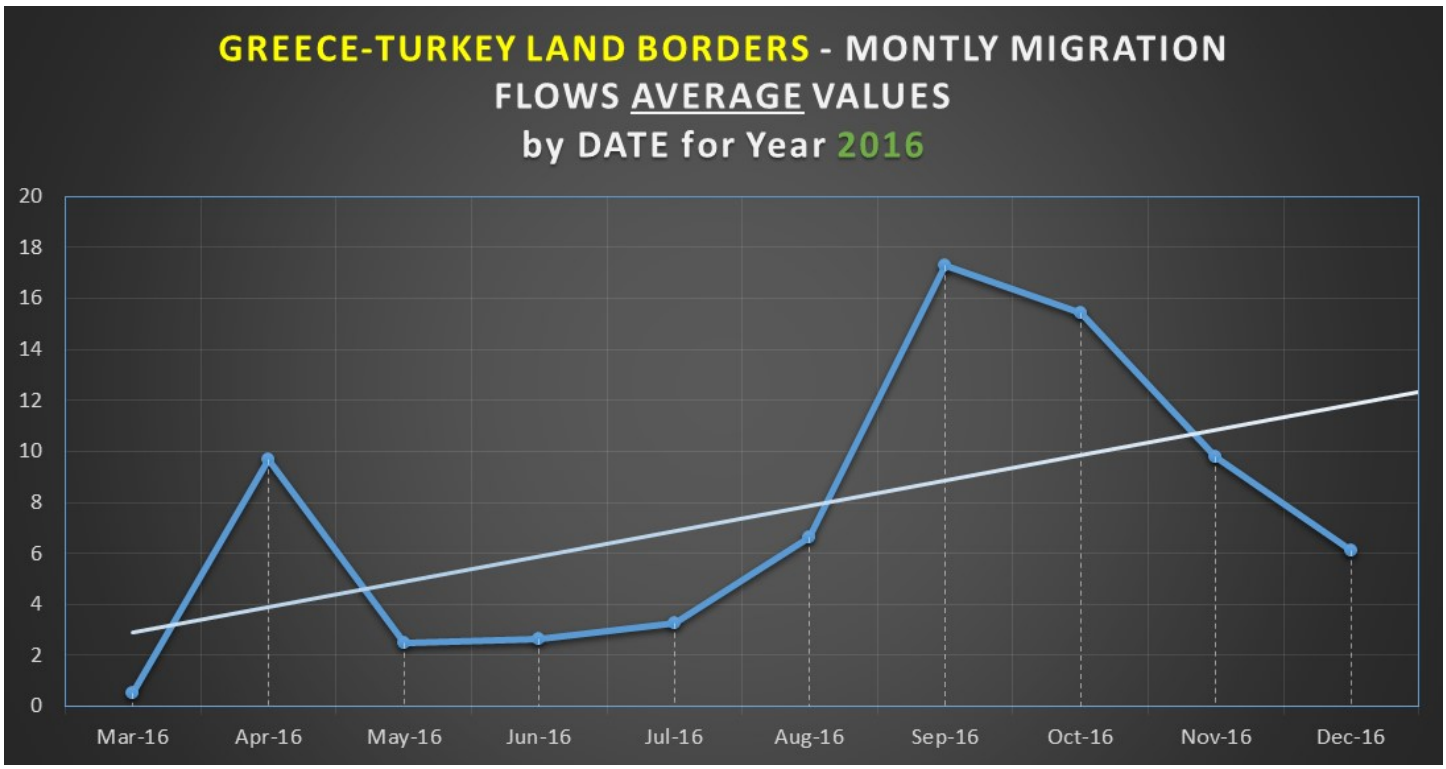


Figure 42

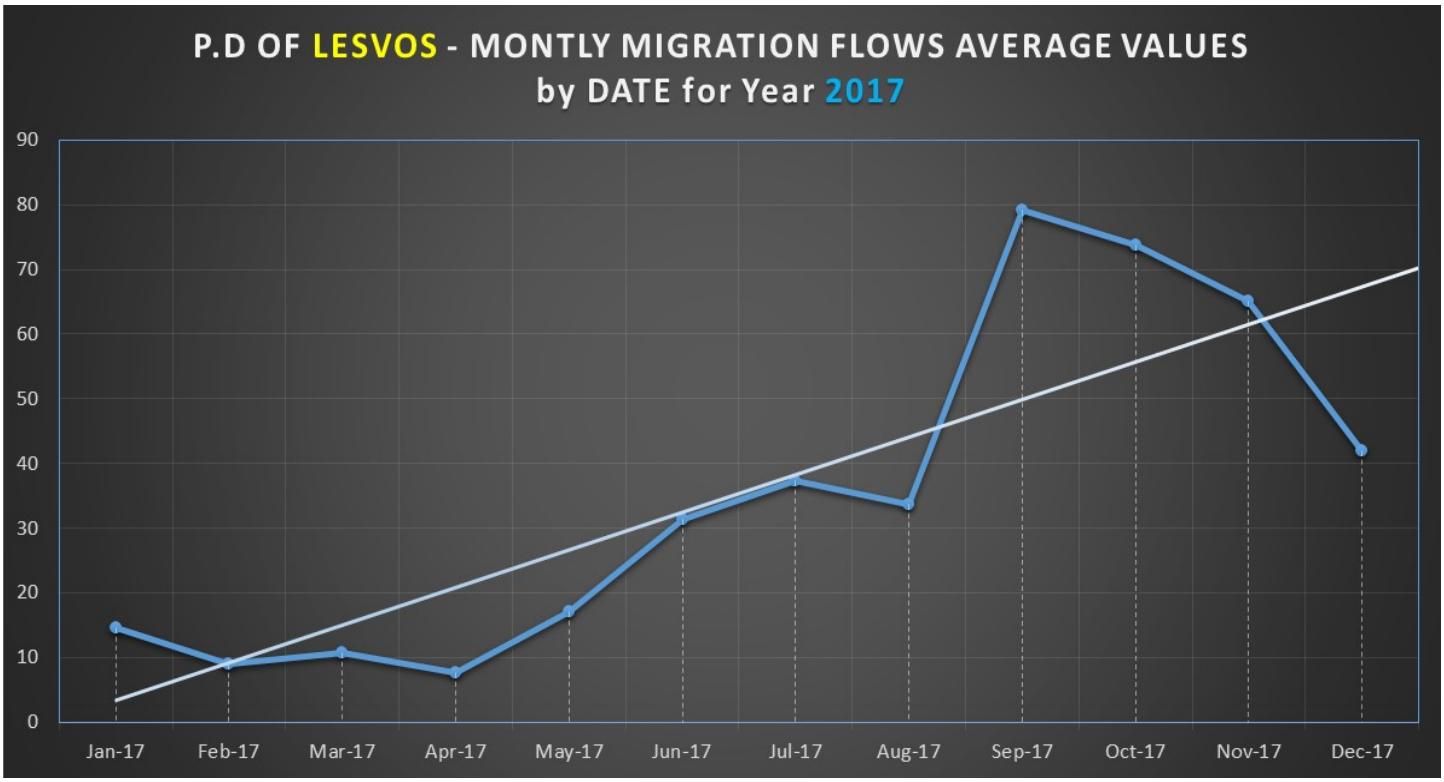


Figure 43

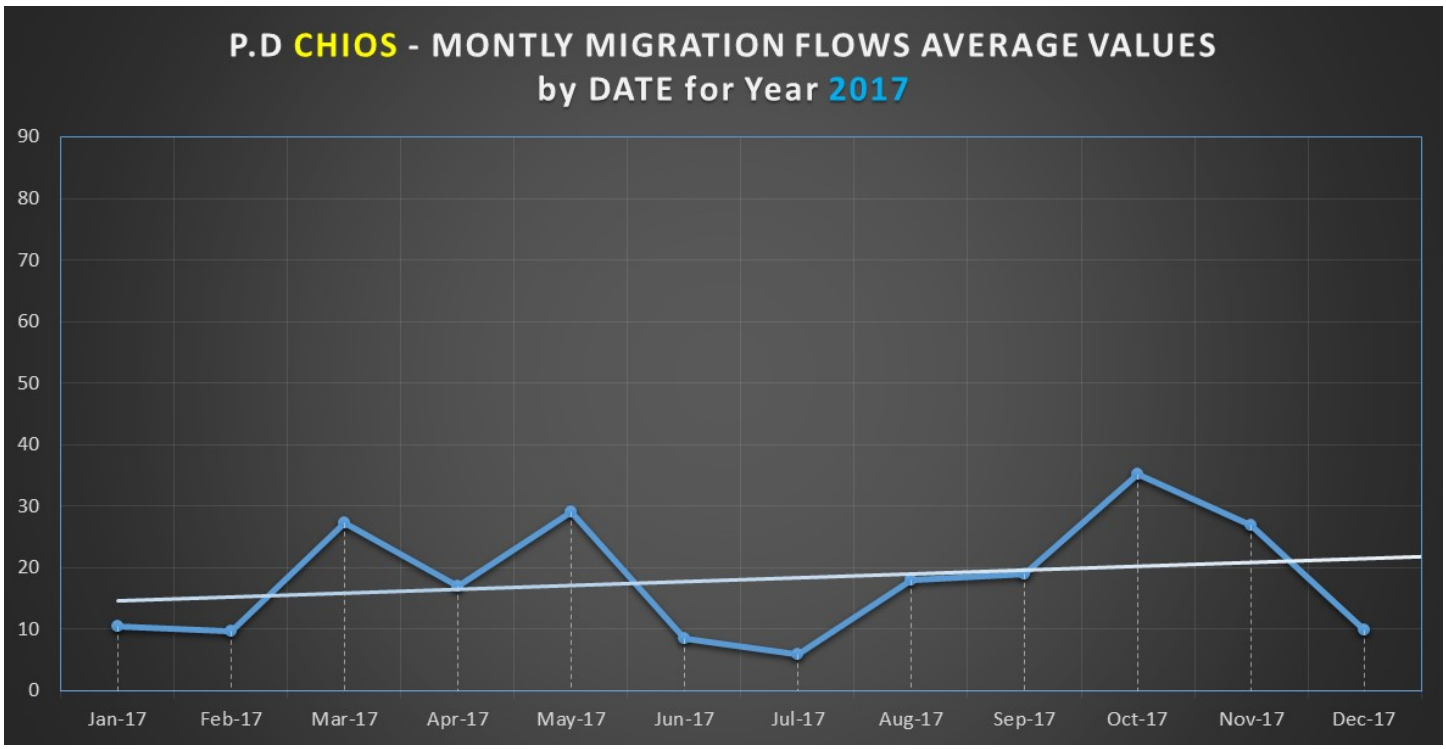


Figure 44

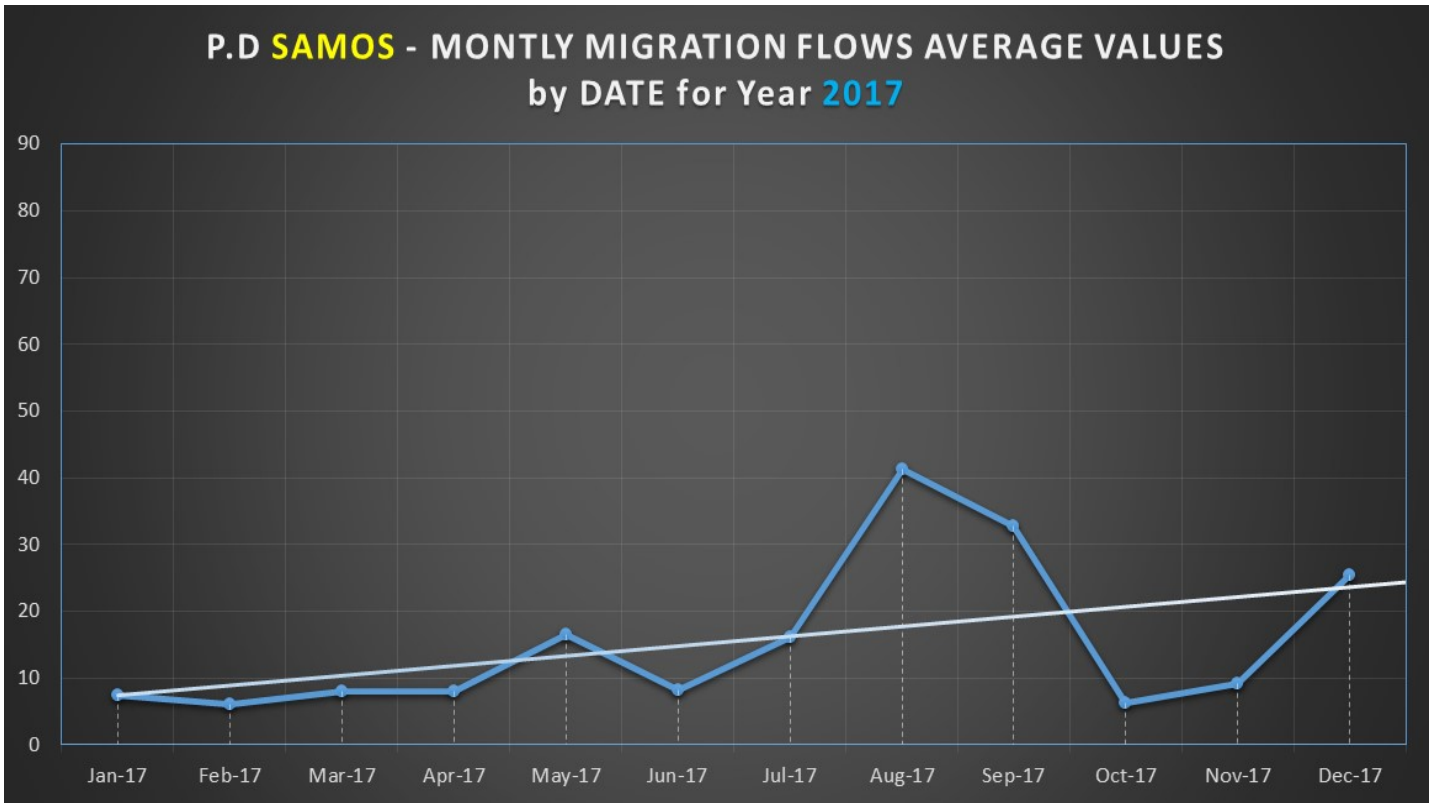


Figure 45

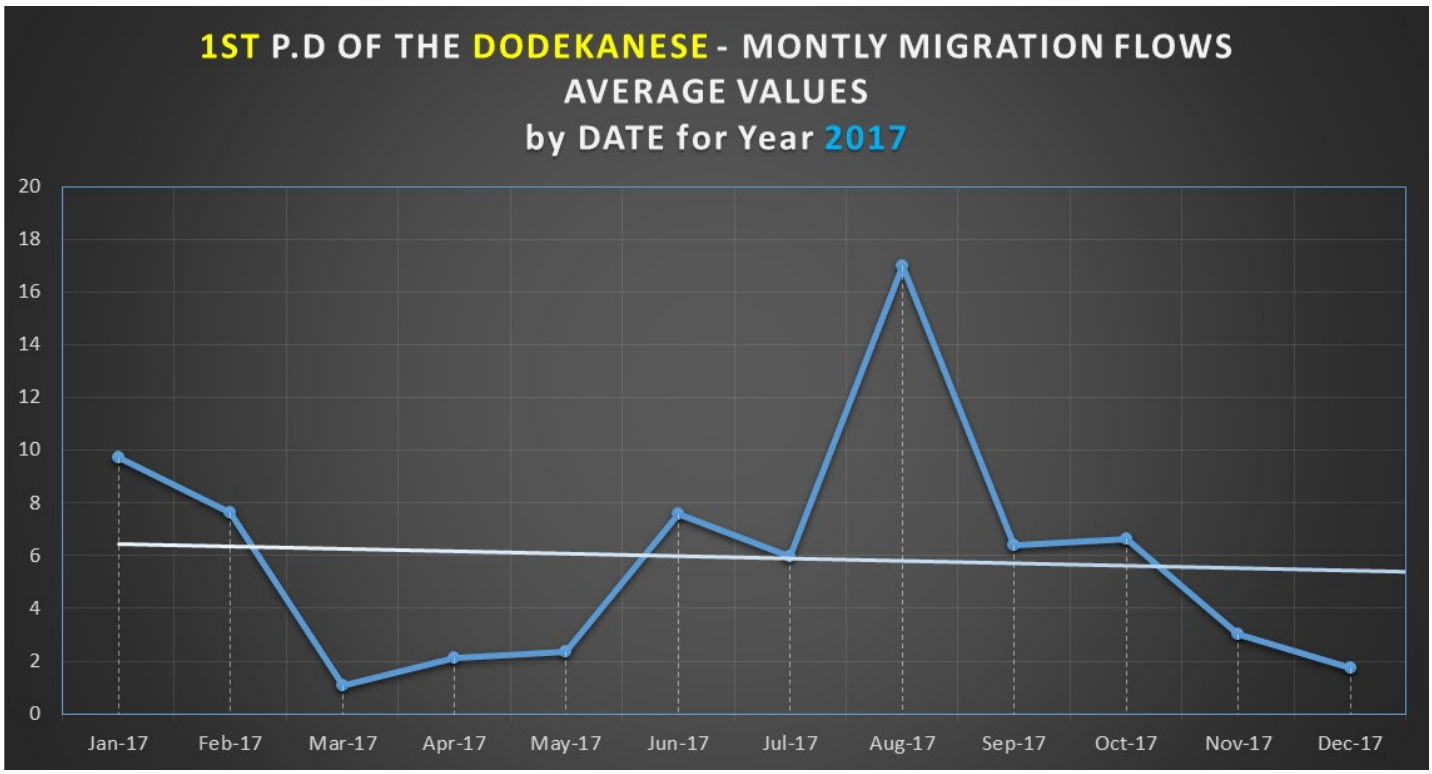


Figure 46

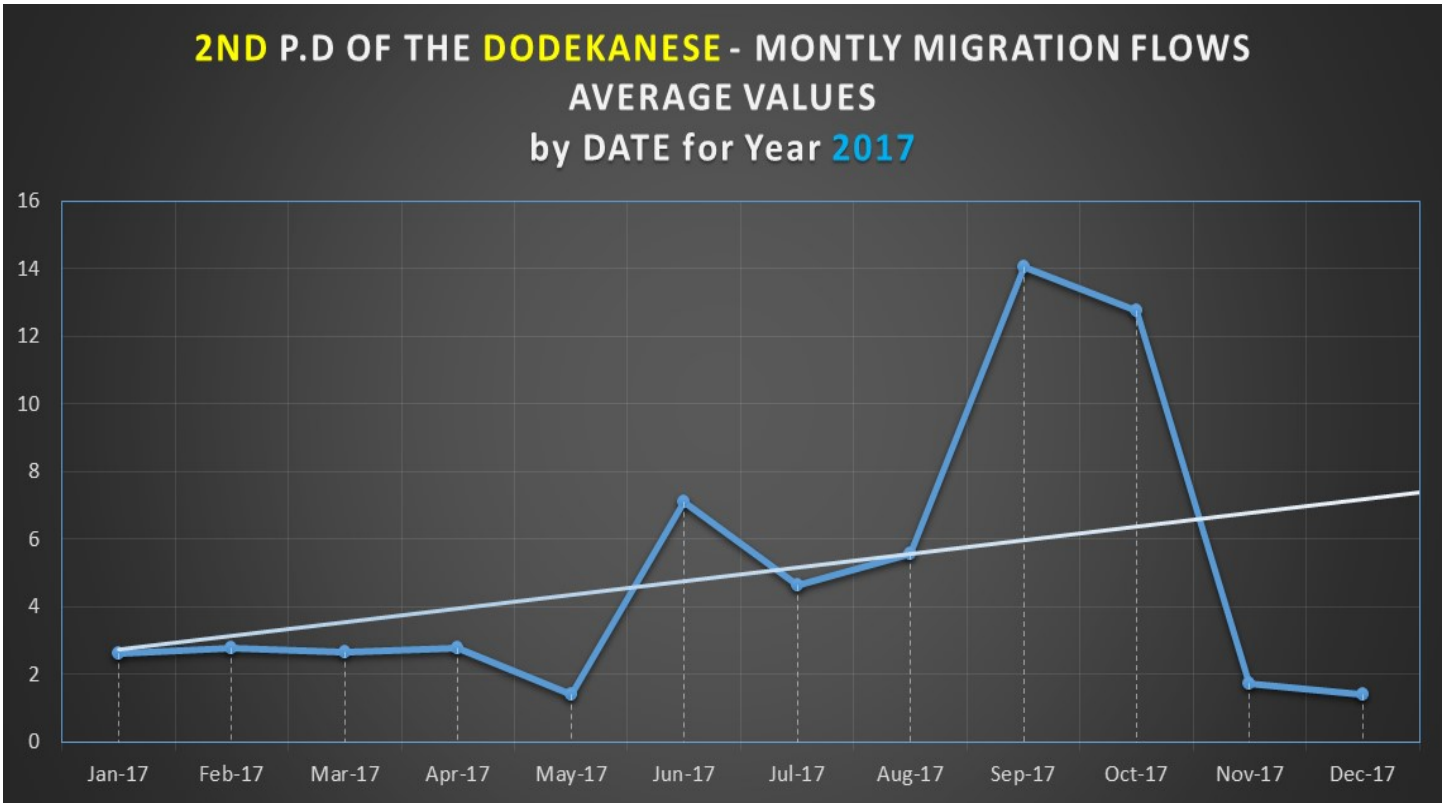


Figure 47

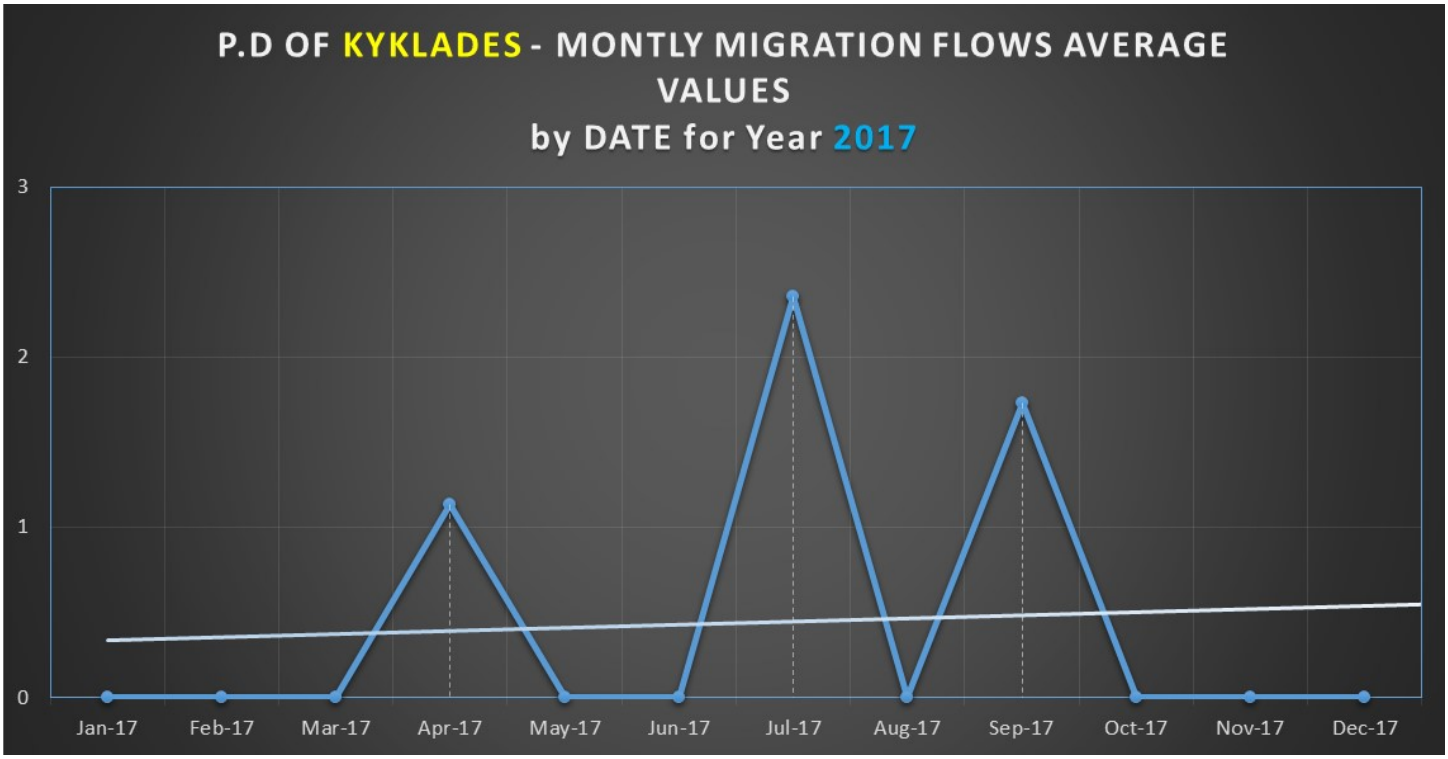


Figure 48

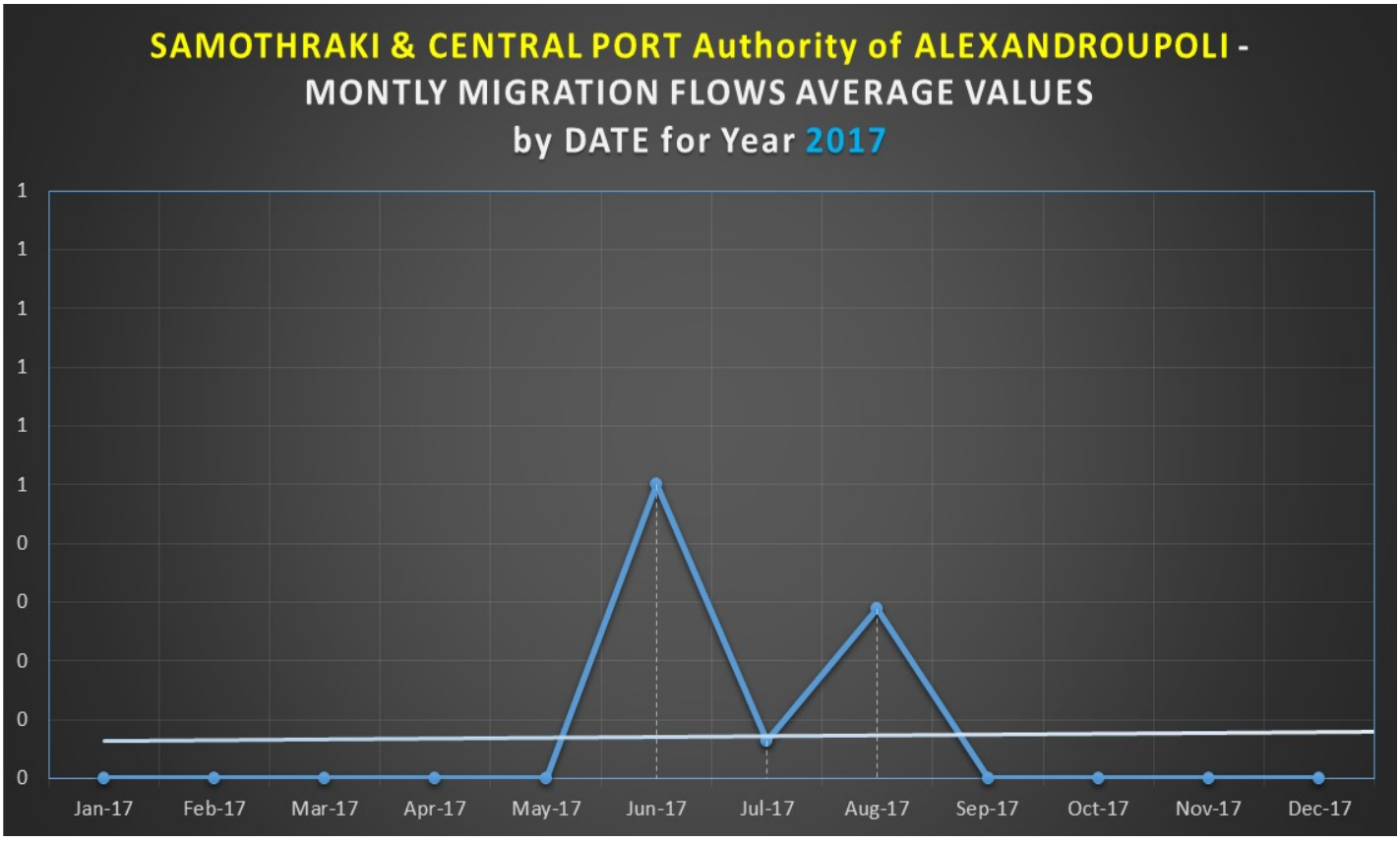


Figure 49

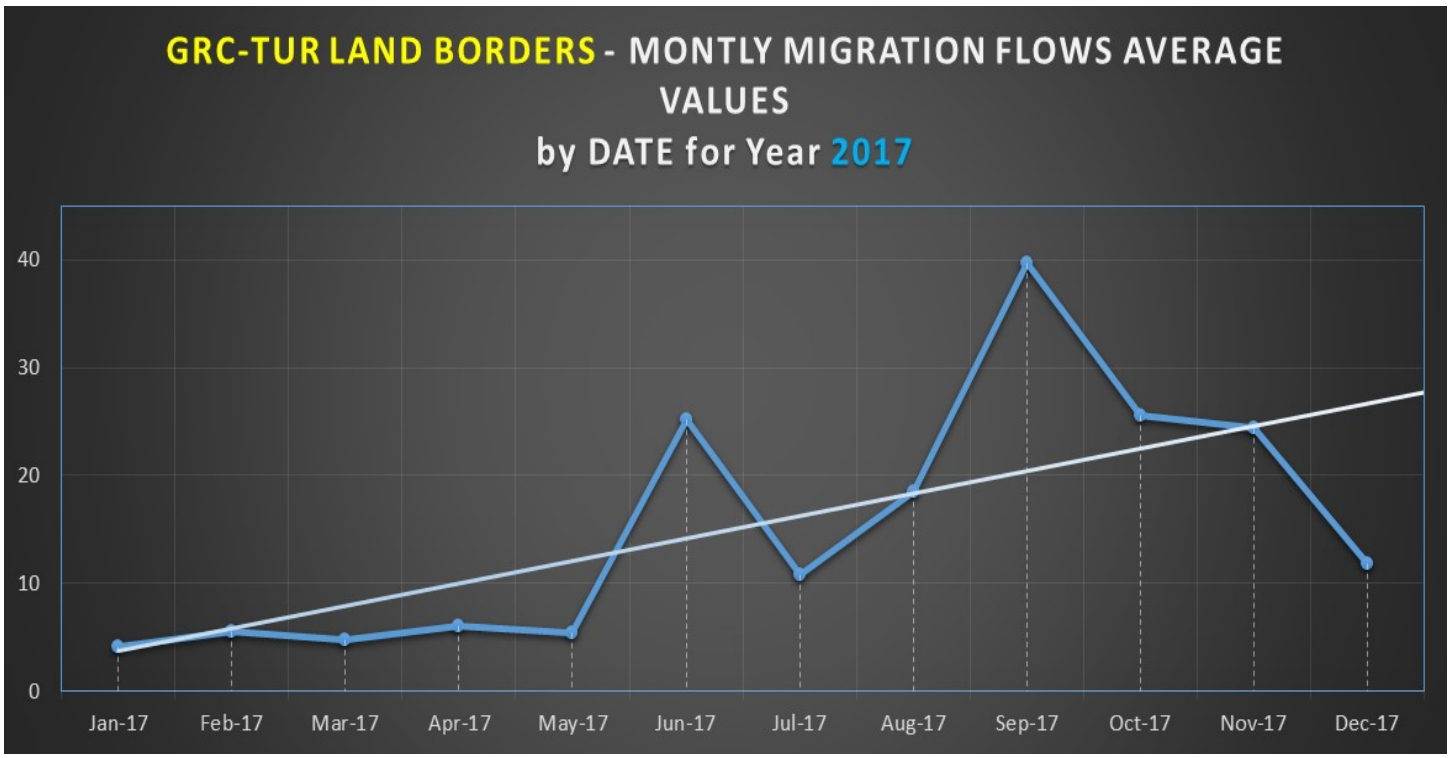


Figure 50

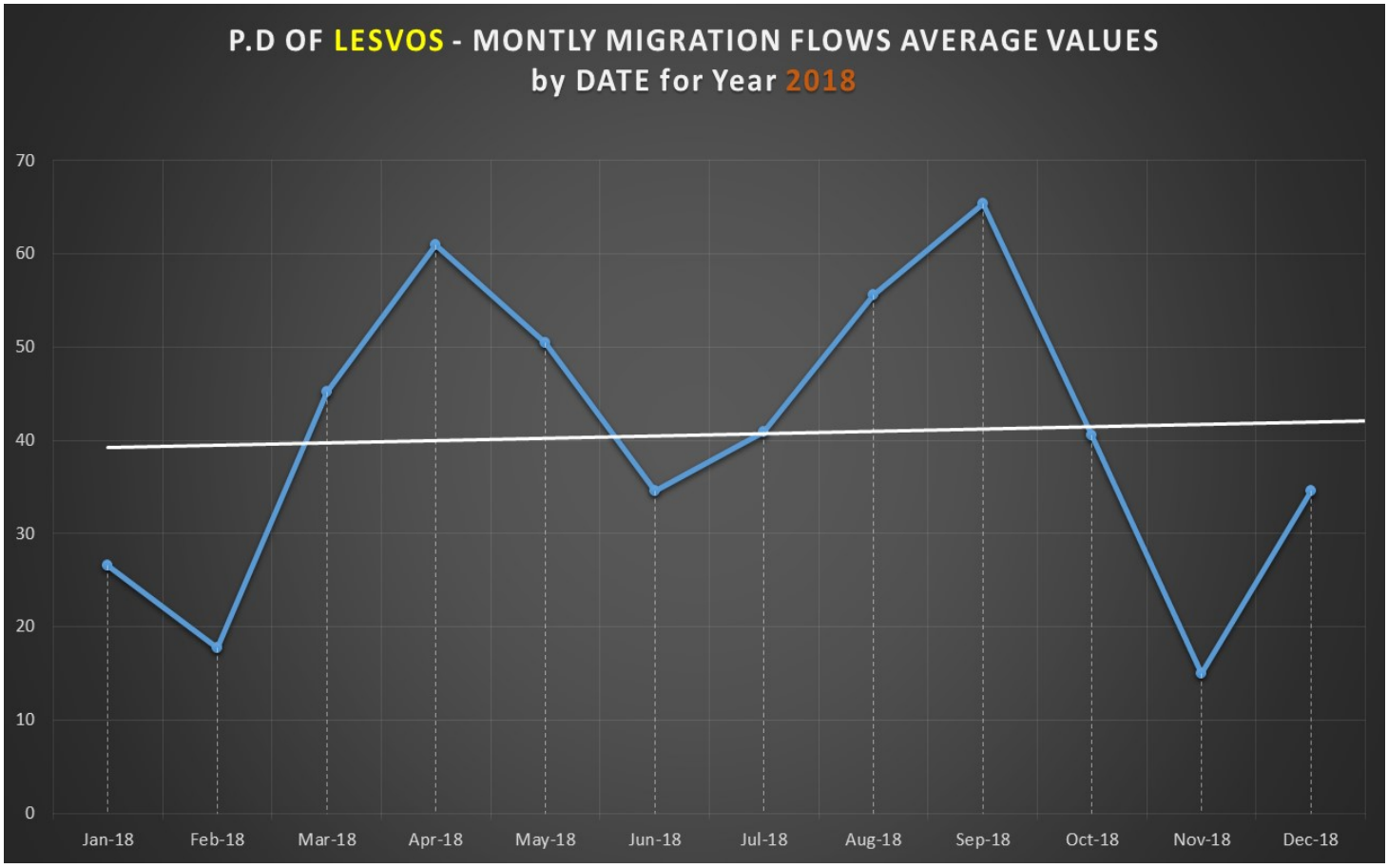


Figure 51

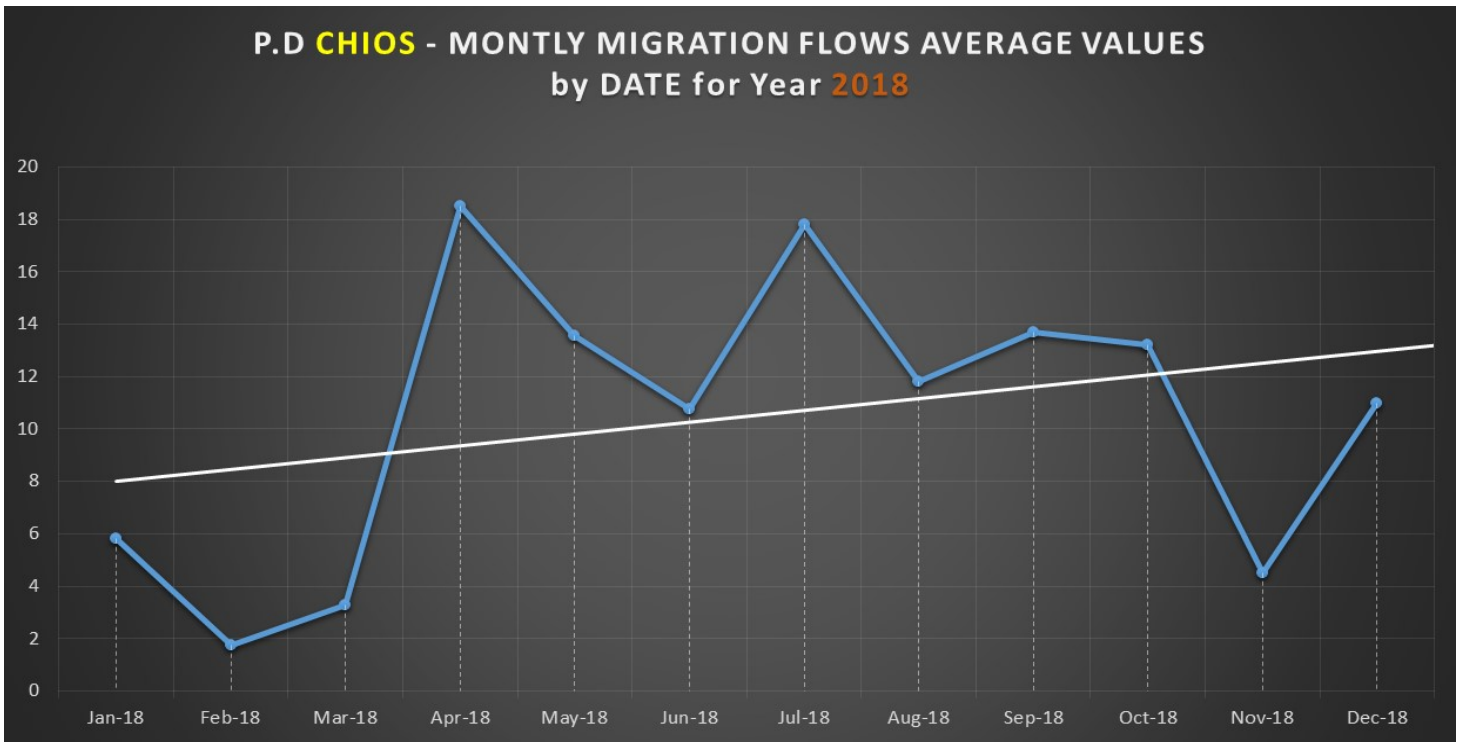


Figure 52

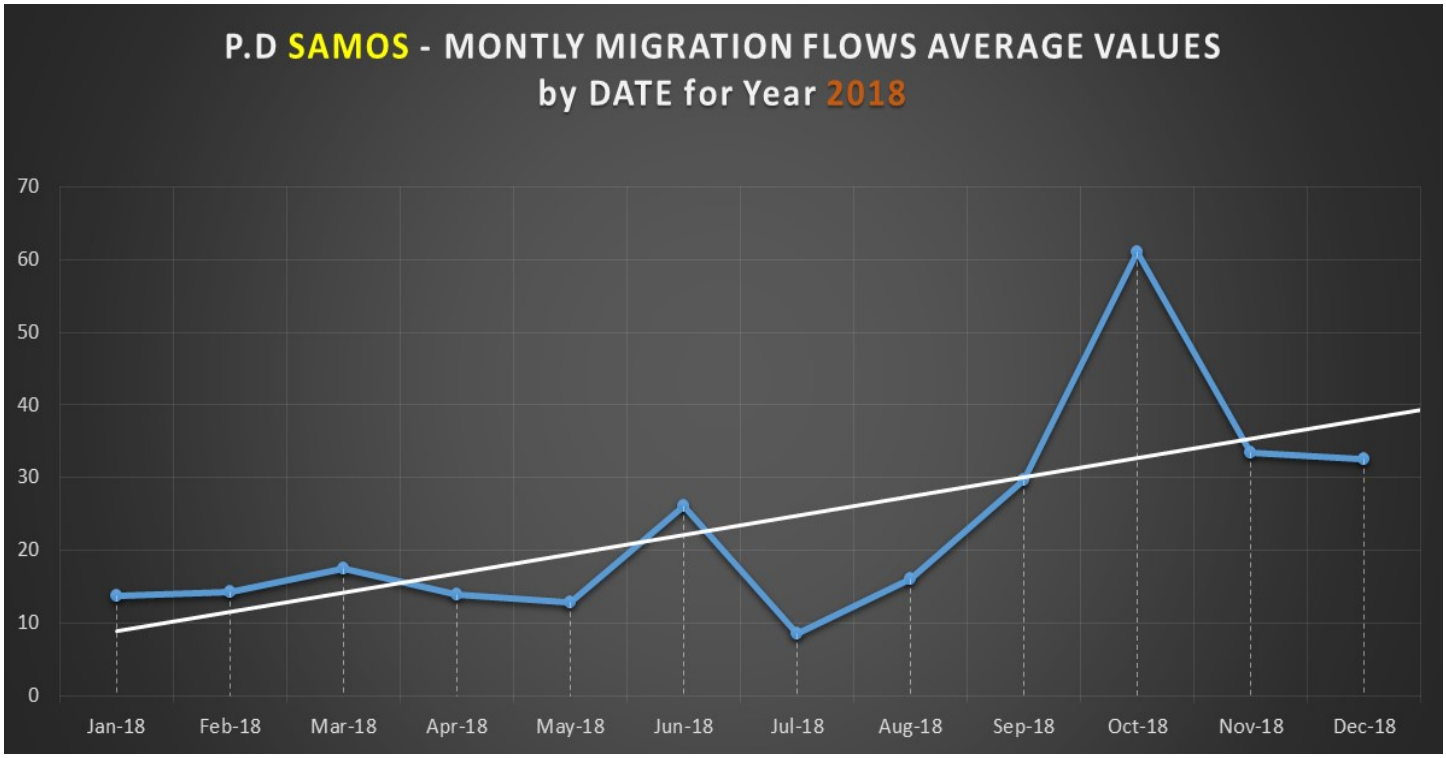


Figure 53

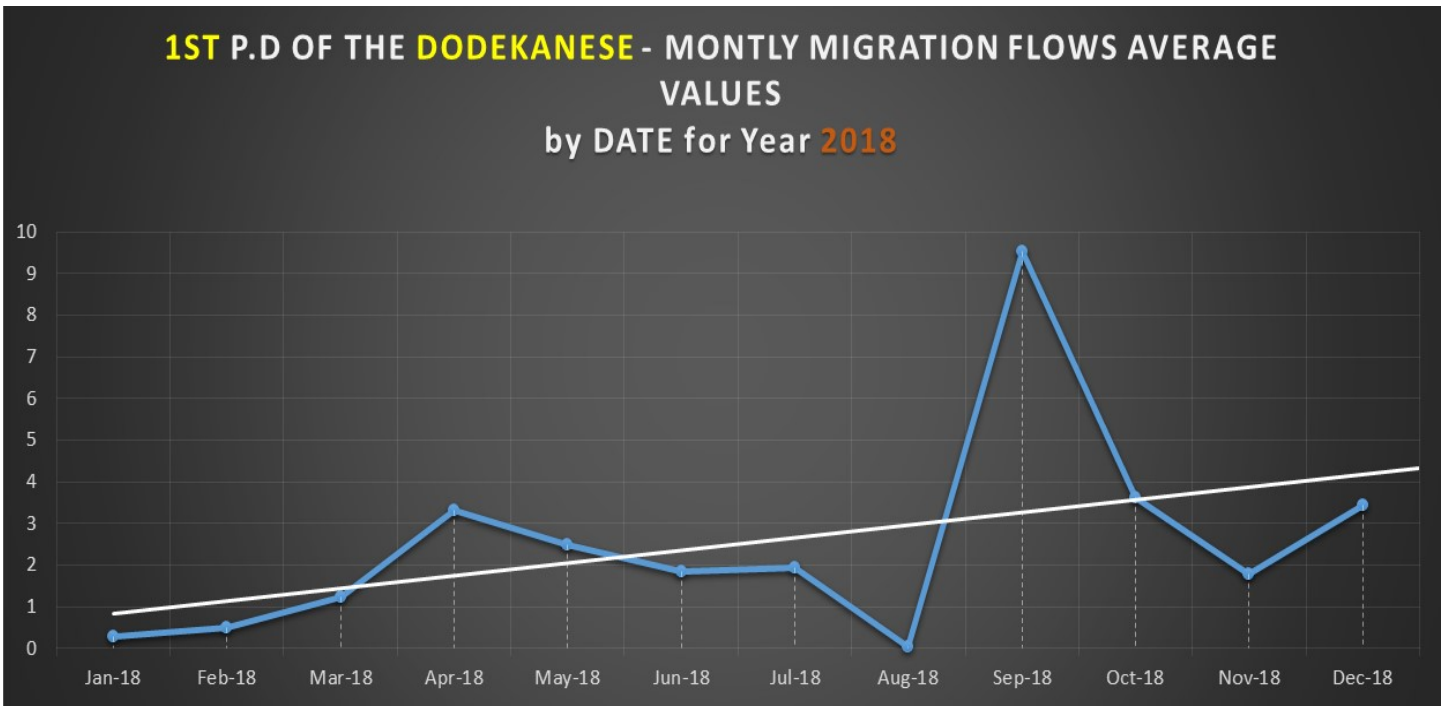


Figure 54

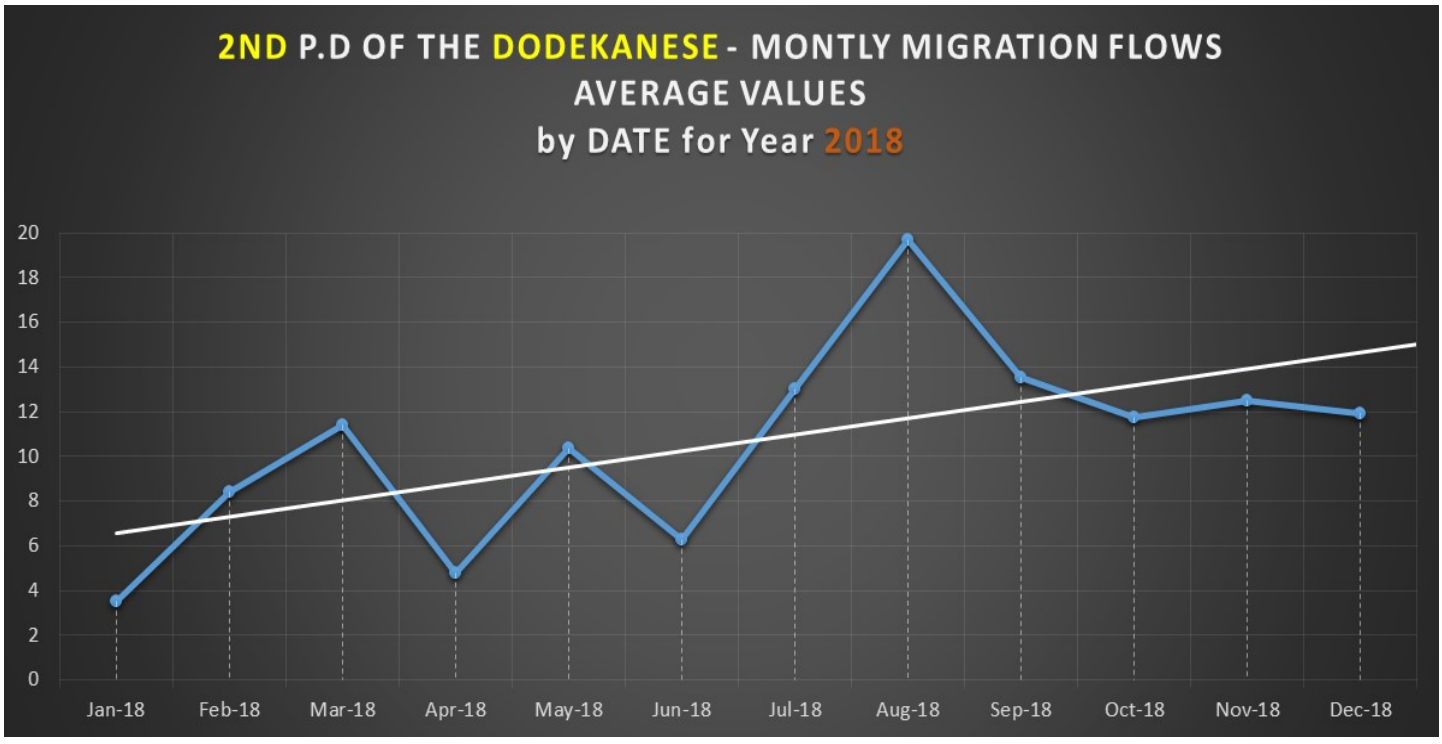


Figure 55

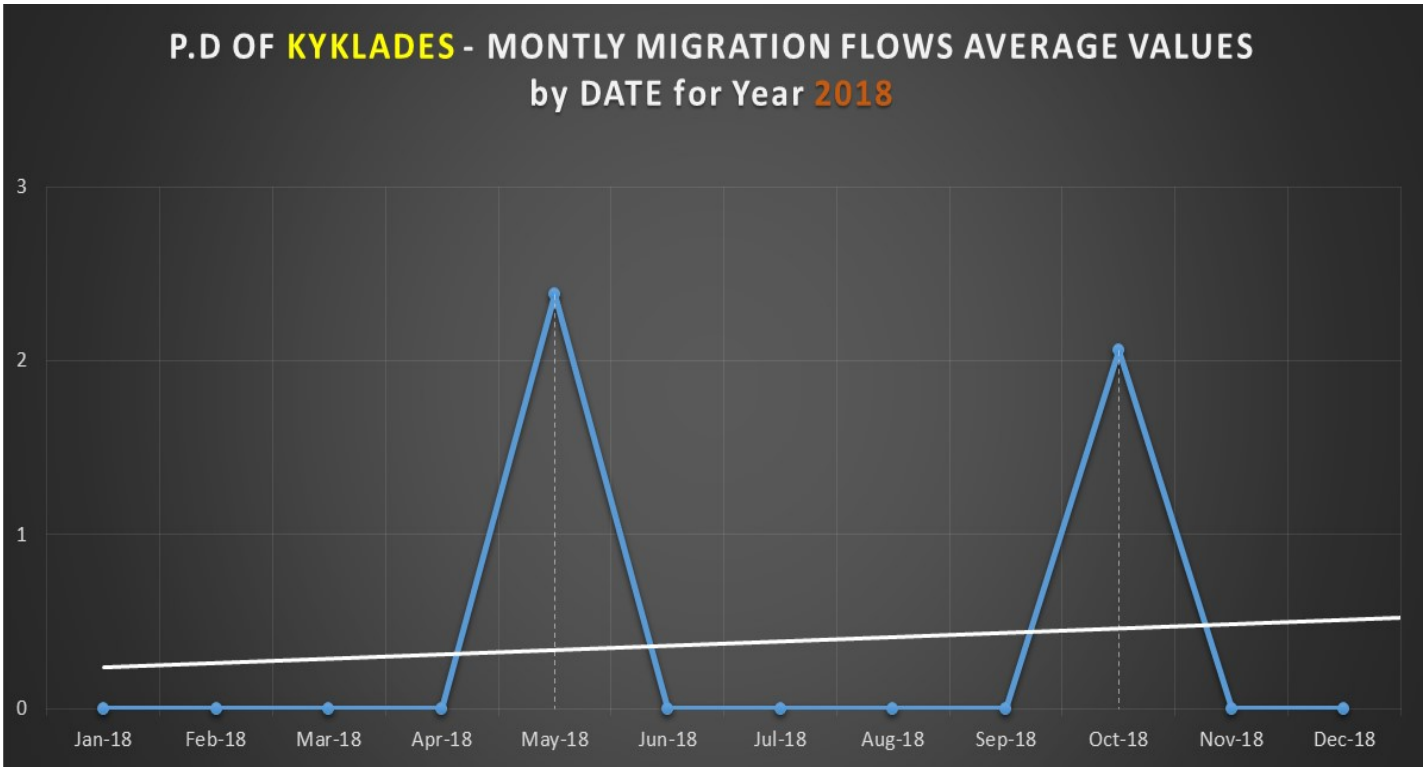


Figure 56

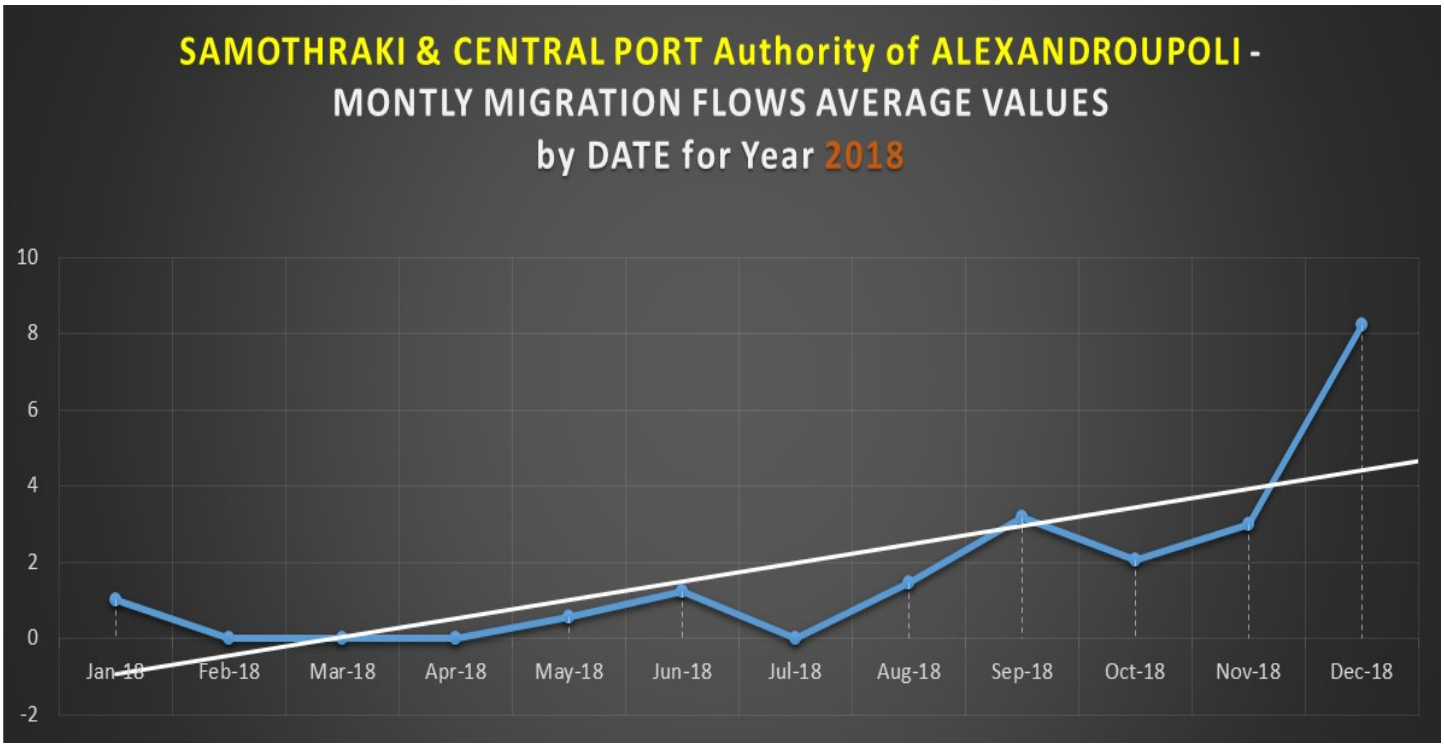


Figure 57

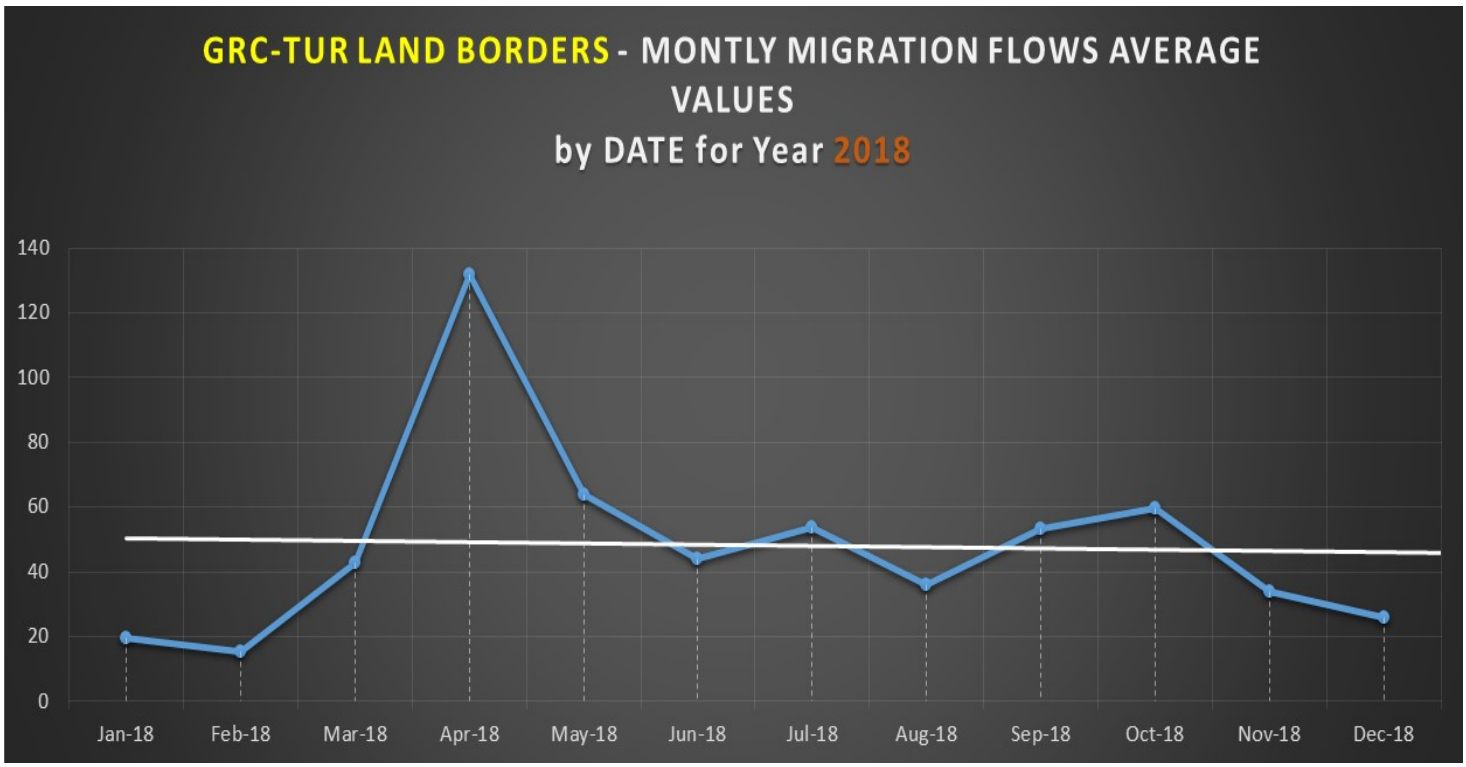

GRC-TUR LAND BORDERS - MONTLY MIGRATION FLOWS AVERAGE VALUES
by DATE for Year 2018
140
120
100
80
60
40
20
0
Jan-18
Feb-18
Mar-18
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18

Figure 58

ANNEX 3

Comments on the correlation coefficient

In general, the correlation coefficient shows if there is interdependence between two (2) variables.

Rearson's correlation coefficient (r) is a statistical measure of the strength of a linear relationship between paired data, consisting of two elements: the sign (relationship direction information) and the numeric value from 0 to 1 (relationship degree / intensity information).

If **r** equals to zero, this means that there is no correlation between the dependent and the independent variable. If r = 1, then the dependent variable is perfectly correlated with the independent variable, meaning that it changes in the same direction. Whereas, respectively, when r = -1, then it changes in the opposite direction[280].

When **r** has values close to the line (**± 1**), the linear regression line better reflects the data.

The scattering of the dependent variable around its mean is expressed by the square of the correlation coefficient (**r^2**). The closer it is to value 1, then the approximate values of the migration flows, deriving from the linear regression line, are more related to the dispersion of the actual values of the dependent variable.

It should be noted that **outliers**[281], which can be observed due to external factors must be taken into account during the forecasting, since they are considered as indicators of incorrect results.

---

[280] **Positive correlation (+)**: a relationship between two variables in which both variables move in tandem—that is, in the same direction
https://www.investopedia.com/terms/p/positive-correlation.asp

Negative correlation (-): a relationship between two variables in which one variable increases as the other decreases, and vice versa
https://www.investopedia.com/terms/n/negative-correlation.asp

[281] In statistics, an outlier is an observation point that is distant form other observations. The outliers might be the result of a mistake during data collection or it can be just an indication of variance in our data.
During data analysis, when outlier is detected, the most difficult question is how an analyst should deal with it.
https://www.researchgate.net/post/When_is_it_justifiable_to_exclude_outlier_data_points_from_statistical_analyses

ANNEX 4

Timeline for 2019 – Migration Phenomenon

Indicative, for the period of January – December 2019, a timeline is imprinted and according to that as well as the mathematical model, we can interpret possible variations between the simulation results and the actual values.

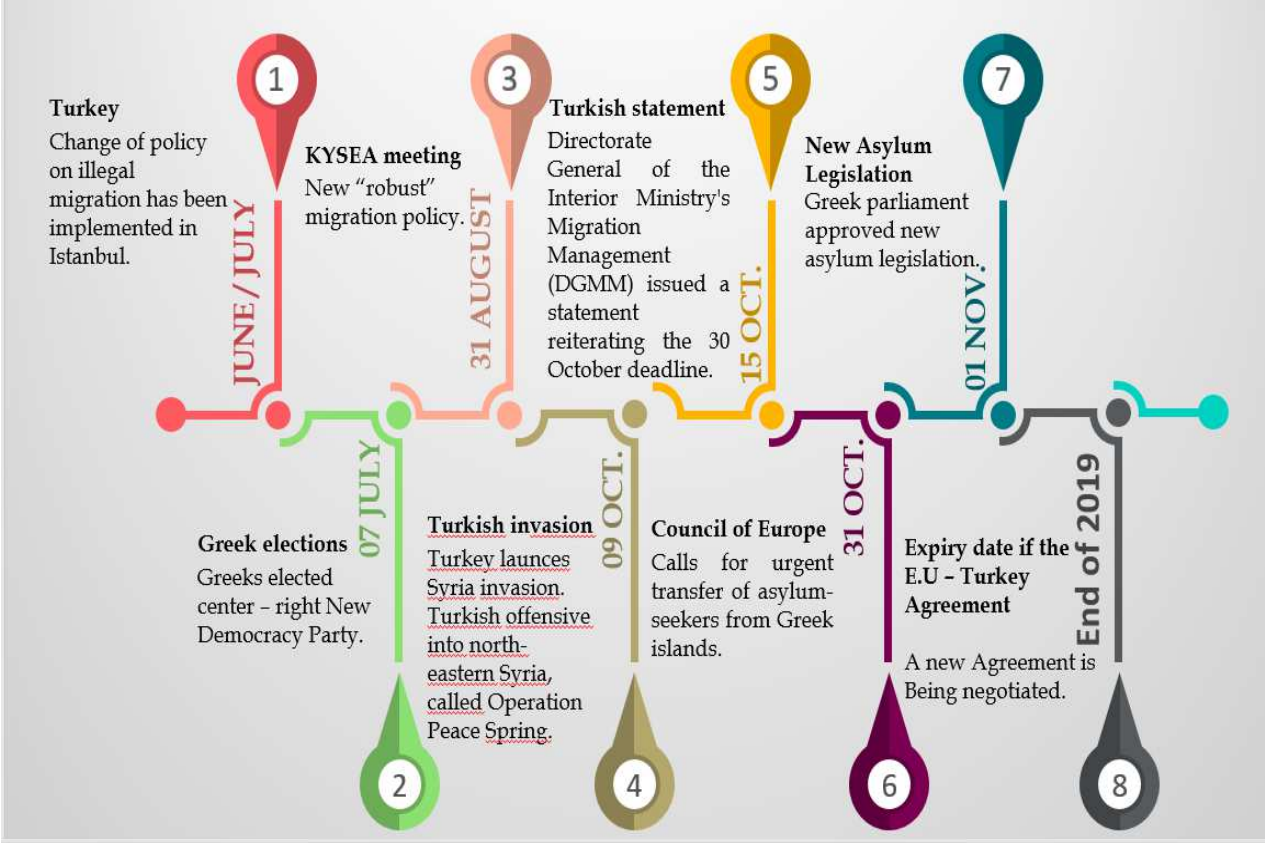


Image 21

https://www.researchgate.net/post/Which_is_the_best_method_for_removing_outliers_in_a_data_set
https://www.theanalysisfactor.com/outliers-to-drop-or-not-to-drop/
https://www.itl.nist.gov/div898/handbook/prc/section1/prc16.htm

ANNEX 5

Another forecasting example

For the needs of this research the period chosen for the correlation analysis was between May – October for the years 2016,2017 and 2018.

The variable correlation that resulted from the applied methodology and was repeated three years in row (2016,2017 and 2018), was between P.D Lesvos and 2nd P.D Dodekanese.

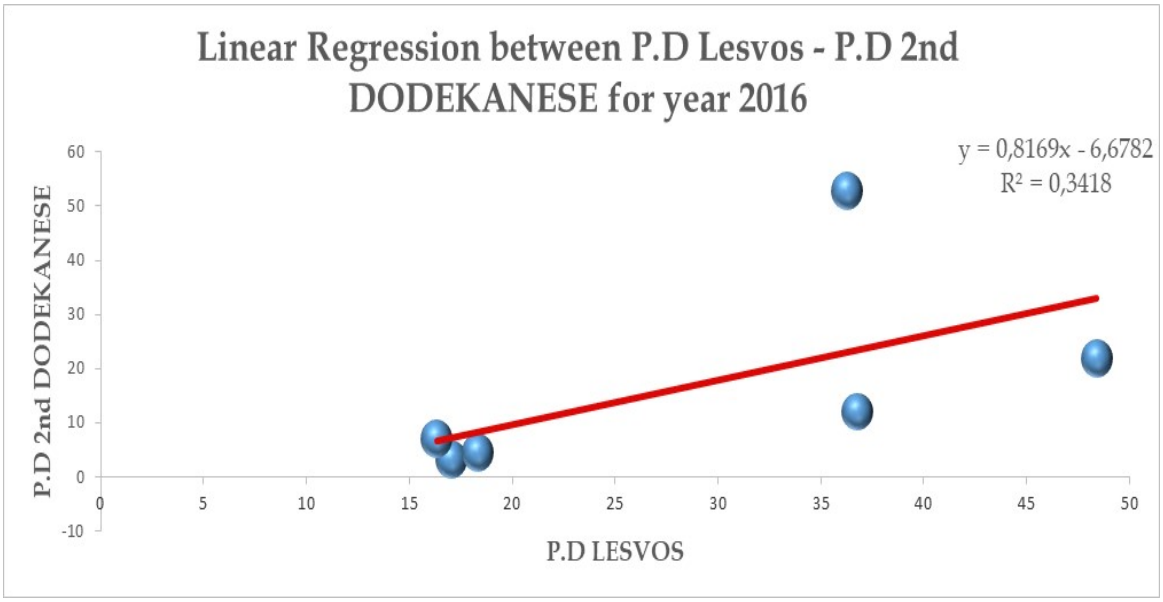


Figure 59: Average (positive) linear regression, where R = 0,58

Removing outlier

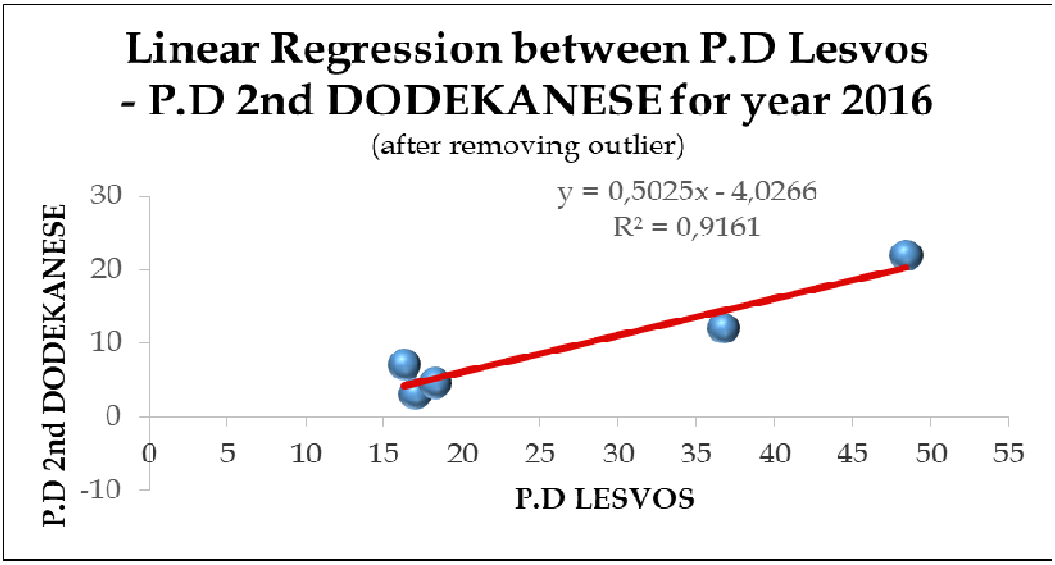


Figure 60: Very high (positive) linear regression, where R = 0,96

Forecasting Procedure

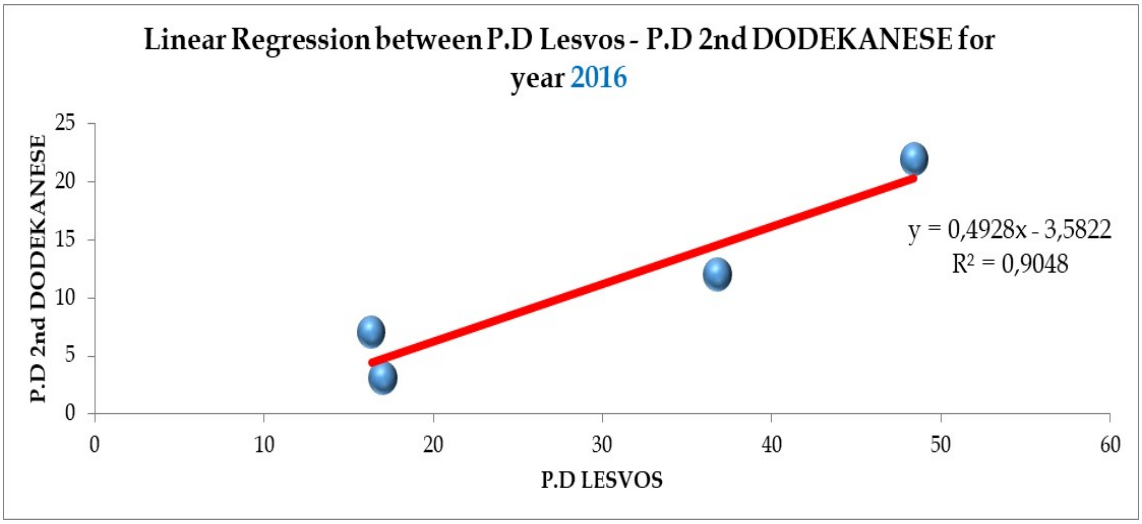


Figure 61

Forecasting period: From October 2016 till December 2017

Long term forecasting

Using 2016 Linear Regresion (y = 0,4928x - 3,5822)				
	Predicted values of variable (y)	**Actual values of variable (x) (P.D Lesvos)**		**Actual values of variable (y)**
July 2017	**14,87**	37,45		**4,65**

Table 43

Short term forecasting for year 2017

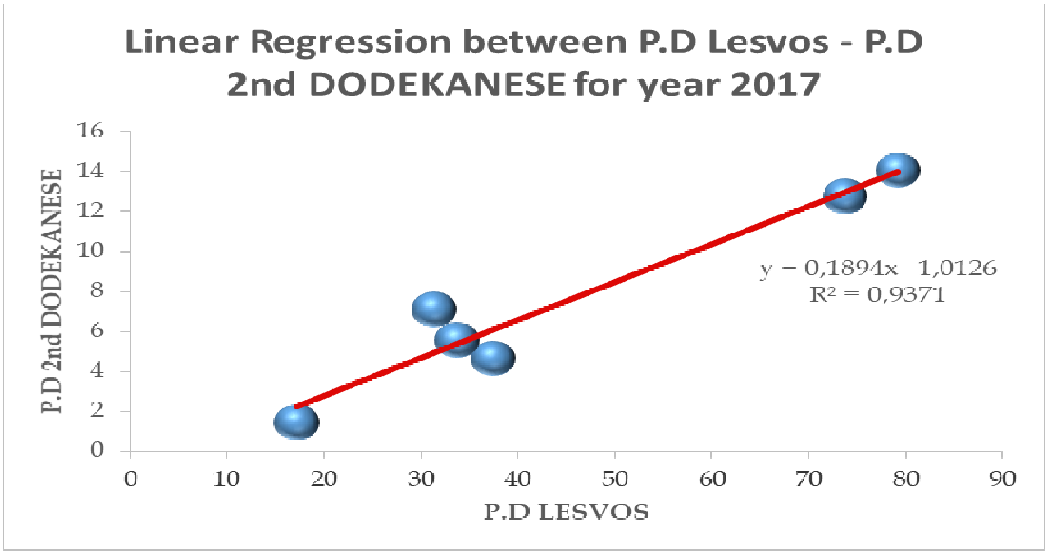


Figure 62: Very high (positive) linear regression, where R = 0,97

Forecasting

	X variable (EXPLANATORY)	Y variable (RESPONSE)
	MEAN values of M.F for P.D LESVOS	**MEAN values of M.F 2nd for P.D DODEKANESE**
May-17	17,19	1,42
Jun-17	31,33	7,10
Jul-17	37,45	4,65
Aug-17	33,74	5,55
Sep-17	79,17	14,07

Table 44

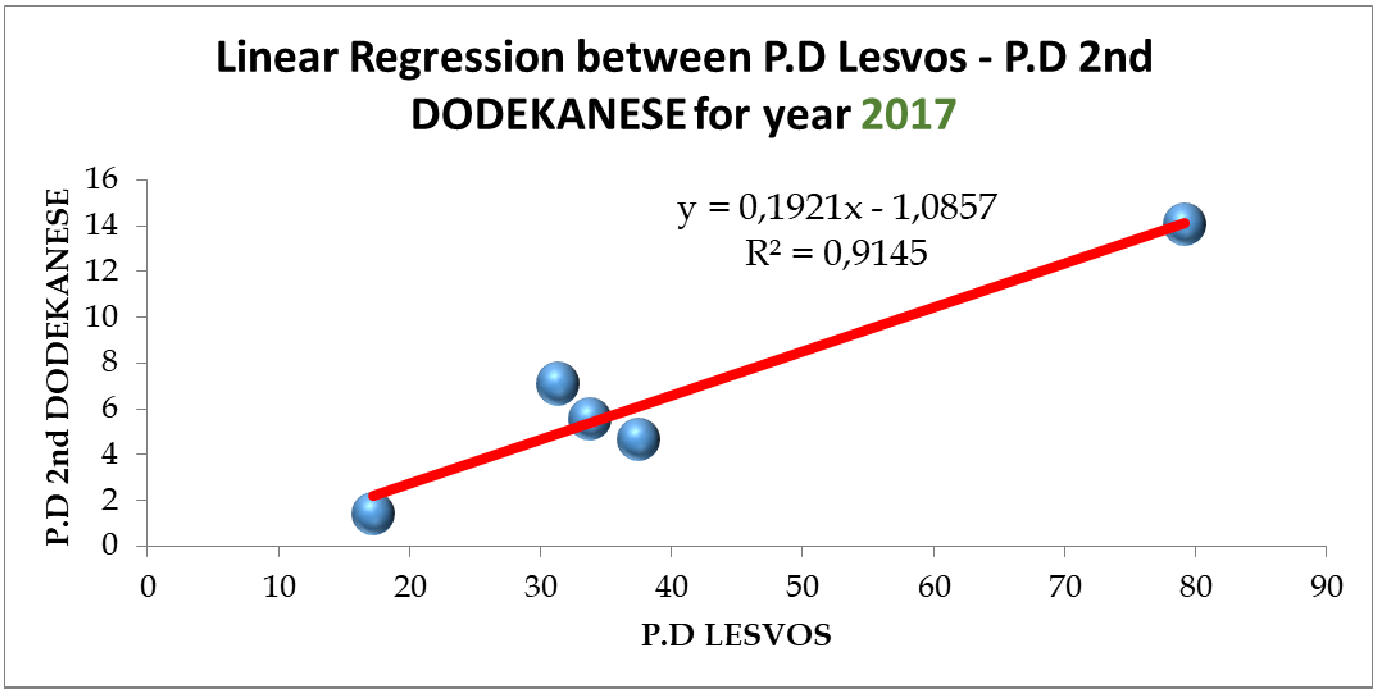


Figure 63

Using 2017 Linear Regggresion (y = 0,1921x - 1,0857)

	Predicted value of variable (y) for October 2017	**Actual value of variable (x) for October 2017 (P.D 1st Dodekanese)**		**Actual value of variable (y) for October 2017**
October 2017	**13,07**	**4,16**		**12,77**

Table 45

Forecasting for 2018

Forecasting procedure

	MEAN values of M.F for P.D LESVOS	MEAN values of M.F 2nd for P.D DODEKANESE
May-18	50,45	10,39
Jun-18	34,60	6,27
Jul-18	40,94	13,00
Aug-18	55,65	19,68
Sep-18	65,43	13,50

Table 46

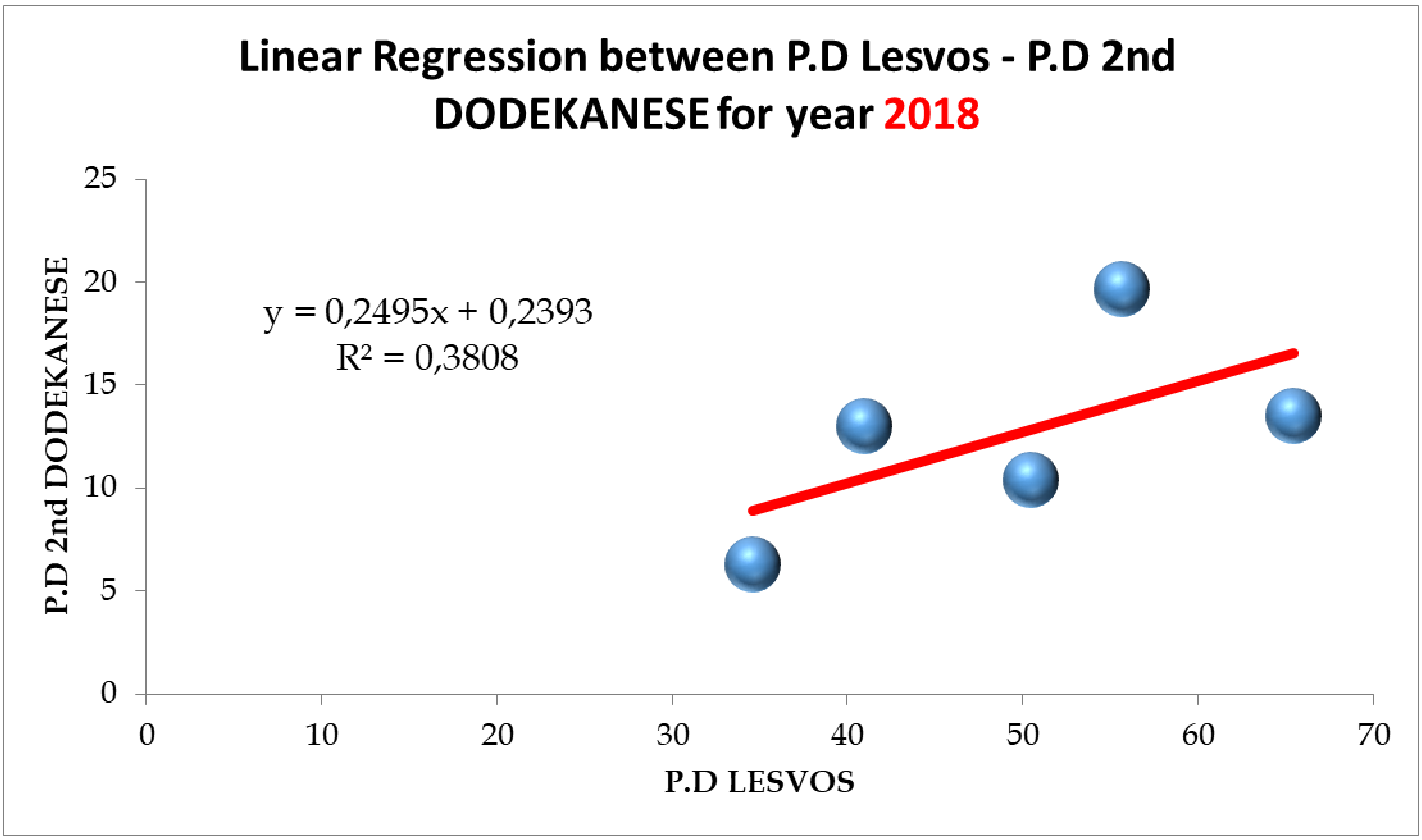


Figure 64

Using 2018 Linear Regggresion (y = 0,2495x + 0,2393)				
	Predicted value of variable (y) for October 2018	**Actual value of variable (x) for October 2018 (P.D 1st Dodekanese)**		**Actual value of variable (y) for October 2018**
October 2018	**10,35**	**4,16**		**12,77**

Table 47

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