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Dear readers,

We are happy to reach you with our second issue. This issue consists of many research articles. We would like to thank everyone who did not spare their voluntary support during the publication process. We will be happy to invite the papers of all researchers working in different career fields.

Sincerely yours.

Assoc. Prof. Dr. Dođan BOZDOĐAN & Lec. Őefika ALTINTAŐ

Editor-in-Chief

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Examination of the Republic Period Translation Office in Terms of Being an Institutional Model for Translation Activities

Buğra KAŞ*

Abstract

Throughout Turkish history, some organized attempts were made from time to time within the scope of translation activities, and these activities were carried out through state-organized societies, delegations, committees, or offices. Both the initiatives made in the Ottoman period and some translation activities after the proclamation of the Republic were conducted within the framework that we can describe as institutionalization from modern-day perspective, and various translation studies were put forward. It is purposed in this study to examine the Translation Office, one of the institutions established by the managers of the period so as to carry out translation studies in the past, in a multi-dimensional aspect. The Translation Office was observed with its administrative, cultural, economic, political, or ideological dimensions, and it was examined whether the existing structure can be used as an institutional model for translation in the relevant context. In the study, initially, the definition of institutionalization was presented through a general framework and discussed through the above-mentioned dimensions, and some evaluations were conducted on the necessity of institutionalization in translation activities. Then, the organizational structure of the Translation Office was analyzed in terms of the period when it showed its existence. Finally, an answer was sought to the question of whether the obtained data can provide an institutional model in the context of translation. As a result of the analysis, it was concluded that the Translation Office can be a model for institutionalization in translation in terms of management and functioning. However, when evaluated on the basis of the sustainability principle, it was observed that it could not fulfill modern-day institutionalization requirements for various reasons, and it was seen that it did not fully represent as an institutional model for this reason.

Key Words: Translation Office, Institutionalization, Institutional Translation, Institutionalization in Translation

Introduction

Translation has been considered as a sub-field of other disciplines such as Linguistics and Literature throughout history, and it has only started to be accepted as a discipline on its own after the 1970s. Even though some studies on both the theoretical and applied fields of translation have been carried out so far, the necessity of an institutional approach to translation emerged in the late 1980s.

It is an undeniable fact that translation activities are concentrated in the same direction as multiculturalism and multilingualism have become a reality of today's world. This situation brings with it the need for a standardization for translation activities. At this point, it is of great importance to develop an institutional approach to translation and to embody the approach to be put forward through a model.

There are various initiatives to carry out translation activities in different periods of Turkish history. It is seen that the periods when translation studies were carried out in an organized manner were divided into "the last times of the Ottoman Period, the period when Hasan Ali Yücel served as the Ministry of National Education in the Republican Period, and finally the time period from the 1980s to the present" (Kayaoğlu, 1998: 71). During these periods, various attempts were made in translation activities, which we can define as institutionalization today. However, when the literature on the concept of institutionalization in translation activities was scanned, no model

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was found in this context. Almost all of the studies on the subject could not go beyond making an introduction to the subject and only made general recommendations.

In the first part of the study, the definition of institutionalization, its basic indicators and the benefits of institutionalization will be mentioned in order to deal with the issue of institutionalization in its most general terms. Later, the concept of institutionalization will be tried to be examined with its administrative, cultural, economic, political, or ideological dimensions.

An Overview of Institutionalization

When the word institutionalization is searched on web page of Turkish Language Association (TLA) to see what the word meaning of institutionalization is, such definitions as “to become institutionalized, to become organized, to gain continuity” are encountered (Turkish Language Association, 2020). When these definitions are examined, it is understood that being organized and based on the principle of continuity are necessary at the basis of the institutionalization action.

When the literature is examined, it is possible to come across various definitions of what the concept of institutionalization is. However, it would be a more meaningful approach to evaluate institutionalization through the concept of institution. For example, Even-Zohar, one of the important names in the field of translation studies, defines the institution as a power that determines what will be liked by the society, decides which norms forming the society will be, and in this context, holds the authority of reward and punishment (Translation Studies, 2020). Based on this approach, it will be more effective to examine the definitions related to institutionalization in the literature.

Institutionalization is defined as “the process of bringing a different and distinctive identity from other businesses” for any company which has the ability to have standards and pre-prepared procedures that are independent of individuals, to follow the ever-changing environmental conditions and to establish systems to adapt to them, to create the organizational chart in accordance with the developments over time, to transform only the communication and business methods specific to its own structure into a culture (Karpuzoğlu, 2004: 26). In another study on the subject, institutionalization is defined as “the establishment of relevant structures and processes for the continuation of the activities of an institution, which is essential, for the institution to produce its own methods without being dependent on the personal methods of the employees, and for the work to run smoothly even if the employees leave the institution.” In other words, institutionalization is the establishment of the necessary structure for a business to continue and develop its activities without being dependent on the existence of individuals (Bezirci, 2013: 62). The most basic point observed in both definitions is that institutions can continue to exist without being dependent on individuals and act within certain standards in their activities.

The concept of institutionalization is not possible when businesses use the term only in their discourse. To be able to say that any business has a fully institutional structure, it must have certain indicators, the details of which will be given below. As a result of the research conducted in the literature, the indicators of institutionalization appear in a multidimensional way in many studies. In the most inclusive way, the main indicators of the institutionalization of the business are listed as the creation of organizational culture, the professionalization of business management, the training activities carried out to keep up with the developments and changes in the field of activity, the perspective of institution on people, the existence of a systematic organizational structure, conducting business activities in the light of a pre-decided plan and policies, standardizing work/processes, and establishing an internal audit system (Bayrak, 2005: 17; Akdoğan, 2000: 112; Güner, 2006: 51). When the basic indicators of institutionalization are thought, it is possible to see that eliminating the dependence on human is not sufficient for institutionalization. Institutionalization is a concept that should be evaluated as a whole with its administrative, cultural, economic, political or ideological, and educational dimensions.

The fact that no model has been put forward concretely in the context of institutionalization in translation activities is a major shortcoming for the relevant field. Of course, it would not be wrong to think that the institutionalization approach, which receives positive reactions from all stakeholders in terms of total quality in every field it is applied, will also be a useful practice in terms of translation activities. In order to be able to talk about an institutionalization in the field of translation, first of all, the consideration of the conditions of the period in which the action will take place, the determination of the administrative scheme suitable for the action, the consideration of cultural elements, the determination of the policy or ideology to be adopted, the planning of educational activities in order to keep up with the changing conditions and new developments, supervision mechanism need to be provided. It is of great importance to establish a legislation in line with the consensus of all stakeholders in order to standardize the business and operating processes of the mentioned dimensions.

In order to create such a comprehensive institutionalization model in terms of translation activities, it would be useful to examine the structure of the Translation Office, which can be considered as the most successful in terms of the product put forward among the institutions established within this framework with its practices in the past. Examining the structure of this institution in detail in the context of the dimensions required for institutionalization in translation activities will give important clues for an institutionalization model that can be created in the field of translation in the future.

Necessity of Institutionalization in Translation Activities

In the most general framework, institutionalization strengthens the reputation of the institution. Strengthening reputation increases the efficiency of the institution. The increase in the efficiency of the institution means that the profitability will increase in a direct proportion. The above-mentioned developments can be easily observed in businesses where institutionalization is fully established.

After mentioning the most basic developments that the concept of institutionalization provides to the business, it is useful to mention what elements institutionalization should have that envisage a more accurate and smooth functioning of operational affairs. These elements can be summarized as follows:

- “Creating an organizational structure suitable for the purposes,
- Writing job and job descriptions,
- Establishment of internal regulations,
- A professional management by distributing authority and responsibilities” (Sönmez and Toksoy, 2011: 18).

The institutionalization that will occur as a result of the factors listed above will also increase the visibility of the business in terms of functioning. It would not be wrong to say that structures based on institutionalization in terms of functionality are getting stronger day by day both in terms of sustainability and economy.

It is necessary to consider to what extent institutionalization, which provides benefits in every field that the business needs, especially in managerial, is applicable in translation activities or whether institutionalization is necessary in translation activities. However, while thinking about this, the fact that it is not correct to base institutionalization on a single and predetermined fixed criteria should also be taken into consideration because institutionalization will differ according to the sector, structure, size, characteristics, and culture of the business. For this reason, in order to be able to talk about an institutionalization in terms of translation, it should be thoroughly examined by considering the characteristics of the culture in which the translation will be carried out, what kind of reasons it will be made, what the expectation will be after the translation, and how the translation will work.

Before discussing whether institutionalization is necessary in translation activities or what kind of institutionalization model should be if institutionalization is necessary in the relevant field as in other sectors, it is useful to examine the translation activities, which were done by the state in the past, and which we can define as institutional or at least organized from today's perspective. In this way, seeing the pros and cons of the past practices, which can be defined as institutionalization initiatives now, can give important clues for the institutionalization model that is planned to be created. “The first translation activity systematically carried out by the delegations in the Ottoman period took place in the Tulip Era. In this period, instead of establishing an inclusive institution for all translation activities, there is a tendency to form a committee for each work to be translated” (Kayaoğlu, 1998: 76). Therefore, translation activities remained very limited.

The Privy Council, which can be defined as a more comprehensive institutionalization initiative from today's perspective, was founded on July 18, 1851. Before its opening, a declaration was prepared for this establishment. In the prepared declaration, the purpose of establishment of the council, the number of members, their qualifications and the election procedures of the members, the working style of the council, and the services it would provide were determined in detail. The council, which carried out translation activities for a certain period of time, was closed due to political, cultural, economic, domestic, and foreign events. This qualification of the council also provided a roadmap for the institutions to be established for translation activities after it.

After the Privy Council, which was responsible for carrying out translation activities as of 1862, lost its effectiveness, it was decided to establish a Translation Society affiliated to the Ministry of Education in 1865, upon the need for translation activities. Like the Privy Council, the purpose of establishment of this society, the

number of members, qualifications and duties of the members, the way the society works and what services it would provide were clearly determined. The society later terminated its activities due to financial reasons.

After the Translation Society, many institutions were established with similar methods in the following years until the end of the Ottoman Period. It is possible to list them, respectively, as follows: Science Office which was created for translation activities within the Council of Education established through the Statute on General Education published in 1870, the Copyright and Translation Office, which was established in 1879 during II. Abdulhamid period, Copyright and Translation Office, which was created during the Second Constitutional Period in 1914. Although all these institutions mentioned above have slight differences, they were established in similar ways and engaged in various activities.

During the GNAT (Grand National Assembly of Turkey) governments, translation activities continued to be carried out systematically by the state. In this context, the Copyright and Translation Council and the Copyright and Translation Committees, led by various individuals, served at different times. The Copyright and Translation Committee, which was formed during the GNAT governments in the Republican Period, continued its activities intensively. However, its operation was regulated by the Declaration of the Copyright and Translation Committee published in 1924.

The Translation Office, which is the subject of the study and is thought to be a model for today's understanding of institutionalization with certain features, was established during the İnönü Period. In order to understand how useful the Office can be in being an institutionalization model in translation activities, it should be evaluated in detail by focusing on the concept of institutionalization.

Institutionalization-Focused Examination of Translation Office

In this part of the study, the Translation Office established in the Republican Period will be examined mainly by using the data presented in the book "Translation Institutions in Turkey" written by Taceddin Kayaoğlu (1998). Inferences will be made about the extent to which the Translation Office created by the state carries the conditions of today's institutionalization and in what dimensions it can set an example for an institutional translation model that can be created in the future.

Before mentioning about the functioning of the Translation Office, which can be defined as an institutionalization initiative from today's approach, it would be useful to briefly mention who and how the institution was created. The Translation Office was established in 1940 with the contribution of Hasan Ali Yücel, who served as the Minister of National Education during the İnönü period. However, the First Turkish Publications Congress (1939) convened before the establishment of the bureau should also be emphasized because some of the decisions taken in the congress are directly related to the relevant office. "One of the decisions that emerged is the Translation Affairs Committee, which created the institution that would gain an institutional identity as a Translation Office in the future" (Kayaoğlu, 1998: 103). After the congress, the members of the Translation Committee were determined, and these members carried out some activities. "One of these activities is to establish a permanent Translation Office" (Gürçağlar, 2005: 36).

Established on May 19, 1940, under the Ministry of National Education, the Translation Office carried out the most intensive and productive translation activities among the institutions established to carry out translation studies until then. Many writers and translators worked in the established office, and many foreign works that had an important role in the enlightenment of the West were translated into Turkish. The Office consisted of a group of 180 translators. "When 210 works from French classics, 90 from German literature, 65 works from English literature and translation works in different western languages are included, a total of 604 Western works were translated by the Translation Office" (Aytaç, 1999: 87). Thus, it was aimed to realize the enlightenment seen in the West, even partially, in Turkey.

The aims of the establishment of translation institutions, which had been founded before, were announced through certain declarations. However, a clear statement as much as the explanation for the purpose of the Translation Office has not been found. With this statement, the establishment purpose of the Translation Office became clear as follows: "The Office was established to deal with the translation order of the works in the list, their distribution to the translators, the examination and follow-up of the translations, and the arrangement and supervision of the translation publications of private institutions" (Kayaoglu, 1998: 297).

According to Hasan Ali Yücel, many attempts were made for translation activities until that day, but they acted haphazardly and as a result the desired goals could not be achieved. The Translation Office, on the other hand, took an important step in ending the errors made in the past and standardizing the translation activities. As stated

before, it would not be wrong to say that there was an attempt to standardize, which is one of the most basic indicators of institutionalization. In this respect, it can be an example based on standardization for translation studies.

The Translation Office also acted in accordance with Atatürk's statism policy and regularly translated world classics. Thus, the national library became an institution that contained the major works in the world. It was emphasized that a predetermined policy should be included among the main indicators of institutionalization. The fact that the Office operated through the principle of statism is a feature that can be utilized in creating an institutional model in today's translation activities.

In the administrative framework, there is a committee consisting of a chairman, a chief, a general clerk, and four members. The delegation coordinated the operation of translation activities. They were authorized to decide which translations would be made, by whom these translations would be conducted, how the resulting translation works would be examined, and how the payment would be provided. In this respect, it is observed that there is a standardization path in terms of management. In this regard, the Office also sets an important example for the administrative scheme, which is one of the bare necessities of institutionalization.

One of the most basic principles of institutionalization is the determination of the procedures and conditions under which the relevant activity will be carried out. The Translation Office also had a unique procedure and specification. Some of the works to be translated were carried out by the members of the Translation Office. Other works were made by translators determined by the committee. It was also announced that citizens who had the skills to translate could also be involved in this process. Thus, the committee increased its stakeholders in translation activities by assigning duties and responsibilities to translators other than itself. The translators were asked to translate 25-30 pages of the given work first. This part would provide the delegation with information about the translator's translation skills. In addition, this translation was checked by other experts in the field, and the translator was told to continue with the translation in case of approval. After the whole work was translated, it was checked again, and if it was found appropriate, the fee to be paid to the translator was decided. This procedure indicates that there was an important system in terms of both functioning and supervision. Since institutionalization requires a standardization in every subject, it can be taken as an example for an institutionalization model in translation activities from today's perspective.

The translation office considered the needs of the country in its activities and made its choices about which translation works would be in order to make cultural progress. Due to the cultural and economic superiority of the West in the conditions of that period, the works to be translated were mainly selected from Greek, Latin, and other Western cultures. Such an approach is a clear indication that the Translation Office included cultural elements in its activities. The cultural dimension, which is another pillar of institutionalization, shows itself here and gives clues for a model that can be created within the scope of translation activities in the future.

It is seen that "the translations made under the roof of the translation office were created within the framework of conscious methodological preferences" (Yazar, 2018: 93). The basic principles needed in terms of translation activities were determined beforehand. This is a very important initiative in terms of the approach that can be defined as institutionalization from today's point of view. It is thought that the Translation Office can set an important example for an institutionalization model that can be created in today's conditions in translation activities with the above-mentioned administrative, cultural, economic, and political aspects. However, the sustainability principle, which forms the basis of institutionalization, is unfortunately not available in the Translation Office. It was closed in 1967 as a result of the resignation of its members.

Discussion and Conclusion

When the translation activities carried out in the Ottoman Period and the Republican Period are examined, it is clearly observed that they made a great contribution to the development of the society in both cultural and educational context and to mediate its orientation to the West, which had reached a much more advanced level of civilization under the conditions of that period. In the period after the proclamation of the Republic, intensive and effective translation studies started by Hasan Ali Yücel, the former Minister of National Education, and continued throughout the same period are seen.

The translation activities carried out in the mentioned period differ from similar studies done in previous dates in terms of being done systematically by the state. In other words, the work to be done was planned and put in writing through the declaration. In other words, it was determined which translator would do which work, who would check and correct the final version of the work, how the fee to be paid for the translations would be and

how they would be paid. In other words, the scheme related to the management and operation of the institution was created. It is possible to define this attempt as a standardization that is desired to be created in translation activities. In this respect, it can be an important example for an institutionalization model that can be planned for translation studies today.

When both the definition of institutionalization in TLA and the definitions given in the related studies in the literature are examined, the principle of sustainability lies at the basis of institutionalization. The Translation Office was closed due to the political and economic problems encountered during its operation. In this framework, it will not be able to make a contribution based on the principle of sustainability for an institutional translation model that can be designed in today's conditions. It would not be correct to say that the Translation Office has become fully institutionalized since it cannot fully reflect the institutionalism indicators from today's perspective. But it can be defined as a big step taken in the context of institutionalization in the above-mentioned issues.

The following suggestions can be made for future studies on the subject: In addition to the dimensions in which the Translation Office is successful in terms of institutionalization, a sustainability-based model can be developed. Moreover, parallel to technological development, a model can be developed by defining the dimensions of a digital institutionalization within the scope of translation. In addition, the suitability or adaptability of the model applied in any sector that has undergone digital institutionalization can be discussed within the scope of translation studies.

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The Social Impact of Technological Innovation in Europe

Afolabi AKAÇI*

Abstract

The current digital transformation is due to the exponential development of technology being successfully implemented in all strata of society. The new technological age is built on countless innovations and countless changes. In some cases, as with blockchain, its hostile approach to centralized systems has many legal and governance implications, while laying the foundations for change or the emergence of business models in the economic realm and different management models in the administrative and organizational realm. Mandatory changes were made in many areas such as companies and public administration. Likewise, robotization and artificial intelligence are particularly important technological developments because of their controversial impact on businesses and their growing demand today. In this context, the legislator is faced with the reorganization of the markets and sanctions. Technology, Law and Economy, as inseparable fields, their interaction is increasing day by day.

Key Words: Digital transformation, blockchain, artificial intelligence

Introduction

A disruption is an unexpected and unpredictable shock that gives rise to far-reaching changes that transform humanity. Any significant technological disruption or leap with global repercussion, any paradigm shift about it; and everything that supposes the rupture or rethinking of past models to which society has become accustomed, implies facing challenges and uncertainties for which there is no roadmap.

Under this approach, this work aims to raise the dimension of the changes that the digital transformation is shaping, showing the issues and controversies that the digital transformation of society raises, making special reference to the regulatory challenges of technological development. In this sense, we will study with particular attention the question of data protection, the control of the power of large technology companies and the complex regulatory issues that originate with blockchain, as occurs with robotics and artificial intelligence. In addition, we have also included a key social question: How will digital transformation affect future employment?

The current digital transformation is due to the application in all orders of society of an exponential development of technology, enhanced by a convergence or coupling of technologies with different origin or application. In this context, the digital society develops and, within it, the digital economy (Tapscott, 1996), which can be understood as the broad set of economic and business activities whose fundamental or differentiating feature with respect to economic activities Traditional is the prominent use of digital technologies.

The introduction and popularization of the Internet during the second half of the nineties of the last century already gave rise to the most generic and primordial concept of digital society, while the more specific meaning of “digital economy” was established a few years later, as the new business-economic model of the second decade of the XXI century. Particularly, starting in 2007, coinciding in time with the outbreak of the global economic crisis (2008-2014) and coincidentally with the appearance of the smartphone. It is convenient to add another synchronicity: the birth of Bitcoin and blockchain technology, in 2008, giving rise, in the midst of the financial crisis, to the beginning of the first digital distributed financial record system independent of national

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monetary sovereignties, a true financial disruption that shakes some classic paradigms of centralized models, fundamentally based on the sovereignty of States, and that leads to the introduction of the new concept of “decentralization of trust” (Palomo, 2018a-2018b).

The digital economy is made up of three layers: the layer of digital infrastructure or supporting elements (equipment, computer programs and networks), the layer that concerns digital products and services and, thirdly, the layer that deals with management processes of digital-based economic and business activities. Likewise, the digital economy has five main attributes: digitization (everything that becomes digital), disintermediation or attenuation of the role of intermediaries (the so-called peer to peer model), connectivity, personalization of services (change of a supply model to a demand model) and payment for use (which relativizes the need for ownership of things).

Two technologies for a change of era: blockchain and artificial intelligence

The new technological era is built on innumerable innovations, but the following areas or technologies should be highlighted: artificial intelligence, robotics, blockchain, 3D-4D printing, cloud computing, big data, nanotechnology, artificial reality, augmented reality, IoT (Internet of things), semantic web, drones, autonomous driving of vehicles, conscious technology, biotechnological applications, etc. Among all of them there are two that seem especially transcendent: blockchain technology; and artificial intelligence (AI).

The voice blockchain ("chain of blocks") identifies a technology that is part of the scope of the so-called distributed ledger technologies or DLT (Distributed Ledger Technologies), since it records transactions through simultaneous or distributed notes in all the nodes of the network. In other words, it is situated in a higher stage than decentralization. It operates using cryptographic keys and the transactions processed within blocks are summarized, which are joined by hash functions that act as links, creating a linear sequence or chain (Pilkington, 2016). This procedure allows blocks to be chained sequentially and, therefore, the information they contain is registered in an immutable and unalterable way, in addition to being replicated and shared in a consensual way between all the members of each blockchain network, granting a verifiable transparency by the members of the network, who act as “nodes” of the network, which implies a kind of “distribution” of the concept of trust that does not require the existence of a “central entity” (Preukschat, 2017).

Thus, a distributed, decentralized, shared and replicated database is created, which can be public (or totally open, as is the case with Bitcoin) or private, which, in turn, can be permitted or totally closed, such as This is the case of Hyperledger, the open source blockchain platform promoted in 2015 by the Linux Foundation. The data or transactions registered in the blockchain must be immutable, auditable and have a system to verify their veracity. The network itself acts as a notary, introducing trust systems between strangers (Workie and Jain, 2017).

The first blockchain was Bitcoin³ (born in 2008), being one of the most prominent Ethereum⁴, which has been suitable for incorporating the so-called smart contracts, including the ERC-20 protocol for the creation and exchange of digital assets representative of other assets (tokens). The possibilities of applying blockchain and the automatic self-execution software of smart contracts or the tokenization of assets, allow us to glimpse an infinity of applications that will take shape over the next few years (Hileman and Rauchs, 2017).

Encryption is essential in blockchain networks. In 1976, Whitfield Diffie and Martin Hellman created the algorithm that bears their name, with which they proposed to divide the encrypted keys into two keys: one public and one private. With the first you can encrypt a message, but the second is necessary to decrypt it. The creators of this cryptographic system are Ralf Merkle (who contributed the so-called Merkle trees with his research), Ron Rivest, Adi Shamir and Leonard Adleman (creators of the RSA algorithm, composed of the initials of their surnames, and which allows the encryption and decryption of messages).

The underlying philosophy of distributed systems and its antagonistic approach to centralized systems has many legal and governance implications, while laying the foundations for change or the birth of business models

in the economic sphere and of different business models. management in the administrative and organizational field of companies and public administration (Lerida and Mora, 2016).

Distribution versus centralization can significantly alter the long-established traditional centralized systems to which citizens are accustomed (property registration, civil registration, medical records, academic degrees, etc.). In fact, a large part of the current legislative body has been built, for centuries, under approaches of coordination, administration and centralized management (Atzori, 2015).

DLT technology is being applied or tested in many areas, such as: crypto assets (many of which are cryptocurrencies); payment systems; stock markets, identity management of people and things; security and authorization systems; supply chains; traceability of goods; intellectual property management; provision of services and exchanges of the collaborative economy; notary records and services; authentication of titles or curricular merits; public contract bidding systems and many more use cases that are being devised every day. To all of them are added some particularly popular ones, such as the new forms of financing business projects, through the so-called cryptocurrency offers, known as ICOs (Initial Currency Offers), STOs (Security Token Offers), or SAFTs (Simple Agreement for Future Token) whose issuance or authorization is so controversial from a regulatory point of view. Thus, the CNMV statement, dated March 16, 2019, can be seen on the precautions that investors should have in relation to raising funds through these operations (Sebastian, 2017).

An application with worldwide resonance was the formal announcement and publication, on Tuesday, June 18, 2019, by the consortium led by Facebook, of the so-called "White Paper" or explanatory document on the launch of "LIBRA" for the year 2020. A means of payment among users of the social network (practically a quarter of the inhabitants of the planet), which has a volume of 2,700 million users. LIBRA is a definitive boost to the development of a virtual, global and parallel monetary system, which moves in a dimension alien to the sovereignty of the States, configuring an innovative, fascinating and also disturbing "beginning" of an alternative monetary system. native. The document indicates the creation of the LIBRA Association as the governing body of the network, in which companies such as Mastercard, Visa, PayPal, PayU, Stripe, eBay, Facebook (through the Calibra company for this purpose), Lyft join. , Spotify, Uber, Vodafone Group, Coinbase, Union Square Ventures, and non-profit organizations. This association aspires to have 100 members by 2020 and the incorporation of the greatest possible diversity of organizations, including universities, is encouraged. It will function as a "permissioned" blockchain, which even has its own programming language (Move), leaving the nodes in charge of these companies; However, it contemplates a future "opening" of the network and Facebook promises to withdraw from the initial leadership to be one more member when the system is in stable operation. An especially significant element that differentiates LIBRA from others such as Bitcoin, is that it will be backed ("Libra Reserve") by risk-free financial assets (bank deposits and short-term fixed income) to reduce its volatility and maintain its value on a relatively low path stable. The potential of this and other virtual currencies is relevant, given that today it is estimated at 1,700 millions of inhabitants, those who still do not have a bank account; and many of them do have access to the internet and use social networks.

Robotization implies the incorporation of robots (versatile and autonomous machines that adapt themselves) to production processes, so it differs from mechanization (machines that perform simple and repetitive tasks) and automation (machines that allow reduce human intervention). For its part, artificial intelligence (AI), closely linked to robotics, supposes the attribution of "intelligence" qualities similar to human ones, since they provide the ability to solve problems or learn. In this sense, artificial intelligence learns through training ("machine learning") provided by humans and by its own self-learning. Basically, AI can identify results or predict future behaviors through data review, using an algorithm that generates behavior patterns. In addition, the results it obtains provide it with experiences that it adds to its records and that improve the algorithms with which it was programmed.

Robotization and artificial intelligence are especially transcendent technological developments due to their controversial impact on the jobs carried out by humans (Salazar, 2019), to a much greater degree than the mechanization or automation experienced since the beginning of the first industrial revolution. It will not only

affect routine tasks but also many other current professional activities (Frey and Osborne, 2016; McKinsey, 2017), also creating new professions linked to the development of these technologies.

Most developed countries have already drawn up guidelines on artificial intelligence that move between two main coordinates or precepts: on the one hand, they want to stimulate their development due to the economic and competitive consequences that they imply; but, on the other hand, they are concerned that ethical principles are preserved in their development. Thus, for example, at the beginning of 2019, the Spanish Government published the document *The Spanish Strategy in R & D & I in Artificial Intelligence*¹² that collects both approaches.

It is already seen that the speed of change of digital transformation and, in particular, of the application of AI, will grant a very narrow margin of time to be able to propose the recycling of employees who will lose their jobs. A new “industrial reconversion” has already begun, such as that which took place in developed countries in the decade of the eighties of the last century; and there is a perceived fear that a large unadaptable or superfluous human group will accumulate (Hariri, 2016) in the new socio-technological context, for which the concept of “universal basic income” will begin to take center stage in economic policies and social.

Challenges for a society in digital transformation

The main historical stages of human society, properly speaking, go back to its origin in agrarian society (between 8,000 and 10,000 years ago) until the 18th century, followed by two and a half centuries of industrial society - it could well be the year 2007 - and that has been the prelude to the current digital society, which is estimated to extend -in its first stage- until 2030. After that date, we will supposedly make the leap to a new model of intelligent society that will prevail for the rest of the XXI century. In all these stages, technology has been, is and will be one of the main factors of change of time.

But, with an eye on the normal parameters of human longevity, that is, looking at the next decades, it can be seen that what will be called intelligent society -an imperfectly defined concept- that began to be used in 2016 - It will refer to the evolution experienced by the digital society at the beginning of the 21st century towards a more technologically advanced and “empowered” society with new communication, decision-making and individual sovereignty capacities. This will be the consequence of the exponential evolution of technology and its interconnection in the way of interconnecting between individuals (P2P), between machines (M2M) and between individuals and machines (P2M-M2P).

In this intelligent society, artificial intelligence, robotics, the Internet of Things (IoT), blockchain technology, neuroscience, genetics, social networks, collaborative economics, economics. circular, smart cities, etc. they are defining elements on which new socioeconomic systems are built. In turn, these also pose major legal challenges on privacy or protection against the influence of large technology and social media corporations.

The intelligent society is a nominally recognized fact, as shown, for example, by the Public Consultation on the digital strategy for an intelligent Spain, issued in autumn 2017, by the Secretary of State for the Information Society and the Digital Agenda of the Ministry of Energy, Tourism and Digital Agenda, transcendent in the concept and in its objectives.

It may be that an intelligent and interconnected society that is more and more and better / less informed¹⁵ -it is already talking about infoxication- increasingly questions the conventions, reaching the very essence of the State and the institutions.

Hyperconnectivity brings out new behaviors and social and economic interactions that were previously impossible. Thus, new business models emerge, such as participatory platforms, which connect individuals and create interdependencies between them, which, in turn, generate opportunities. Although these relationships will also change later, reaching direct relationship systems between the parties (peer to peer or P2P) that will give rise to legal or para-legal relationships, many of which, especially when they have economic significance, will move into regulatory limbos. between what is legal, what is alleged and what is illegal.

Society has changed, has changed, and continues to change, and it may exude a certain air of rebellion against what seemed solidly established and assumed. This generates risks, but also favors the appearance of

new opportunities and new business models that will also require the introduction of a new legal body that can consider the legal consequences of technological innovation. For example, the well-known Apple Store or Android platforms allow anyone to citizen or company work for companies Apple, Google, Samsung and many others, developing applications (Apps) that can be offered through these sales platforms. This can make the community of users and creators those who develop the expansion of the business and complement the products and services of said companies¹⁶, without the developers being employees of said companies.

The challenge of regulation in the digital society or of the intelligent society extends to all sectors (Cuadra-Salcedo and Pinar-Manas, 2018). Thus, in a sector as regulated as the financial sector, innovation has led to the need to develop regulatory sandboxes that accommodate the new proposals of the growing Fintech-Insurtech sector (United Kingdom, Australia, Singapore and even Spain) but there is a lack of a “ global sandbox ”applicable to more than one country or jurisdiction (Arner, et al, 2015).

Continuing with the examples from the financial sphere, the British Financial Authority (FCA, Financial Contact Authority) has proposed to create a global network of financial innovation that allows sharing experiences and analyzing how to advance in a supranational regulation, given that the technological environment overwhelms the jurisdictional boundaries. The financial sphere, due to its strategic and particularly sensitive nature, requires special attention.

Technology is a co-substantial element in modern financial markets and more and more algorithms are making decisions to form investment portfolios or to advise their clients (Palomo et al., 2018; Fernandez, 2019). A significant case is the one that happened on May 6, 2010, in the episode dubbed the flash crash, when the North American Dow Jones Index plummeted nearly 1,000 points in just a few minutes due to the gregarious behavior of the financial robots of HFT (High Frequency Trading) which, fortunately, was able to recover twenty minutes later.

Another cross-cutting element in technology is data protection, which has become the cornerstone for an orderly development of the digital society (Pinar et al, 2016). Special effort has been made to protect personal data, but the importance of the data generated by things is already guessed, since, directly or indirectly, information about people, companies or institutions is transmitted from our interactions. The already close development of 5G communications networks and, with it, the exponential multiplication of the data generated by sensors integrated in home devices or in vehicles and facilities, makes the control of the management and use of data a priority.

Another regulatory challenge comes from the rapid growth of what are now large technology companies (bigtech or techgiants), indisputable protagonists of the digital transformation and provoking both admiration and suspicion (Ayyagari et al., 2018). The concentration of market power and the enormous global relevance of their operations, with undefined regulatory spheres, is leading them to star in some controversies and, on occasions, scandals, resulting in high economic sanctions with great reputational effect.

It is beginning to be seen that the regulation proposed with the objective of controlling or attenuating the market power of these companies is becoming more of an entry barrier for new smaller companies (Autor, et al., 2019) than in a system of guarantees for users. And this is so because it is precisely the large corporations that have the most material and professional resources to meet these regulatory requirements, being able to exercise powers of influence or lobbying to promote legal developments that favor or even prevent them. the entry of new competitors who, where appropriate, may be absorbed before they become a threat to your position. Compliance with the regulation has high economic costs that, many times, can only be borne by large companies. From another point of view, a derived effect is that, if the situation is oligopolistic or monopolistic, competition decreases (Gutierrez and Philippon, 2017) and, also, the incentives to continue innovating are reduced.

Excessive or inappropriate regulation can be counterproductive for users or for new companies that want to enter these highly concentrated markets. Regulation is then debated on several fronts: on the one hand, the difficulty of regulating new business models that are so innovative and, at times, disruptive, for which traditional legislation seems outdated and unconditionable; on the other hand, the usual problem of wanting to maintain the

balance between the intention not to curtail efficiency, innovation and economic progress, versus consumer protection (Mantelero, 2014).

The control of anti-competitive practices leads, in some cases, to the relocation of technology companies to other countries, clearly impacting, not only on the creation of domestic wealth, but also on the loss or inability to attract professional and business talent. It is the eternal dilemma between innovation and competition.

Another regulatory problem is the one that concerns the tax issue. The great market power and the size of the large technology companies play in their favor to optimize their international taxation through the optimal geographic location of headquarters and subsidiaries, being able also to use their negotiating capacity and their position of strength to suggest to governments their possible relocation to other countries in the event of not reaching sufficiently satisfactory agreements.

For this reason, it is important to create systems of international legislative coordination that reduce “arbitrage” between different jurisdictions, even when these companies may seek what could be called an optimal tax geolocation (GTO). In this sense, in 2013 the OECD began to develop the so-called BEPS (Base Erosion and Profit Shifting) plan, which contains 15 measures aimed at avoiding these tax problems. The European Commission also developed a document on principles of justice and efficiency in the single European digital market and, in March 2018, proposed a directive for the Tax on Digital Services, which did not advance due to the discrepancy between the Member States on whether it was the opportune moment and if this rule was really necessary; Although, with the commitment to continue in its parallel approach to the OECD and with the objective of concluding in the year 2025.

The correct assignment of the activities carried out by technology companies is also relevant for the purposes of the corresponding legal regulations. Many platforms transact with data instead of prices, giving more importance to the number of users than to the income from their activity, since the market value of these companies is concentrated in the intangible “goodwill” that they create with their penetration. digital, from which derives the capacity for “scalability” of digital businesses with a minimal marginal cost and its extraordinary market value.

In many cases there is ambiguity even between different national jurisdictions and also globally. For this reason, it is necessary to understand business models to determine how they should be normatively conceptualized, without having to curtail innovation and the creation of new business models. From this angle, it is not easy to determine whether a company is developing anti-competitive practices by continuing to innovate permanently and, indirectly, by not allowing other potential competitors to enter; or, if, on the contrary, more than a competitive practice, what those dominant companies is, only, implement a disruptive business model, for which there is no competitor.

Conclusions

Technology has transformed society, giving rise to the current digital society that, supported by its new tools, has “empowered” itself towards an incipient intelligent society, intensive in the use of social networks and in the generation and sharing of data.

In an increasingly technological society, two key elements will stand out: trust and values. Trust, especially as a reputational model in a hyper-connected society and, also, trust as a fundamental element for the robustness of distributed networks and of all collaborative economy models. Without trust in the systems and in the actors, a digital world based on intangibility and the absence of a specific location and jurisdiction cannot be built. In this sense, the current international jurisdiction and the preponderant and traditional model of national jurisdictions seems to become obsolete given the potential of digital globalization. One could already ask what would be the jurisdiction of an Internet server located in international waters, or on the Moon.

It is important to develop a legal body, preferably international, to avoid jurisdictional problems, which ensures what can be called the Rights of the Digital Citizen. If until now the actions of some citizens against or against others have been settled in the courts applying the principles of justice of humanity or the Universal Declaration of Human Rights itself, now it will be necessary to contemplate respect for those rights, not only on

the part of humanity, but also on the part of intelligent machines; since their learning and accumulation of experiences may derive differently from how they were initially created, leaving their creator or original programmer no longer responsible.

In this context of vertiginous change, the possible difficulty to understand the operation and implications of some new technologies by broad layers of society, various levels of the administration or some companies, the lack of permeability to innovation in some cases and the erroneous perception that the speed of changes is less than announced, have led to procrastination of many actions aimed at digital transformation, and even to the absence or poor emission of positive signals to promote changes technological. However, these processes differ considerably from one country to another.

Without a doubt, there are many challenges and challenges that the current technological revolution brings. Regulatory solutions will never be perfect or complete, but they will have to be dynamic and transnational. The zero risk society does not exist, so it is necessary to learn to live with an increasingly powerful technology. You cannot do catastrophic demagoguery about technological development. The battle between techno-optimism and techno-pessimism continues and regulation must be able to offer answers and solutions.

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The Relationship Between Defense Expenditures and Economic Performance in Selected Countries

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Abstract

There is no consensus on the impact on growth of military expenditures, which are included under the state expenditures planned by policy decision-makers, since they have different characteristics from the rest of the state expenditures. Military expenditures made in order to provide support for issues such as protecting the welfare of society, protecting the country's borders, defending against attacks from outside, protecting energy fields in order for economic growth to take place are being increased by countries day by day. Considering that dec jul is directly proportional to growth, countries are spending on production and R & D by providing the necessary infrastructure for the defense industry. Countries that have achieved a rapid technological acceleration from an industrial point of view ensure the security of their own nation, which is one of the social state requirements, protect their borders, and minimize their costs and external dependence. Countries can follow independent policies in case of possible threats with technological advances. This study aims to examine the worldwide history of the defense dec and the relationship between military expenditures for the defense industry and economic performance in selected countries by conducting a panel data analysis. In the analysis, Turkey, Azerbaijan and Pakistan, which are in close social, cultural and economic relations, were included in the analysis and the period 1992-2019, when there were no difficulties in providing data, was considered. The growth rates in real gross domestic product per capita as an indicator of economic performance, while using military spending as an indicator of the share of military expenditure in gross domestic product was used. As a result of the analysis, it was concluded that an increase in military spending has a negative impact on economic growth. It can be said that military expenditures have a negative impact on growth in the relevant countries due to the fact that they are carried out instead of efficient investment expenditures.

Keywords: Military Expenditures, Economic Performance, Granger Causality Test, Panel Data

Introduction

From the past to the present, many discoveries have been made in the history of humanity, both for their own defense and to hold power. This power, which was first obtained for individual defense, has evolved as a defense for the protection of communities after the transition to settled life. These communities have revealed experts or classes in the field. The defense class, which is among these classes, can be expressed as a special unit with duties such as eliminating the threats that may arise and ensuring the security of the people in the society (Durgun and Timur, 2017: 126). The protection of societies or the desire to be ahead of other states can make states even stronger with the expenditures made on this unit. Goods and services produced for use in the military field can be examined under two headings. The first is the expenses for the food, clothing and living quarters of the persons hired to defend themselves. The second is the equipment and weapons that will be used against threats and for the security of the society. Countries may experience difficulties in the procurement process as there is a limited market for the sellers of these goods (arms and equipment). These necessary goods cannot be supplied or can be met with high costs. Societies can produce by investing in these goods and services, which are difficult to supply or have high costs. This industry is a sector that requires high R&D, capital and risk. Produced goods can sometimes remain in the stocks of countries without being used at all. For this reason, limited production is made. Production

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in the military field in the world is made by developed countries. It also aims to be among the countries that aim to take its place in this field in Turkey, Azerbaijan and Pakistan (Saraçöz, 2018: 10). This study aims to examine the worldwide history of military expenditures and the relationship between expenditures for the defense industry and economic performance in selected countries by using panel data analysis. As an economic performance indicator, real gross domestic product figures, which are widely used in the literature, and military expenditure figures for the years between 1980-2020 as a defense industry indicator are taken as basis.

Definition of Military Expenditures

It can be defined as the expenditures made to military and civilian persons who will serve to ensure the security of society, in order to sustain activities such as equipment, vehicles, equipment, and shelter. In addition to these, there are also institutions that can support military units or prevent threats that may occur outside the military field. Expenditures made on police, militia and customs officers, expenditures on civil defense, expenditures on foreign military organizations, expenditures on organizations producing weapons, expenditures on research and development that will provide development in the military field are among these expenditure items (Tügen, 1988: 48).).

There is no general definition of military expenditures in the global sense. Countries can include different expenditures in their military expenditure titles. These differences cause military expenditures to be calculated differently. While Germany calculated military expenditures as 49,602 million marks in 1993, NATO calculated this amount as 63,854 million marks. Again, while China was calculating 7.3 billion dollars in 1993, when the military support is taken into account, the amount rises to 34 billion dollars (Brozka, 1995: 51). In Table 1 shown below, the titles of three different organizations included in the military field are shown. In this table, it is seen that these titles may differ by international organizations.

Table 1. Expenses Considered Included in Defense Expenditures by International Organizations

Military Spending Heads	NATO	IMF	UN
Payments to Military Forces			
Payments to officers and military personnel	+	+	+
Payments to civilians working in or related to the armed forces	+	+	+
Cost of privileges provided to working personnel and their families	+	+	+
Pension	+	—	+
Payments to military installations	+	+	-
Weapons spending	+	+	+
Infrastructure and superstructure investments	+	+	+
Maintenance and repair expenses	+	+	+
Military research and development expenses	+	+	+
Other needs	+	+	+
Military/Defense/Strategic Expenditures			
Stocking of strategic goods	+x	—	-
Incentives for weapons production	+x	+	-
Military aid to other countries	+	+	+
Contributions to international agreements	+	+	-

Civil defense	-	+	+
Expenditures on Former Military Forces/Activities			
Support for veterans	-	-	-
War debts	-	-	-
Expenditures on Other Powers			
Gendarme	+ <i>a</i>	+ ^a	+ <i>a</i>
customs custody	+ <i>a</i>	+ ^a	+ <i>a</i>
Police	+ <i>a</i>	-	-
Spending on Other Accounts			
Assistance/Disaster recovery	+	-	-
United Nations Peacekeeping	+	+	-
Obligations for Future Expenditures			
Credit support	+	+	-

Source: Brzoska, 1995: 48-49, cited by Giray, 2004: 184-185

+: Included in Military Expenditures. -: Not included in Military Expenditures.

+^x: Included in defense expenditures if managed and financed by the defense organization.

+^a: Included in defense expenditures when trained, equipped and available for military activities.

Characteristics of Military Expenditures

Expenditures made in the military field are described as fully public and bear all their characteristics. Since the expenditures are not specific to individuals, everyone can benefit from within the borders of the country. In this way, no one in the society is deprived of this service. Individuals in the country do not have to compete with each other while consuming this service.

Industries producing in the military field are non-profit. For this reason, high performance and quality products are produced. Every stage of the goods in production is controlled by the state. Confidentiality is very important to prevent espionage in military technology (Karaköse, 2015:53-54).

State of International Defense Expenditures

A number of data are available for states to protect themselves and ensure their continuity in the face of regional, national and global threats. These data can be considered in two parts as fixed and variable. Fixed data; geography, history, population and culture. Variable data is; economic, technological and military capacity. All these data define international power. In other words, the strategic superiority of states in the international arena emerges through the correct management of these data with strategic mindset, planning and political will (Davutoğlu, 2003: 17).

Fixed data has a long-term and hard to change or unchangeable structure, while variable data is open to short and medium-term changes. The historical heritage of the states has a significant impact on the borders of the areas they are responsible and related to (Davutoğlu, 2003).

Another important function in determining the defense power is geography. The conditions created by geography have a positive or negative effect on the defense needs of countries. In the same period, there is no significant change in the economic welfare levels of the countries in the region. Undoubtedly, population is also an element that emerges with geography. As well as geographical location, population structure is also highly effective on the defense capacities and needs of countries. Beyond the geographic and population data, the main

determinant on the defense function is the economic and technological developments. Maintaining a balance between economic and security priorities, neglecting economic development and being dependent on imports for security cause significant cracks in the power parameters of states. “The countries that work most efficiently in this regard are the countries that consider the defense sector as an economic field in itself and plan this sector in a way that will both meet their own defense needs and generate economic returns with the weapons and defense systems they produce” (Davutoğlu, 2003: 39).

When we look at the distribution of the top 100 companies in the defense sector in terms of economic size in 2017 by countries and regions, it is observed that approximately 60% of them are located in America and Western European countries. It is observed that these countries are in the position of defense exporter as mentioned. These countries are also among the countries that allocate the largest shares from their budgets to the defense industry. However, the sector has a positive impact on the budget, as they convert a certain part of their investment into economic input through exports. In other words, if the shares allocated to defense from the budget increase in countries with high economic capacity, this has a positive effect on their power parameters. Turkey, within the framework of its geopolitical borders and population characteristics, economic potentials and the threats in return for these, has to become externally independent in the defense industry and to get out of the importing countries in this field and quickly rise to the level of exporting countries. This fact is more clearly understood when the historical heritage, geographical location and rapidly growing population structure that Turkey is faced with within the framework of the power factors that determine the strategic positions of the countries. In the periods when the export-oriented development strategy was adopted after the 1980s, the export potential of the defense sector was not sufficiently evaluated and the technological breakthrough in the sector could not be realized to the desired extent (Davutoğlu, 2003: 41).

Contrary to other sectors, the lack of freedom of production and export in the defense industry, and the fact that production and export decisions are made in the private sector on a state scale rather than on a firm basis bring some requirements in practice. The fact that the export potential of the sector has not been adequately evaluated and the technological breakthrough has not been realized to the desired extent is directly related to these restrictions. “The export process can be defined as the process from the emergence of a product as an idea in the defense industry, the maturation of the idea, its development and production, to the stage of promotion/marketing, financial support and export of this product in both domestic and foreign markets” (SSM Export Strategy Document 2010).

With the establishment of the Undersecretariat for Defense Industries (SSM), in our Defense Industry, where sectoral internal discipline is ensured, the Law No. 5201 on the "Inspection of Industrial Organizations Producing Warfare Tools and Equipment, Weapons Ammunition and Explosives" and No. 5202 “With the entry into force of the Defense Industry Security Law, the necessary legal proceedings have been completed. Within the scope of Law No. 5201, there is an obligation to publish a list subject to control in the defense industry sector in the official gazette every year.

Within the scope of this law, the duties of the Ministry of National Defense are; production, import and export permits and end-user document approval. In the defense industry, export permit procedures begin with the submission of export applications by the companies to the Ministry, and after the document review phase is completed by the Ministry, the approval decision is taken by submitting it to the opinion of the General Staff and the Ministry of Foreign Affairs. In addition, “in order to prevent the uncontrolled spread of weapons-related technologies in the international arena; The export control regimes established on a voluntary basis to inform each other of the weapons and technologies they export are called "Weapon Export Control Regimes". The purpose of these regimes; to define weapons-related technologies, to determine technological limits, to keep arms traders under control within the framework of legislation, and to prevent uncontrolled spread by sharing information on arms trade.

International security agreements are signed within the framework of the “Defense Industry Security Law” numbered 5202. With these agreements, it is aimed to ensure the safe conduct of bilateral relations with the countries with which cooperation in the field of defense industry is carried out and to determine the main lines of

issues related to the security of international projects to be carried out by organizations/companies bilaterally with various countries.

Literature Review

When the literature is reviewed, it is noteworthy that there are many empirical and descriptive studies examining the relationship between defense expenditures and growth. The method and sample group used in the studies differed according to the countries. Benoit (1978) examined 44 less developed countries in his study using annual time series data between 1950 and 1965. Gross national product, investment rates, defense expenditures and foreign aid were used as variables. In the study, a direct relationship was found between per capita income and defense expenditures. Dunne et al. (2001) analyzed the data of 1960-1996 using the Granger causality test in their study for Turkey and Greece. In the study, in which real gross domestic product and military expenditures were used as variables, the causality relationship was positive for Greece and negative for Turkey. In the study carried out by Karagöl and Palaz (2004), the relationship between defense expenditures and growth was examined in terms of Turkey with the help of data covering the years 1955-2000. In the short term, a relationship has been determined between defense expenditures and economic growth. Yıldırım et al. (2005) examined the effects of military expenditures on economic growth in terms of Middle Eastern countries and Turkey. The study was modeled using the panel section technique, through data covering the years 1989-1999. According to the result obtained from the study, a positive relationship was determined between the variables. In the study conducted by Duyar and Koçoğlu (2014), the relationship between defense expenditures and growth was examined. The variables used in the study; Using real gross domestic product, military expenditures, gross capital formation and labor force variables, six sub-Saharan countries were analyzed with the help of data covering the years 1990-2012. In the study, the model was established using the panel GLS technique. In the study, it has been determined that military expenditures have a positive effect on economic growth. In his study, Support (2016) established a relationship between economic growth and military expenditures through panel data analysis, using annual data for the years 1998-2014 for fourteen NATO countries. In the study, a bidirectional causality relationship was found between military expenditures and growth.

Data Set and Econometric Model

In the study, Turkey, Azerbaijan and Pakistan, which have similar cultures, were examined within the framework of panel data analysis. Since the data between 1992-2019 is uninterrupted, the time interval between these years was preferred. As the dependent variable, real gross domestic product (GDP) as an indicator of economic performance; the independent variable is military expenditure (ASH) variables. These variables used in the analysis were obtained from the World Bank Development Indicators Database. The econometric model used in the analysis is shown in equation (1) below.

$$\ln GSYIH_{it} = \alpha_i + \delta_{it} + \beta_1 \ln ASH_{it} + \varepsilon_{it} \quad (1)$$

Each of the countries used in the i analysis in the model; t stands for time periods. α and δ indicate the probability of country-specific fixed effects and deterministic trends, respectively. The ε parameter also represents estimated residuals representing long-term deviations.

Econometric Methods and Findings

In order to achieve healthier results in panel data analysis, it is necessary to investigate the cross-sectional dependence between the variables. Pesaran (2004) emphasizes that there may be correlations between cross-sections in panel models where the cross-section size (N) is small and the time dimension (T) is large. Since N=11 T=20 or N<T in the study, cross-sectional dependence and homogeneity should be checked. If the cross-section dependency is not taken into account, misleading and inconsistent results can be obtained (Chudik & Pesaran, 2013).

Table 2. Cross Section Dependency Test Results

Test Name	Test Value	Probability Value / Critical Value
<i>Pesaran CD_{LM}</i>	28.199	p=0.0000
<i>Friedman R</i>	50.543	p=0.0000
<i>Frees Q</i>	0.2760	Frees Q Dağılımına göre kritik değerler $\alpha = 0.10 : 0.1294$ $\alpha = 0.05 : 0.1695$ $\alpha = 0.01 : 0.2468$
<i>Breusch Pagan LM</i>	190.595	p=0.0000

When the cross-section dependency test results in Table 2 are examined, the null hypothesis is not accepted. In other words, dependence between units was determined according to the results of Pesaran CDLM, Friedman R, Frees Q and Breusch Pagan LM tests. In this case, it is recommended to use the Pesaran Panel Unit Root Test as it allows heterogeneous autoregressive coefficients (Apergis and Payne, 2010: 546). The results of the Pesaran Panel Unit Root Test, which is the second generation unit root test, are given in Table 3.

Table 3. Pesaran Panel Unit Root Test Results

		Variables	PP		Variables	PP
		<i>Level</i>	<i>Fixed</i>		GSYIH	28.8957 (0.0001)
ASH	11.8965 (0.0643)			ASH	62.6708 (0.000)	
<i>Fixed +Trend</i>	GSYIH		20.2512 (0.0025)	GSYIH	284.732 (0.000)	
	ASH		7.91778 (0.0000)	ASH	112.064 (0.000)	

The values shown in parentheses below the t-bar values represent the probability value.

According to the pesaran unit root test results, while the GDP and ASH variables are not stationary at the level level, when the first degree differences of the variables are taken, it is seen that they become statistically significant at the 5% significance level and become stationary. Therefore, econometric analysis will be continued by taking the first differences of these variables.

Although there are permanent shocks affecting the system in econometric analyzes, testing whether there is a long-term relationship between the variables will increase the power of the test. For this purpose, Pedroni Cointegration test will be performed (Tatoğlu, 2012: 240). Pedroni has suggested several tests that allow heterogeneity in cointegration analysis (Asteriou and Hall, 2007: 373). This test allows for heterogeneity in the cointegration vector. This test not only allows the dynamic and fixed effects to be different between the sections of the panel, but also allows the cointegrating vector to be different between the sections under the alternative hypothesis (Guvenek and Alptekin, 2010:181). Table 4 shows the results of the Pedroni cointegration test.

Table 4: Pedroni Cointegration Test Results

	Statistic	Prob.	Weighted	
			Statistic	Prob.
Panel v-Statistic	0.270047	0.3936	0.335136	0.3688
Panel rho-Statistic	-0.973632	0.1651	-4.610813	0.0000
Panel PP-Statistic	-2.351438	0.0094	-5.014875	0.0000
Panel ADF-Statistic	-1.577467	0.0573	-2.598480	0.0047
Group rho-Statistic	-3.003734	0.0013		
Group PP-Statistic	-4.335826	0.0000		
Group ADF-Statistic	-2.511949	0.0060		

According to the results of the cointegration test, it is observed that there is cointegration since most of the p values are greater than 0.05. According to the Pedroni cointegration test, in which we investigated the long-term relationship between Military Expenditures (lnASH) and economic growth, the H_0 hypothesis (there is no cointegration between the series) was rejected. It can be stated that there is a significant relationship between military expenditures and economic growth in the long run. In this context, there is a long-term movement between Military Expenditures (lnASH) and economic growth in selected countries, and the analyzes show that there is a long-term relationship between the variables.

According to the results of the Pedroni cointegration test, there is at least one cointegrating relationship and the variables move together in the long run. According to the double Granger causality test, while there is no causality from military expenditures to income, there is a causality from income to military expenditures. Granger Causality Test results are given in Table 5. When the P values are examined, it is observed that there is a causality from GDP to ASH because it is less than 0.05.

Table 5. Granger Causality Test Results

Null Hypothesis:	F-Statistic	Prob.
ASH does not Granger Cause GSYIH	1.47831	0.2348
GSYIH does not Granger Cause ASH	3.75780	0.0280

Conclusion

Defense expenditures, unlike other expenditures, can be called indispensable expenditures for countries. Today, all countries have expenses related to defense expenditures in their budgets. In this study, which was prepared to test different theories in the literature, an experimental study was conducted with the help of time series of GDP per capita and Military Expenditures of Turkey, Azerbaijan and Pakistan covering the years 1992-2019. ADF and PP unit root tests were applied to determine the stationarity of defense expenditures and economic growth series. It was determined that the series were stationary at the first difference, and thus, the relationship between the series could be examined. Then, VAR analysis was applied to determine the lag length and the appropriate lag length was determined. In order to determine the stability of the VAR analysis, the stationarity graphs of the model were examined and as a result, it was determined that the model was dynamically stationary and stable. As a result, a definite causality has been determined between defense expenditures and economic growth for the examined period in the economies of Turkey, Azerbaijan and Pakistan. When the results of the Granger Causality Test are examined, it is observed that there is a causality from GDP to ASH, since p values are less than 0.05 when examined, a causality from ASH to GDP could not be determined.

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The Relationship Between Economic Growth And Environmental Pollution in D8 Countries: Panel Var Analysis

Emre YİĞİT*

Abstract

In this study D8 (Turkey, Indonesia, Iran, Egypt, Pakistan, Nigeria, Malaysia, Bangladesh) countries per capita in the real gross domestic product was examined by relations panel VAR analysis between carbon dioxide emissions and energy consumption. The data obtained from the World Bank Economic Indicators Database for the period 1990-2014 were analyzed with the annual data. As a result of this study, one-way Granger causality relationship was determined from real gross domestic product to energy use and carbon dioxide emission.

Keywords: Economic Growth, CO2 Emissions, Energy Use, VAR Analysis

Introduction

One of the most important goals of an economy is to maximize growth. However, with the recognition of some environmental changes in the growth process, the relationship between the environment and growth has started to be questioned. Since the early 1990s, environmental problems such as global warming, climate change and environmental degradation have been raised. In order to realize the economic growth of the countries, supplying energy demands from fossil based fuels such as coal, natural gas and oil causes an increase in greenhouse gas emissions, especially carbon dioxide (CO₂) emissions (Topalli, 2016: 428). The source of environmental problems is stated as the increase of carbon dioxide gas in the air. For this reason, the increase in the amount of carbon dioxide was investigated and its possible relationship with the income was questioned. As a result, the relationship between environment and economic growth has taken its place in the field of environmental economics. Especially after World War II, the increase in economic growth has increased the environmental problems. From the 1960s onwards, negative externalities such as environmental pollution caused by growth, crowding of cities and increasing incidents of violence have come to the forefront.

In the first part of the study, the interaction between CO₂ emission and economic growth will be explained. In the second part of the study, the literature among the related variables will be examined. Chapter 3 covers the years 1990 to 2014 period in my D8 countries (Turkey, Indonesia, Iran, Egypt, Pakistan, Nigeria, Malaysia and Bangladesh) to the effect of pollution on economic growth were examined in the framework of the panel VAR analysis. In the last part of the study, the analysis results are shared.

CO₂ Emission And Economic Growth

When the literature is examined, the relationship between economic growth and CO₂ emission is widely explained within the framework of Environmental Kuznets Curve (EKC). Kuznets, in his study of 1955, suggested

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that there is an inverse U-shaped relationship between economic growth and income injustice (Kuznets, 1955: 1-28). According to the EKC hypothesis, as shown in Figure 1, environmental pollution increases initially with economic development, but environmental pollution begins to decrease after income reaches a certain level (Stern, 2004: 1419-1439).

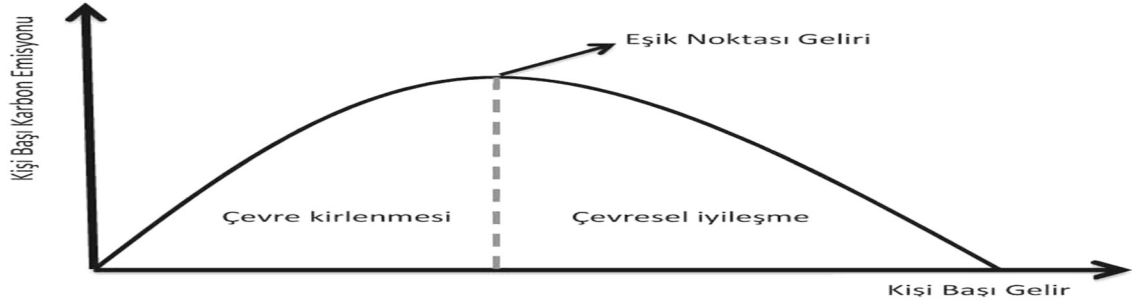


Figure 1. Environmental Kuznets Curve (EKC)

Grossman and Krueger's work in 1991 is considered to be the main study that explains how the relationship between EKC will occur. Grossman and Krueger discuss the impact of economic growth on the environment; scale, structural and technological impacts have stated that there are three different effects (Carson, 2010: 3-23).

The scale effect correlates the increase in production scale with the growth of economies and the amount of natural resources used and the amount of waste and emissions generated. While technology is data, the use of more natural resources in production leads to environmental degradation. In addition to the use of more natural resources, it increases the amount of waste and emissions with increasing production scale. This creates negative effects on the environment (Grossman and Krueger, 1991: 3-4).

The structural impact explains the structural changes and shifts in economic activities. The structural effect indicates that the economy will undergo a structural transformation with the ongoing growth process and that the impact of economic growth on the environment will be positive (Tsurumi and Managi, 2010: 19-36).

On the other hand, new technological processes will take place, as the technological impact will increase the welfare of countries and will be able to allocate more funding to research and development expenditures. Clean technologies as a result of technological advances will replace dirty technologies and environmental quality will begin to increase (Borghesi, 1999: 6-7).

The main reason underlying the problem of global warming and climate change is the production of industrial production facilities using fossil-based energy, heating activities in houses and the production of large amounts of greenhouse gases by motor vehicles (Kum, 2009: 208). The environmental impacts of CO₂ emissions have reached significant levels today. Research and development activities (carbon capture and storage, clean coal technologies) are aimed at reducing gas emissions in order to achieve the goal of reducing these environmental hazards. CO₂ emissions from fossil based sources increase carbon emissions as energy use increases. After the combustion of fossil fuels, it leaves solid and gas wastes to the environment. In addition to not being able to use these wastes left to the environment, it also causes environmental pollution (World Energy Council Turkish National Committee, 2010: 150-152).

The basic needs of people such as nutrition, warming and shelter must be met in order to survive. Population growth leads to more energy demand in transport, industry and energy sectors to meet these requirements. More energy demand also has an increasing effect on greenhouse gas emissions. Another impact of population growth on greenhouse gas emissions is deforestation. This deforestation effect increases greenhouse gas emissions due to urbanization and expansion of agricultural areas (Shi, 2001: 4). Population growth and greenhouse gas emissions tend to be in the same direction. A population increase of 1% increases greenhouse gas emissions by an average of 1.28% (Shi, 2001: 18).

The growth effect yields GDP per capita divided by the total population. The amount of energy consumed by the economies entering the growth process increases. This increase increases CO₂ emissions (Karakaya and Özçağ, 2003: 13).

Energy density is defined as the amount of energy used per unit of production or the ratio of total primary energy consumption to GDP. The lower the rate of energy density, which is the most basic indicator of energy efficiency, the more efficient it is used. Mostly, energy densities of developed countries are lower than those of developing countries. The reason for being low is the fact that developed countries use technology more effectively and have a large share in the service sector (Karakaya and Özçağ, 2003: 13).

Carbon density is expressed as the fraction of fossil fuel consumption consumed by the total amount of CO₂ emissions. The effect of carbon density measures the amount of CO₂ emitted as a result of the energy consumed per unit, and its size depends on the rate at which fossil fuels are consumed in energy use (Hamilton and Turton, 2002, pp. 63-71). For the production of 1 unit of energy, the carbon emission produced by burning coal is about twice as high as natural gas (Zhang, 2000: 587-614).

The last factor affecting carbon dioxide emissions is deforestation. Deforestation is important in terms of controlling greenhouse gas emissions because it affects the storage of CO₂ in the air through photosynthesis. Expansion of the settlement due to population growth, conversion of forest areas to various land use types, illegal reasons are considered among the factors that cause deforestation (Sedjo and Sohngen, 2000: 6).

As mentioned above, there are five important factors in CO₂ emissions in a country. Reducing one or more of these five factors reduces CO₂ emissions. However, no country will choose to reduce its economic growth. Therefore, other factors will need to be emphasized. Among other factors, the most important and effective will be to reduce the energy intensity and emission intensity. Because when these two factors are reduced, a significant reduction of carbon emissions may occur (Karakaya and Özçağ, 2003: 13).

Literature Review

There are many studies examining the relationship between CO₂ emissions and economic growth in the EKC approach.

In their study, Agras and Chapman (1999) analyzed panel data for 34 countries in the period 1971-1989. As a result of the study, the relationship between CSE was not supported (Agras and Chapman, 1999: 267-277).

Coondoo and Dinda (2002) conducted a Granger causality analysis for 88 countries in the period between 1960-1990. As a result of this study, one-way causality from CO₂ emissions to income in North America and Western Europe; A one-way causality from revenue to CO₂ emissions in Central Africa, South America, and Japan; In Asian and European countries, a two-way causality relationship has been identified (Coondoo and Dinda, 2002: 351 367).

Dijkgraaf and Vollebergh (2005) examined the relationship between CO₂ emissions and per capita income for OECD countries in the period between 1960 and 1997. Panel data method was used. At the end of the study, they stated that there is an EEA relationship for CO₂ emission in OECD countries (Dijkgraaf and Vollebergh, 2005: 229-239).

Say and Yücel (2006) studies the period covering the years 1970 to 2002, the relationship between total energy consumption and total CO₂ emissions are studied within the framework of Turkey for regression analysis. They found a strong relationship between the variables stated in the result of the study (Say and Yücel, 2006: 3870 3876).

In his study Ang (2007) analyzed the relationship between EKC for CO₂ emissions, income and energy consumption for France in the period between 1960 and 2000. According to the results of the analysis, support for the relationship between EKC has emerged findings (Ang, 2007: 4772-4778).

Fodha and Zaghoud (2010) examined the relationship between CO₂ and per capita income for Tunisia during the period 1961-2004. As a result of the study in which cointegration and causality analysis was conducted, no

relationship was found between the CCE and a linear relationship between CO2 and per capita income (Fodha and Zaghoud, 2010: 1150-1156).

In their study, Saboori et al. (2012) analyzed the EKC hypothesis for Malaysia in the period covering 1980-2009 with ARDL method. As a result of the study, they demonstrated the existence of a long-term relationship between CO2 emission per capita and GDP per capita. In both the short and long term, they found an inverse U-shaped relationship between CO2 emission and economic growth, which confirmed the EKC hypothesis. According to the results of the Granger causality analysis based on the VECM model, no relationship was found between CO2 emission and economic growth in the short term, but a one-way causality relationship from economic growth to CO2 emission in the long term (Saboori et al., 2012: 184-191).

In the study of Hamit-Hagar (2012), panel vector error correction model and Granger causality test were applied for Canada during the period of 1970-2007. As a result of the study, a unidirectional causality relationship was found from income to CO2 emission in the short and long term (Hamit-Hagar, 2012: 358-364).

Methods (2013) study, long-term CO2 emissions from economic growth for Turkey stated that there is a relation. In addition, it has identified a one-way causality relationship from economic growth to CO2 emission (Method, 2013: 1-8).

Güllü and Yakışık (2017) examined the relationship between CO2 emissions, energy consumption and GDP per capita for MIST (United Mexican States, Republic of Indonesia, South Korea-Republic of Korea, Republic of Turkey) countries in the period covering 1971-2010. As a result of the study, MIST countries stated that there is a one-way causality relationship from economic growth to CO2 emission and energy consumption (Güllü and Yakışık, 2017: 239-253).

Dumrul and Kılıçarslan (2018) studies, for the period covering the years 1970 to 2013, Turkey has studied the relationship between economic globalization and CO2 emissions. As a result, both economic globalization and economic growth lead to an increase in CO2 emissions. In addition, they found that there is a one-way causality relationship from economic globalization to environmental pollution (Dumrul and Kılıçarslan, 2018).

Külünk (2018) study, a period covering the years 1960-2013, examines the relationship between economic growth and CO2 emissions for Turkey. As a result of the study, he stated that there is a one-way causality relationship from CO2 emission to economic growth (Külünk, 2018: 193-205).

Data Set And Model

In this study, the relationship between economic growth and CO2 emission for D8 countries is examined. In the analysis, seasonally adjusted annual data for the period 1990-2014 compiled from the World Bank Economic Development Indicators Database were used. The econometric model used in Panel VAR analysis with E-views 10 econometrics program is shown below.

$$\Delta GDP = \alpha + \sum_{ni=1}^m \mu_{ni} CO2_{t-i} + \sum_{ni=1}^m \theta_{ni} ENERGYUSE_{t-i} + \varepsilon_{1,t}$$

GDP variable refers to real gross domestic product per capita, CO2 variable refers to CO2 emission amount, ENERGYUSE variable refers to energy use.

Empiric Findings

In order to be reliable in VAR analysis, the model should be stable. Firstly, the logarithm of the variables was taken. Unit root test results are shown in table 1 below.

Table 1. Unit Root Test Results

Değişkenler	Genişletilmiş Dickey Fuller	Phillips Perron	Levin, Lin ve Chu	Im, Pesaran ve Shin
GDP	I ₀ : 0.2002 I ₁ : 0.0006	I ₀ : 0.9954 I ₁ : 0.0000	I ₀ : 0.2950 I ₁ : 0.0051	I ₀ : 0.8431 I ₁ : 0.0004
CO2	I ₀ : 0.8227	I ₀ : 0.7358	I ₀ : 0.4791	I ₀ : 0.7546

	I ₁ : 0.0000	I ₁ : 0.0000	I ₁ : 0.0000	I ₁ : 0.0000
ENERGYUSE	I ₀ : 0.7899 I ₁ : 0.0000	I ₀ : 0.1059 I ₁ : 0.0000	I ₀ : 0.0870 I ₁ : 0.0000	I ₀ : 0.8463 I ₁ : 0.0000

According to the results of the extended Dickey Fuller test, Phillips Perron test, Levin Lin and Chu Test and Im, Pesaran and Shin stationarity tests, the hypothesis that $\alpha = 0.05$ significance level is stable when all first-order differences are taken. In order to determine whether the model as a whole is stationary, the inverse roots of the characteristic polynomial are shown in Figure 2 below.

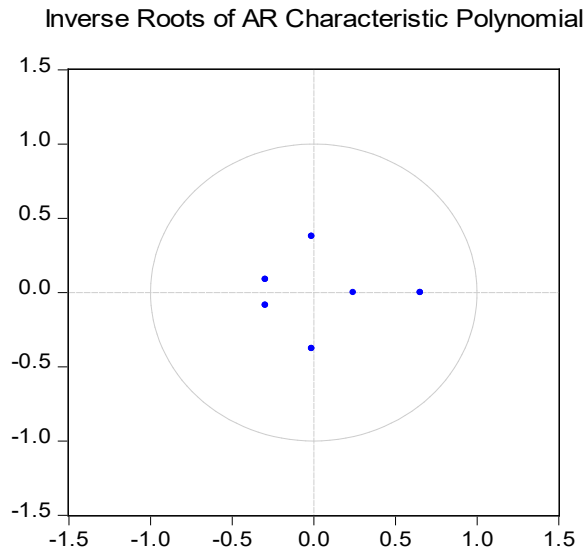


Figure 2. Inverse Roots of AR Characteristic Polynomial

As shown in Figure 2, all the inverse roots of the characteristic polynomial are in the unit circle. With this result, it is seen that the whole model is stationary.

Table 2. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	504.9138	NA	1.25e-07	-7.381085	-7.316835	-7.354976
1	539.3641	66.87414	8.60e-08	-7.755354	-7.498355*	-7.650916
2	556.8909	33.24945	7.59e-08*	-7.880749*	-7.431001	-7.697983*
3	564.5680	14.22515	7.74e-08	-7.861294	-7.218797	-7.600199
4	573.7615	16.62939	7.73e-08	-7.864139	-7.028893	-7.524716
5	581.9976	14.53424	7.83e-08	-7.852905	-6.824909	-7.435154
6	592.1456	17.46053*	7.71e-08	-7.869788	-6.649042	-7.373708
7	595.4804	5.590778	8.41e-08	-7.786477	-6.372982	-7.212068

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Determining the lag length in VAR models is one of the major problems. Criteria such as Sequential Modified Probability Ratio (LR) test statistics, Final Forecast Error Criteria (FPE), Akaike Information Criteria (AIC),

Schwarz Information Criteria (SC) and Hannan-Quin Information Criteria (HQ) were used to find the appropriate lag length. Table 2 shown above shows that the appropriate delay length is 2. Once the appropriate delay length has been determined, the estimated VAR model results will be interpreted using that delay length. Cointegration is performed to test whether there is a long-term relationship between the series. For this purpose, Pedroni Cointegration test analysis was performed.

Table 3. Pedroni Residual Cointegration Test

Series: GDP CO2 ENERGYUSE				
Sample: 1990 2014				
Included observations: 200				
Cross-sections included: 8				
Null Hypothesis: No cointegration				
Trend assumption: No deterministic trend				
User-specified lag length: 2				
Newey-West automatic bandwidth selection and Bartlett kernel				
Alternative hypothesis: common AR coefs. (within-dimension)				
Weighted				
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-1.402265	0.9196	-1.397065	0.9188
Panel rho-Statistic	-3.061000	0.0011	-0.840223	0.2004
Panel PP-Statistic	-4.164084	0.0000	-1.637299	0.0508
Panel ADF-Statistic	3.054522	0.9989	2.759036	0.9971
Alternative hypothesis: individual AR coefs. (between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	0.340359	0.6332		
Group PP-Statistic	-0.776883	0.2186		
Group ADF-Statistic	3.564855	0.9998		

As it is seen in Table 3, when the p values obtained from the analysis are considered as greater than 0.05, the null hypothesis that there is no cointegration is accepted. So there is no cointegrated vector. Since the series are not cointegrated, Vector Autoregressive Models (VAR) will be used. The results of the cointegration test provide information about whether there is a long-term relationship between the related variables but not the direction of the variables. In order to determine the direction of the relationship between these variables, the variables should be grouped as internal and external (Bozkurt, 2007: 91). Granger developed the Granger Causality test to determine the direction of the relationship between these variables (Granger, 1969: 424-438). Table 4 below shows the results of the Granger Causality Test.

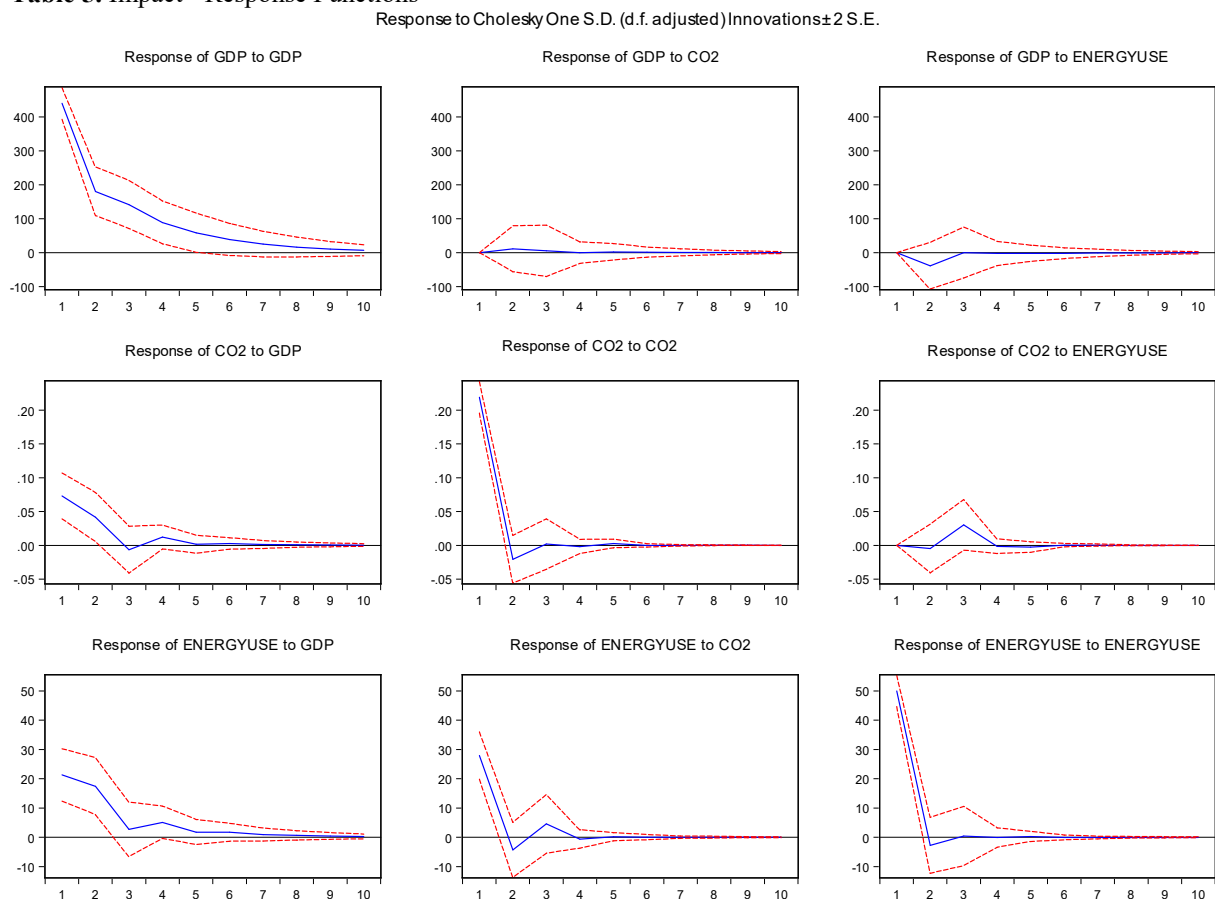
Table 4. Granger Causality Test results

Dependent variable: GDP			
Excluded	Chi-sq	df	Prob.
CO2	0.808481	2	0.6675
ENERGYUSE	1.456781	2	0.4827
All	1.587824	4	0.8110
Dependent variable: CO2			
Excluded	Chi-sq	df	Prob.
GDP	7.005684	2	0.0301
ENERGYUSE	3.517435	2	0.1723
All	9.319421	4	0.0536
Dependent variable: ENERGYUSE			
Excluded	Chi-sq	df	Prob.
GDP	14.50325	2	0.0007
CO2	0.501044	2	0.7784
All	15.39391	4	0.0040

Looking at the Granger Causality test results shown in Table 4, a unidirectional causality relationship was found between GDP and CO2 from real gross domestic product to carbon dioxide emissions. Saboori et al. (2012), Hamit-Hagar (2012), Methods (2013), Güllü and Yakışık (2017) are examples of the studies supporting the findings. A one-way causality relationship between GDP and ENERGYUSE has been identified from real gross domestic product to energy use. Kraft and Kraft (1978), Aqeel and Butt (2001), Uzunöz and Akçay (2012) are examples of the studies supporting the findings.

Within the framework of VAR analysis, impact response function analysis should be used to see the impact of one of the variables on the current terms and the current values of the other variables. Impact response function analysis is a method based on structural shocks and it is important to have causality in this method. According to the Granger causality test, the variables were ordered from the most external to the internal and the effect response functions were analyzed. ± 2 standard errors were determined when calculating effect response functions for the variables in the model. The dashed lines in the graph give confidence intervals, while the dashed lines give the response of a standard error shock dependent variable that occurs in the error terms of the model over time (Bozkurt, 2007: 95). It is important to show whether the results of the analysis are within the confidence interval in terms of statistical significance. Table 5 below examines how the dependent dependent variables are affected over time when a positive shock is applied to variables based on a lag length of the VAR model.

Table 5. Impact - Response Functions



When the effect response functions are examined in Table 5, it is seen that the shock effects in the model approach to zero over time. So the system is stationary. The approaching of the system towards zero indicates that the econometric model is stable. The responses of a standard error shock dependent variable are within confidence intervals. As can be understood from this, it can be said that the analysis results are statistically significant.

The purpose of variance decomposition is to explain the estimated error variance of one variable by other variables. Econometric model of the variables themselves and other variables of the percentage of a shock caused by itself and other variables is to show (Enders, 2004: 280). The variance decomposition of the GDP dependent variable obtained as a result of the analysis is shown in Table 6 below. The effects are shown as a percentage.

Table 6. Variance Decomposition of GDP

Period	S.E.	GDP	ENERGYUSE	CO2
1	0.075274	100.0000	0.000000	0.000000
2	0.078369	99.83472	0.003085	0.162194
3	0.082408	97.69500	0.082765	2.222235
4	0.085957	95.11063	2.840890	2.048479
5	0.089534	91.91597	3.394591	4.689439
6	0.093021	90.06032	5.396478	4.543206
7	0.094029	90.19954	5.350352	4.450104
8	0.094332	90.21587	5.357688	4.426444
9	0.094561	90.09458	5.377640	4.527776
10	0.095045	89.90081	5.488368	4.610825
11	0.095273	89.81394	5.596567	4.589488
12	0.095437	89.77710	5.585972	4.636926

Looking at Table 6, when the first three periods are defined as short-term, a large proportion of the change in real GDP per capita is due to it, followed by CO2 emission and energy use, respectively. In the long run, however, the ranking after real GDP per capita changes. In the long run, energy use is seen to have a 1% greater impact on CO2 emissions.

Conclusion

In this study, the relationship between real gross domestic product, CO2 emission and energy use was examined by using the data for D8 countries covering the period of 1990-2014. Pedroni Cointegration test was used to determine whether cointegration was used among the variables used in the analysis. In addition, since these variables are stationary at the same level as a result of unit root tests and the inverted roots of the characteristic polynomial of the econometric model are included in the unit circle, it was not objected to use Panel VAR analysis. Granger causality test was performed among the variables mentioned. According to the causality, a one-way causality relationship was determined from real gross domestic product to carbon dioxide emission and energy use. According to the results of variance decomposition, 98% of the change in real GDP per capita in the short term is caused by itself, followed by CO2 emission and energy use, respectively. In the long term, while 90% of the change in real GDP per capita is due to itself, approximately 5.5% is due to energy use and approximately 4.5% is due to CO2 emission.

When the results of the analysis are examined, it is seen that energy use and CO2 emission have a long-term effect on economic growth. CO2 emissions and energy use in D8 countries, namely Turkey, Indonesia, Iran, Egypt, Pakistan, Nigeria, the lack of long-term energy policy for the public and private sectors of Malaysia and Bangladesh stands out as a major shortcoming. In these D8 countries, a long-term energy policy should be established and implemented with determination.

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AI Supported Smart Service Recommendation Algorithm

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Abstract

Armut Technology is an online platform that brings together customers and service providers, and positions service providers as business partners with the principle of "Crowdsourcing". Nearly 4000 services are offered within the company. This number is increasing gradually as new service requests are also received from service providers. When customers login to the website or application, they search from the wide service pool by typing their desired service description. With this project, it is aimed to provide the services they need in real time when they are online by predicting them with artificial intelligence supported algorithms.

The related topic is modeled as "Recommendation Engine" under the machine learning discipline. All service requests coming in 2020 were used as a training set. Since the queues of the services requested by the customers are interconnected in terms of temporality, the requested service queues are modeled according to the "Conditional Probability Based Prediction" method. In order to capture exceptional customer behaviors, customer specific habits have also been added to the service list. All machine learning models run on the AWS cloud ecosystem. It has been developed with the principle of running web services in Docker containers, which is the industry standard and used during the service of machine learning models to the customer.

"Top-8 Service Accuracy" was chosen as the success metric of the project. The success rate of 22%, which is currently achieved by combining popular services throughout Turkey, has been increased to 37% with the new algorithm supported by AI. This rate comes up to 44% when we look at the customers who have had at least 1 service request in the past.

The current service recommendation system, which has difficulty in capturing special customer behaviors with the perspective of "popular service throughout Turkey", has significantly improved with the new AI supported approach by taking into account customer habits and the relationship between services. In the next stages of the project, innovative methods used in this field such as "Collaborative Filtering" and "RNN" will be performed together with the "ClickStream" data of the customers and the success rate will be tried to be increased.

Keywords: Artificial Intelligence, Recommendation Engine, Conditional Probability Based Prediction

Introduction

One of the most important factors affecting the success of digital platforms is user experience. Ease-of-use comes as one of the features that affects user experience the most. Ease-of-use includes presenting and highlighting the services that the customers would want or need at the time and providing easy access to these services with one click. This will enable customers to use the digital platform in an easier and faster way and will provide them with an impressive user experience. This would also increase the loyalty of customers to the platform as well as increase the number of the requested services on the platform. The project presented in this paper aims at improving the user experience by predicting the next service that the customer will request on Armut's platform.

Armut Technology works as a service marketplace that aims at matching the customers' local service requests with the best local service providers and fulfilling the requested service with the best experience to the customer and the service provider. Service providers see the job opportunities on the app and they apply to the ones they

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find most suitable. A job deal is created when a customer chooses the most suitable offer for them. After the job is done, customers can leave a rating and review regarding the job on Armut's system. Armut's revenue sources are mainly the job application lead price taken from the providers when they want to see and quote the job. Among more than 4000 services available on Armut's platform, the most common services include Moving, Home Cleaning, and Private Lessons.

The predictions of the smart service recommendation algorithm will be shown to the customers through the web and mobile interfaces. At every session, eight services will be predicted and presented to the customer. If the recommendations are correct, the service request duration is expected to decrease and the number of requested services is expected to increase. This recommendation system will also be used as an input to the email and mobile communications with the customer.

Literature Search

In recent years; in parallel with the huge increase in online business models, "Smart Recommendation Systems" has gained significant importance. The biggest technology giant companies, Google (Liu, Dolan ve Pedersen, 2010), Twitter (Ahmed and others, 2013), LinkedIn (Rodriguez, Posse ve Zhang, 2012) and Netflix (Steck, 2013) are still making huge investments on "Smart Recommendation Systems" in order to ensure customer retention and increase sales. (Adomavicius and Tuzhilin, 2005, s. 5) breaks these systems into 3 main categories: "collaborative filtering", "content-based filtering" and "hybrid filtering"

"Collaborative filtering" approach depends on the patterns from similarity of users' product preferences or similarity of products used by common customers (Herlocker, Konstan, Terveen and Riedl, 2004, s. 6). The basic idea behind the algorithm is if customer X and customer Y have similar product preferences in the past then these customers are more likely to choose similar products in the future. For example; in an online music site, customer-customer similarities and song-song similarities are calculated and then used for relevant recommendations to customers.

"Content-based filtering" approach depends on deriving the specific and domain based features from the product and then using them to calculate similarities (Van Meteren and Van Someren, 2000, s. 3). For example; an e-commerce site in which computers are sold, only domain specific features like price, CPU type, CPU performance, storage capacity of the disk etc. are extracted and then similarity calculations are applied over them.

"Hybrid filtering" approach depends on the collaboration of both "collaborative filtering" and "content-based filtering" methods (Burke, 2002, s. 2). The similarity scores calculated by each of these algorithms then combined together by assigning relevant weights to obtain a new and more accurate similarity score. The new product recommendation is then served to customers based on this hybridly calculated similarity score.

Because of their fast-speed running times and having produced explainable/interpretable predictions, "Statistical Based Recommendation Engines" also existed as commonly applied methods in industry (Portugal, Alencar ve Cowan, 2018, s. 8). The most common method among all of them is called "Association Rule Mining (ARM)". Such method is based on comparing the probability of getting a single product with getting the same product with others (Zhang ve Zhang, 2002, s. 2).

Both their response time speed and their level of accuracy is improving together, that's why "Recurrent Neural Networks (RNN)" architecture which is placed under Neural Networks has also become used to build recommendation engines in recent years (Zhang, Yao, Sun ve Tay, 2019, s. 3). As modelling the products that customers bought as a sequence, next item prediction methods are applied via RNNs. Although such approaches give significantly good results in terms of business metrics, it needs a big volume of data and training time is significantly long. That's why it is still too hard to use them for industrial applications.

General Architecture of Newly Proposed Model and the Success Metrics

As Armut does with all its artificial intelligence projects, in this project, it first developed a simple/basic model and started using it and monitored its performance for a while. After that, taking this model's performance as a

reference, more innovative AI models are developed and the performance of the new model is compared to the performance of the reference model. Thanks to this methodology, the performance improvement between the basic model and the AI model is quantified. In the “Smart Service Recommendation Algorithm” project, first “Apriori” and then “Popular Service Recommendation” was used as a baseline. After the use of the “Apriori” algorithm in the live environment, it was decommissioned because it didn’t solve the “sequentiality” problem. Because in most ecommerce websites customers can add more than one item to their basket and then buy all of them at once, Apriori model can produce good results, however, in Armut where the services are ordered as a sequence of separate but interconnected requests, Apriori didn’t produce suitable recommendations. Apriori’s logic focuses on the difference between the probability that items bought separately and that they are bought together, therefore the fact that one item was bought before or after the other does not affect Apriori’s recommendations. However, in Armut’s case, for example, a Moving service request usually comes after a Home Painting request but the opposite doesn’t usually happen. Because Apriori treats the two sequences as the same, it was decommissioned.

As a baseline model for the “Smart Service Recommendation” project, the “Popular Services Model” was selected. This model was developed in three flavours; the first is recommending the popular services all over Turkey, the second is recommending the most popular services in the past four weeks, and the third is recommending the most popular services in the past four weeks in the same subprovince where the customer resides.

Under the “Smart Service Recommendation” project, the “Conditional Probability Based Model” presented in this paper predicts the services that the customer may request based on the last N services that they requested most recently.

$$p(X_t|X_{t-1}, X_{t-2}, X_{t-3}, \dots, X_{t-N}) = \frac{p(X_t, X_{t-1}, X_{t-2}, X_{t-3}, \dots, X_{t-N})}{p(X_{t-1}, X_{t-2}, X_{t-3}, \dots, X_{t-N})} \quad (1)$$

Using Equation 1, the probability of requesting any service based on the previous N service requests sequence can be calculated. Table 1 shows examples of such sequences. For the Conditional Probability Based Model, the probability for requesting any service when the length of the past service requests sequence N=3, N=2, and N=1 is calculated. Then the infrequent sequences that are statistically insignificant are removed. After that, for each customer the eight services that they will most probably request are predicted in real time. This flow is depicted in Figure 1.

Thanks to the “Smart Service Recommendation” project, customers receive personalized recommendations for eight services through Armut’s mobile app and website. As for the success metric for this project, it is calculated based on whether the customer’s next service request is for one of the recommended eight services or not. If the customer’s request is for one of the eight services, then the prediction is labeled “correct” and if the customer requested another service then the prediction is labeled “incorrect”. By dividing the count of correct cases over the count of all cases we can get an average score which we call “top8 accuracy”. When comparing the performance of different models, we use this metric, as in Table 2 for example.

Table 1. Example Service Sequences

Service t-3	Service t-2	Service t-1	Service t
Plumber	Painter	Moving	Home Cleaning
Plumber	Painter	Moving	Home Cleaning
Plumber	Painter	Moving	Heat Insulation
Plumber	Painter	Moving	Heat Insulation
Plumber	Painter	Moving	Math Private Lesson

Table 1 shows the same three-service-requests sequence (Plumber-Painter-Moving) made by different customers and the last service request that came after that sequence for each of them. The Conditional Probability

Based Model would calculate the probability of requesting the Home Cleaning service after requesting this sequence as 40%, same for Heat Insulation, and 20% for Math Private Lesson based on the data in the table. The model’s probabilities are recalculated frequently with the most recent data and the recommendations are made based on these probabilities.

The new model, by calculating conditional probabilities, represents the population behaviour. However some customers might behave consistently differently from the population and we wanted to take them into account in the model predictions. An example of this behaviour is a customer ordering the same service frequently, however this service sequence pattern is not a common one over the whole population. To take this case into account, in case the customer has frequently ordered services, we replace (at most) the three services with the least probabilities out of the eight services that the model predicted. We replace them with the most requested three (at most) services that the customer orders frequently. That way the model’s predictions represent the population's behaviour as well as the customer’s personal behaviour.

Table 2. Final model and baseline model performances. T8: Most popular eight services model. T8M: Most popular eight services in the past month model. T8MP: Most popular eight services last month in the same subprovince as the customer. CP: Conditional Probability Based Model.

Customer Segment	T8	T8M	T8MP	CP
All Customers	20.88%	21.35%	21.64%	35.97%
New Customers	21.70%	22.45%	22.70%	23.02%
Customers with one previous service request	22.02%	22.65%	22.72%	45.88%
Customers with two previous service requests	21.40%	21.88%	21.98%	44.58%
Customers with three or more previous service requests	19.51%	19.67%	20.13%	41.21%

Table-2, shows both reference models and “Conditional Probability Based Prediction Model” success metrics. Except for the case of customers with no history, our “Conditional Probability Based Prediction Model” significantly overperforms the referenced model as shown in the Table-2. Since the reason for the success of our newly proposed model is directly related to customers’ service history, as the number of services getting by customers are increasing then the success gap is also increasing as expected.

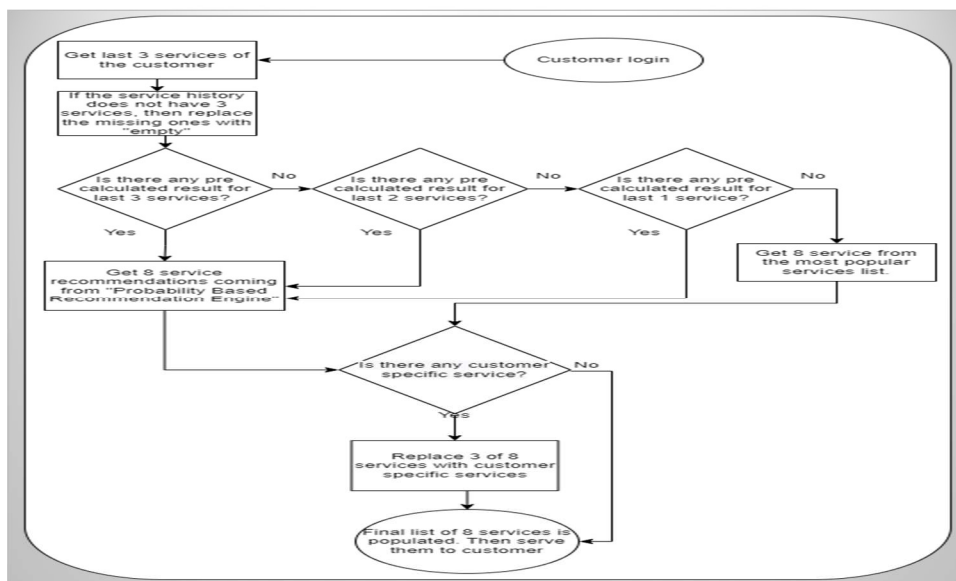


Figure 1. “Smart Recommendation Engine” flow

Result

“Smart Recommendation Engines” are so important for e-commerce companies, since they have a great potential to enable customer retention and boost product sales. The new approach called “Conditional Probability Based Recommendation Engine” offered in the scope of this study has significantly overperformed the reference models as mentioned in the performance section. As the number of services that customers received in the past increases, the model success metrics are also improved in parallel. Success rate goes up to 44% for the customers who have at least 2 services in their service history. This rate is almost 2 times of the referenced model called “Popular Services”. In the next steps of this project, more innovative and state-of-the-art algorithms like “Collaborative Filtering” and “RNN” will be applied. But the most significant drawback of these algorithms is their nature of time consuming training times and low-speed real time predictions. Even if these algorithms have more success metrics like accuracy, they might not be applicable for industrial usage because of such drawbacks. Since the AI models are calling during the communication with customers, they should have characteristics of high speed response time that never interfere with interaction between customer and application. In this project; to address this problem and to make our response time performance better, the potential results are pre-calculated periodically and then stored on relational databases which are designed for high performance queries. At the moment that customer needs real time service recommendation predictions, the only thing is retrieving data by basic SQL queries. As mentioned before, if any AI related model is going to be used for an industrial application, there exists two important factors that should be fulfilled: “Acceptable performance in terms of business metrics” and “Minimum real-time prediction latency”. Our model, “Conditional Probability Based Recommendation Engine”, is able to fulfill both of these requirements which makes it an applicable model for industrial applications.

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