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ANADOLU ÜNİVERSİTESİ AÇIK VE UZAKTAN EĞİTİM PROGRAMLARINDAKİ JENERASYONLAR VE GELİŞMELER

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ÖZ

Anadolu Üniversitesi'nin en önemli hedefi, Açık ve Uzaktan Eğitim ile toplumun daha geniş tabanına ulaşmaktır. Bu hedef, 1982-2014 yılları arasında açık ve uzaktan eğitim programlarının sayılarını içeren veriler kullanılarak dikkatle değerlendirilmiştir. Program sayısının zaman ile ilişkisi, lineer modeller perspektifinde incelenirken zaman içinde meydana gelen yapısal değişimleri modelde ifade edebilmek için bazı özel kukla değişkenler kullanılmıştır. Ayrıca çalışmamızda bu yapısal değişimlerin (kırılmaların) nedenleri değerlendirilirken, dünyadaki açık ve uzaktan eğitimin tarihçesi ile teknolojik değişimler dikkate alınmıştır. Tarihsel açıdan değerlendirmelerde yeni jenerasyonların özellikle teknolojik ilerlemelere bağlı olarak oluştuğu da gözden kaçmamıştır. Çalışmamızda, Model III en küçük standart hataya sahip olduğu için, en iyi model olarak seçilmiş ve 2016 yılı için yapılan öngörüde program sayısının 35'e düşeceği sonucuna ulaşılmıştır. Böylece, Anadolu Üniversitesi'nin toplumun daha geniş tabanına yayılma politikasından kopmamak için, program sayılarını ve çeşitliliğini artırması gerektiği uyarısı ortaya çıkmıştır.

Bu çalışma program bazında, diğer çalışmalardan farklı olarak, kullanılan istatistiksel metodoloji ile geleceğe bir projeksiyon yapmak amacıyla üretilmiştir. Burada üretilen bilgiler Açıköğretim Fakültesi Dekanlığı ile paylaşılmıştır. Fakülte Yönetiminin bu çalışmadaki sonuçları dikkate aldığı ve üretilen modellerin ve tahminlerin alternatif bir bakış açısıyla yönetime ışık tuttuğu 2016 yılındaki program sayılarındaki artıştan anlaşılmaktadır.

Anahtar Kelimeler: *Anadolu Üniversitesi, Açık ve Uzaktan Eğitim, Kukla Değişken, Yapısal Değişim*

DEVELOPMENTS AND GENERATIONS OF OPEN AND DISTANCE EDUCATION PROGRAMS IN ANADOLU UNIVERSITY

ABSTACT

An important objective of Anadolu University is to reach the broader community through Open and Distance education. This

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objective was carefully examined with data running from 1982 to 2014. With this in mind, linear models were used to examine the relationship between time and the number of open access programs. Specific dummy variables were applied to represent the structural changes overtime in the models. The study also examines technological changes that also contribute to structural breaks. In historical evaluations, it has also been observed that new generations took place, especially depending on technological progress. Model III had the smallest standard error and was therefore the best applicable model in this study. The study also forecasted that, by 2016, the open and distance programs will reduce to about 35 and this signaled a need for increasing and providing variety of programs to reach the broader populace.

Unlike other studies, this study was produced on program basis to make a future projection with the statistical methodology used. The information obtained in the study is shared with the Faculty. It can be understood that faculty management has taken into account the results of this study and increased the number of programs in 2016.

Keywords: *Anadolu University, Open and Distance Education, Time series, Dummy Variable, Structural Change*

I. INTRODUCTION

The dynamic linear relationship between the years (time) of operating an open and distance education (ODE) program in Anadolu University (AU) and the number of programs that have been made available was carefully expatiated. This relationship study was done considering the structural breaks that had occurred over the years in AU. Structural breaks are normally observed in time series data of countries and educational institutions, and this represent the historical developments that has occurred over the years. In this study however, the structural breaks are a true reflection of historical developments that occurred in the Open Education Faculty (OEF) at AU.

For the purposes of this study, time, which represents years of operating the open and distance programs (ODP) was the independent variable, whiles the number of open and distance programs offered became the dependent variables in the linear models. In a 33 years' time frame, the study carefully investigates the number of opened and closed distance programs in AU.

Since decision to start new programs in the university requires economic resources, infrastructure, teaching staff, etc., the study attempts to find out whether the objective of AU to reach the broader populace through ODE has been fulfilled over the years and this forms the justification of the study.

Dummy variables were used to represent the structural breaks in the study and emphasis was placed on the connection between these dummy variables and the application of different generations of ODE in AU. The study exhibits characteristics of being multidisciplinary in nature since it covers both literature in ODP and statistics needed for the best model selection. As known, if statistical analysis is used as a tool in education or any other branch of social sciences, the most accurate of these methods must be determined in order to attain the desired goal. Therefore, on the issue of assessing the best method of analysis from statistical point of use was taken into account.

AU started ODE with two programs in 1982. Over the years, the programs increased in number from 2 to 42 in 2014 as a result taking Turkey's labor market into consideration. This has led AU to cover a broader student base in terms of ODE and has also led to the establishment of University centers outside the boundaries of the country in accordance with Turkey's Education Policies. The intension of carrying distance education services to the Turkish Minorities covers areas in Western Europe, Macedonia, Kosovo, Azerbaijan and Bulgaria.

In this era of technology, AU has also incorporated technology to its open and distance educational system over the years but it is however remarkable to note that, the number of distance education programs is steadily declining.

While investigating the relationship between the number of open and distance education programs with time on the basis of linear regression analysis, the study also reviewed and explained the causes of structural breaks that has occurred over the years in the OEF. As a result, literature on historical developments of ODE in the world and Turkey was included in the study. From the in-depth literature, it was revealed that AU started the Open Education Faculty in the second generation and is currently experiencing the fourth stage according to Sherron's and Boettcher's generation classifications. As a result, AU is currently transforming ODE digitally in order for education to be made flexible and comfortable.

II. THE DEVELOPMENT OF OPEN AND DISTANCE EDUCATION AND IMPORTANCE OF TECHNOLOGY

Technology always had a close relationship with distance education because it clears away the distance between lecturers and learners by using printed materials, radio broadcast, phone, TV, sound tracks, and videotapes, and internet. This relationship is gaining importance in time because of the rapid technological development which provides diminishing costs, increasing range and accessibility, ease of use and spreading to a greater population (Bates, 1993).

Kaufman (1989) and Nipper (1989), classified the experience of distance education in the world and they proposed that, this experience can be divided into three generations. The first generation covers the use of single technology without any direct interaction among the students and the education provider. Although educational television and radio fits similar description by the lack of interaction, the basic form of this system was print-based communication and the basic instruments of it were text books and printed materials.

Second generation distance education can be characterized by an associated use of books and printed materials which are specifically designed for distance education, together with one-way television and radio broadcasts. In this generation besides these instruments, generally a communication was mediated among students and teaching staff by a third person or institution. Second generation distance education can be described as industrial in nature (Peters, 1983). Because many of the second generation practices, educate huge numbers of learners, and so Daniel (1996) described them as mega-universities with over 100,000 or more students.

In distance education third generation is mediated on two-way communications, such as the internet or video-conferencing that enable interaction between the teacher and the student. Correspondence can be held between the teaching staff originating the course and the students. Through this generation students at different locations can communicate with each other either individually or as groups. The most important character of this generation is that it enables easier communication between students and teacher, and providing more communication equality for learners. Third generation is usually described as knowledge-based or post-industrial education system (Campion and Renner, 1992;

Farnes, 1993). In such generation, autonomous and small teams design, develop and manage the distance education system and deliver courses. Sometimes the team takes care of the student's dialogue, discussion and constructive approaches on teaching and learning and then develops the course and web-based administrative services. Third generation distance education can also be characterized by economies of scope and by quickly produced and customized system. Although operating costs can be substantial such systems can be realized with low initial establishment costs. Third generation institutions are generally placed in conventional universities as a distance education branch (or faculty). Besides these dual mode institutions, distance education institutions can be established specially for only conducting distance education.

Kaufman (1989) specified these three generations as an advancing increase in student control, and underlined their effects on improving dialogue opportunities and also the contribution of them on thinking and evaluation skills (Bates, 2005, pp.6-7).

In the last three decades, second generation open and distance learning is experienced in many countries, and became an important part of the most modern educational systems. On the other hand, after 1996 third generation distance education institutions started to spread rapidly in advanced countries, and also in the developing countries. Open learning and distance education projects are started in many countries at all education levels. There are now examples of developing open and distance education institutions operating in many countries, across all scientific subjects (Bates, 2005, pp.13-14).

On the other hand, Nipper (1989) described the first generation as correspondence teaching. In this system, books and other documents were sent to the learners and their correspondence with the lecturer was so seldom and tardy, and it was restricted with the exams or submission of home works (Nipper, 1989, p. 63).

Nipper put forward that, second generation in distance education provided students an educational package with the common use teaching devices as radio and TV broadcasts, audio and video tapes together with books and texts. In this generation sometimes telephone conservations and some face-to-face communications were held, in order to set up a teacher-student interaction. Furthermore, some models of this generation allowed two-way correspondence among the students and the teacher, which

provides the students the opportunity for socialization as in campus education (Wright, Jeff and Wood, 1995, p.2).

Sumner explained the development of distance education according to Haberman's Communicative Action Theory. Sumner's aim was not to develop criticism and bring new approaches to the theory but he wanted, to lay out the historical development of open and distance education. Sumner claimed that, the history of distance education is generally similar with the history of education. According to him, the initiative of such education, depended on the emergence of the need for adult education and the necessities brought with the Industrial Revolution. These were educated workforce, adult literacy, the introduction of a cheap and mass-producing publishing industry, and an advanced transportation facilities. In large but low populated countries such as Canada and Australia, correspondence study added another necessity to this list, as a reliable postal service with low cost (Hamilton, 1990; Sumner, 2000, p.273). At the end of the 19th century, many universities in Canada, US and Europe started distance education programs, in order to meet the growing demand for education. In the first quarter of the 20th century, such education services was being provided by universities and some private educational institutions in all stages such as elementary, secondary and higher education and even in vocational education (Willis, 1994, p. 9).

Then the two World Wars and additionally massive technological developments induced the development and growth of distance education. Governments demanded this education system for soldiers in the years of World War I (Holmerg, 1986). And after World War II, soldiers returning back to their homes approved all kinds of education and even correspondence study, as an important tool to restore the community after the demolition of the two World Wars and the Great Depression (Sumner, 2000, p. 275).

Especially after World War II, distance education was introduced in many countries especially because of the request from public authorities. The societies' demand was too strong in the beginning afterwards it grew gradually in a continuous manner, but distance education system remained essentially unchanged until the end of 1960s, while many new media techniques provided necessary support to the system (Bates, 1991).

The slowness of the postal services was the most important handicap in achieving success in correspondence among teachers and students. So distance education stayed as an individualized form

of teaching which isolates students from on campus teaching and group study process (Sumner, 2000, p. 275).

As cited before, a number of factors such as new corresponding and multimedia technologies, modernization of books and developed support services for students induced the growth of the second generation of the system. The establishment of the British Open University in 1969 also accelerated the improvement of distance education and second generation of this system is started to be named as multimedia distance education. (Keegan, 1990).

The first multimedia teaching model of the Open University generally used one-way technologies, such as, radio and television broadcasts, audio and video cassettes. Additionally, University has predominantly specialized in preparing print- based materials in distance courses (Sumner, 2000, p. 276).

The beginning of the 21st century with other generally accepted names; The Information Age and the Second Industrial Revolution as many others and Noble (1995) referred, changed the objectives and images of both economies and open and distance education. In 19th century during the First Industrial Revolution, the structure of the economy shifted from small producers and household workshops to factories and big offices. In the late of the 20th century economies started to shift towards the infrastructures of the information age and its highways (Menzies, 1996). The forerunner and the main instrument of Second Industrial Revolution and knowledge-based economy in the information age is certainly being the internet and computers.

Today, distance education is becoming an education which can serve better in reaching economic targets more than social goals and purposes. Although this education system creates a dependency on technology it can be used in acquiring the skills of workers in large numbers, needed for knowledge-based economy.

In the information age, distance education experience is continued by the use of the Internet and the World Wide Web. (Mason 1992), The instruments used in modern distance education such as, modular courses, on-line exams, websites, electronic interaction between people, and computer conferencing which are new forms of correspondence education seems as a special and distinctive phenomenon in the history of human communication. Computer conferencing started provisionally as an experimentation in some universities, but today it grew with both on-campus as well as off-campus lectures (Sumner, 2000, p. 278).

Associating with these detailed comments, Sherron and Boettcher (1997) created a table for classifying the generations of distance learning technologies which can be seen as Table. 1.

Table 1: Generations of Distance Learning Technologies

Features	**First Generation 1850s to 1960**	**Second Generation 1960 to 1985**	**Third Generation 1985 to 1995**	**Fourth Generation 1995 to 2005?**
Primary Feature	Predominantly one technology	Multiple technologies without computers	Multiple technologies including computers and computer networking	Multiple technologies including the beginning of high-bandwidth computer technologies
Media	*Print (1890+) *Radio (1930s) *Television (1950s and 1960s)	*Audiocassettes *Television *Videocassettes *Fax *Print	*Electronic mail, chat sessions, and bulletin boards using computers and computer networks *Computer programs and resources packaged on disks, CDs, and the Internet *Audio conferencing *Seminar and large-room videoconferencing via terrestrial, satellite, cable, and phone technologies *Fax *Print	*Electronic mail, chat sessions, and bulletin boards using computers and computer networks plus high-bandwidth transmission for individualized, customized, and live video interactive learning experiences *Computer programs and resources, packaged on disks, CDs, and the Internet *Audio conferencing *Desktop videoconferencing via terrestrial, satellite, cable, and phone technologies *Fax *Print

Communication Features	*Primarily one-way communication *Interaction between faculty and student by telephone and mail *Occasionally Supplemented by on-site facilitators and student mentors	*Primarily one-way communication *Interaction between faculty and student by telephone, fax, and mail *Occasionally Supplemented by face-to-face meetings	*Significant broadband communication from faculty to students via print, computer programs, and videoconferencing *Two-way interactive capabilities enabling asynchronous and synchronous communication between faculty and students and among students *Internet good for text, graphics, and video snippets	*Two-way interactive real-time capabilities of audio and video *Asynchronous and synchronous communication between faculty and students and among students *Full 30-frame-per-second digital video transmission with databases of content resources available via the Internet and World Wide Web *Lengthy digital video programming available on demand

Source: Sherron and Boettcher (1997).

At the same time, Taylor (1995) has classified the distance education technologies quite similarly as follows;

First Generation - The correspondence model: Print

Second Generation - The multimedia model: Print, Audiotape, Videotape, Computer-based learning (e.g. CML/CAL), Interactive video (disk and tape)

Third Generation - The Tele Learning model: Audio teleconferencing, Video conferencing, Audio graphic Communications (e.g. Smart 2000), Broadcast TV/Radio + Audio teleconferencing

Fourth Generation – The flexible learning model: Interactive multimedia (IMM), Computer Mediated Communications (CMC) (E-mail, CoSy, etc.)

From literature, the historical developments of distance education can be classified in 3 or 4 generations.

III. OPEN AND DISTANCE EDUCATION PROGRAMS OF ANADOLU UNIVERSITY FROM YESTERDAY TO TODAY

The first important example of open and distance education in Turkey is YAY-KUR, which was founded as the result of the decision to promote the mass education policy cited in the 2nd Five-Year Development Plan. Nearly 50 YAY-KUR schools (vocational schools) were established from 1975 to 1974. During the period of the 2nd Five-Year Development Plan, Eskişehir Academy of Economics and Commercial Sciences established closed-circuit television system in order to embark on make mass education for the first time in Turkey.

Eskişehir Academy established the infrastructure of ODE and used the TV broadcasts as the main instrument in reaching the student masses.

The successful implementation of the Academy was closely followed, examined and learned by the public administration. As a result of the success chalked by the distance program, a law numbered 2547 was enacted in 1982 with the goal of restructuring higher education in Turkey.

While this law was being drafted the success of Eskişehir Academy was taken into account and Open Education Faculty was established at AU in Eskisehir as a first in Turkish Education System in the year 1982. In fact, with the establishment of this faculty, there is a need to mention here that a very serious phenomenon emerged. The law numbered 2547 which was enacted for the aim of restructuring Turkish higher education in order to raise the rate of enrollment in higher education. This target would have stayed as a distant dream without the success and the establishment of AU, Open Education Faculty at that time.

AU was the first university which started open and distance education with Economics and Business Administration programs in Turkey, According to the discussions touched on earlier in this paper, AU Open Education Faculty started to operate from the second generation, and has wasted no time since 1982. From the first day, trained staff of the University started to prepare the textbooks according to distance learning techniques which were delivered to students in order to support television lectures. So, television programs and textbooks were used as effective training tools. Additionally, AU also met society's face to face education and demand, by the help of its country wide offices which were built at

the beginning. AU started to implement a powerful ODE system with an objective to involve every community or society in Turkey.

Although working in accordance with this aim, capacities of Economics and Business Administration Programs in the early 80s were limited. However, the nature of the massive demand for higher education remained for a while. As years went by, the social and economic demand for ODE has reached a point of saturation. For instance, in the 1990s ''application and registration'' demand were met with significant increase in staff capacity by 40% to 50%. This later fell to 25% in the subsequent years. As Individual demand for distance education increases and by taking the concentrations of individual interests and expectations into account, new educational programs were opened in order to meet different demands towards the different new programs (Barkan, 1998). During the legislative changes made in the years 1993-1994, two new faculties were established at AU with the names of Faculty of Economics and Faculty of Business Administration to carry out the programs of business and economics. By the establishment of these faculties, the perception of distance education inferiority was prevented since distance education graduates and graduates from the formal streams had equal right to employment. From 1990 to 1997, Open Education Faculty by opening several degree completion programs experienced some volatile periods. These license completion programs were opened as a result of public demand and offered by the public depending on its opportunities. Thus, every day on the way to a meet a larger mass of students which was the main target and coverage, transient elevations and stability were observed. However, in this period AU followed the spread of distance learning technology and developed at the level of our world and country by succeeding in face-to-face teaching support applications with the support of country wide offices which were built. While many similar open and distance education institutions around the world were failing in face-to-face teaching supports for open and distance education students. AU also induced society's education and training demand by the help of its country wide offices. This application has undoubtedly increased the visibility, reputation and increased the resources of Au.

Between 1993 and 2008, AU built some new structures in order to move beyond the traditional functions of distance education and started to use much more intensive modern communication technologies. By such activities, AU entered to the phase of third generation in open and distance education. Among these, AU made

the first video-conference trial in 1997. In 1999, lectures in marketing were given by video-conferencing technology to the students in the Economics Department of Ahmet Yesevi Turk and Kazak International University in Kazakhstan.

Also, Knowledge Management Distance Education Program was opened in 2001. More Internet and computer technology that is based on real-time was incorporated in teaching courses. Students attended live classes in a virtual classroom environment with the course instructor. In 2001-2002 academic year, "Second University" program was launched.

By 2008, Rector of the University opened a discussion and asked the university's senior academicians and management what lessons can be given by trained staff of open and distance education. A draft was prepared and this led to discussions by presenting proposals for new programs. After taking contributions to these proposals, new programs were opened.

The programs started running in the shortest possible time since the University's technological infrastructure were world class and made it easy to effect the change

During this period, the Computer Research and Application Center (BAUM) were also ready with high tech-equipment and experience gained over the years. This made it possible to evaluate many different exams of very large mass of students at the same time.

In recent years, interactive learning environment is enriched for learners by offering interactive e-books, video, audio, animations. In this way, the "Information" is transferred to learners with different center distance education techniques coming out of the ordinary. Apart from that, students began to take face-to-face lectures aiming to bring together academicians and experts online through e-seminars.

Open Education exams are offered by e-services in order to prepare students for the final exams in an efficient and effective way. Nowadays, discussion groups which involves the course instructor and the students are easily formed with the motive of exchanging information among distance education students. A recent addition to the flexibility of distance education is the online academic chat environment. Thus, AU, creating more flexible learning models, are trying to lead a digital revolution. AU, also in recent years opened offices in Western Europe, Macedonia, Kosovo, Bulgaria and

Azerbaijan. This by so doing is contributing greatly to globalization of knowledge and information transfer.

Relying on such developments which have been expatiated so far, we can argue that, AU is now experiencing the fourth generation in ODE.

During the development process of ODE system in AU which has been summarized above, the numbers and names of the started programs can be seen in Figure 1 as a graph.

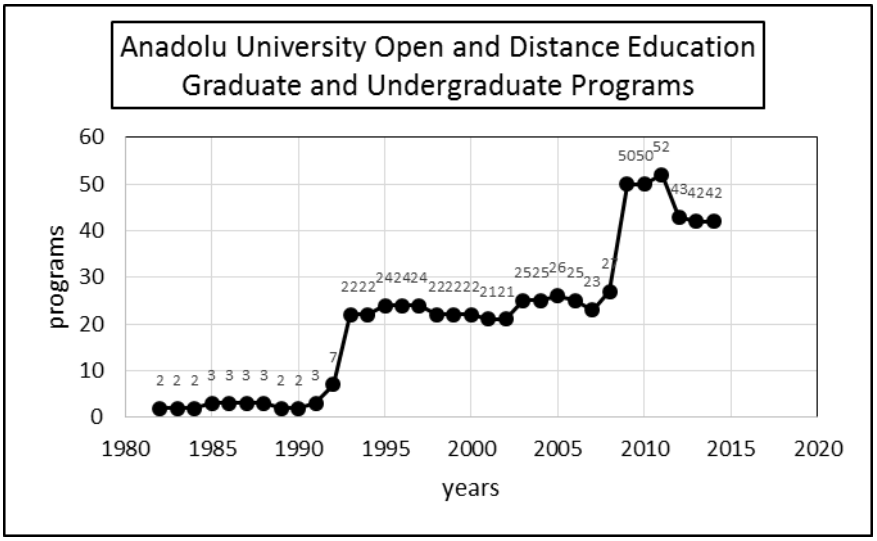

Figure 1: Anadolu University Open and Distance Education - Graduate and Undergraduate Programs

In trying to make the learning models more flexible, AU used the digital revolution as a catapult in the fourth generation process of its open and distance education system in accordance with Taylor, Sherron and Boettcher's approaches.

IV. METHOD AND FINDINGS

In many practical situations, time trends occur in response data. Sometimes the trend is the only factor affecting the response and sometimes the time trend effect occurs in addition to the effects produced by other predictor variables. We can take care of the time trend by using one or more suitably defined dummy variables. Appropriate model terms in these dummy variables are then added to the rest of the model arising from other predictors, and the whole

model is then fitted. In the discussion below, the response data is the numbers of programs and this focuses primarily on the time trends. It must be remembered here that, other parameters which are appropriate for the problem under study, must usually be estimated simultaneously. When there are three time trends, dummy variables must be engaged in each trend (Draper and Smith, 1981, pp. 250-252; Ağaoğlu, 1989, pp. 135-149). So, X matrix must be as follows;

$$\begin{bmatrix} 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 2 & 0 & 0 & 0 & 0 \\ 1 & 3 & 0 & 0 & 0 & 0 \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ 1 & 12 & 0 & 1 & 0 & 0 \\ 1 & 12 & 1 & 1 & 0 & 0 \\ 1 & 12 & 2 & 1 & 0 & 0 \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ . & . & . & . & . & . \\ 1 & 12 & 16 & 1 & 0 & 1 \\ 1 & 12 & 16 & 1 & 1 & 1 \\ 1 & 12 & 16 & 1 & 2 & 1 \\ 1 & 12 & 16 & 1 & 3 & 1 \\ 1 & 12 & 16 & 1 & 4 & 1 \end{bmatrix}$$

The first column of the matrix above (X_0) is established for the constant term. The second, third and fifth columns specify three different trends and the dummy variables are referred respectively as X_1, X_2 and X_4.

X_3 is set to zero for all points on the first line and then goes to 1 for all points on the second line to allow for a jump (positive or negative) from the first line to the second. In the same way, X_5 is set to zero for all points on the second line and then goes to 1 for all points on the third line to allow for a jump (positive or negative) from the second line to the third. If no other predictor variables are involved we can fit the model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \qquad (1)$$

The parameter β_3 is the step change which becomes effective at the 12th observation point and is the vertical distance, the second line lies above the first at this point. In the same way, the parameter

β_5 is the step change coming into effect at the 28th observation point and is the vertical distance, the third line lies above the first at this point.

A. Structural Changes and Models in the Analysis

As mentioned above there are two important structural change points in our study:

First, the establishment of Faculty of Economics and Faculty of Business Administration from 1993-1994. In addition, opening several new programs at the OEF.

Second, the opening of many new programs in 2008 with the initiative of the Rector.

Therefore, we considered that the number of programs has a vital importance in our study. Then, when the series was created, we saw these two major structural changes. According to these structural changes, our data set was divided into 3 periods as, from 1982 to 1992, 1993 to 2008 and 2009 to 2014.

By considering structural breaks, 4 models were produced in the study. While constructing the models, the distribution of the number of programs in the scatter diagrams was taken into account and models were produced in accordance with 4 assumptions below:

Model I: Model with structural changes and with existing trends in 3 periods.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \quad (2)$$

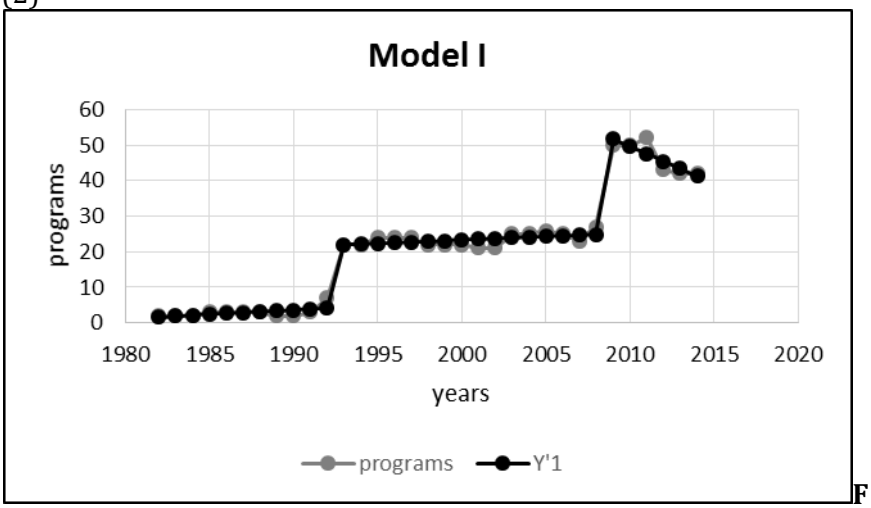

Figure 2: Model I

Model II: Model containing structural changes, without an existing trend in 3 periods.

$$Y = \beta_0 + \beta_3 X_3 + \beta_5 X_5$$

(3)

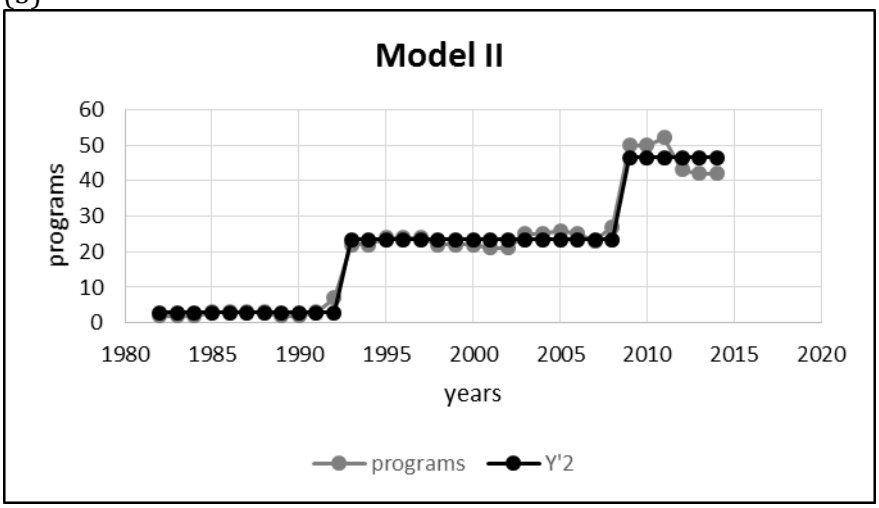

Figure 3: Model II

Model III: Model having structural changes without a trend in 1st period, but with trends in 2nd and 3rd Periods.

$$Y = \beta_0 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5$$

(4)

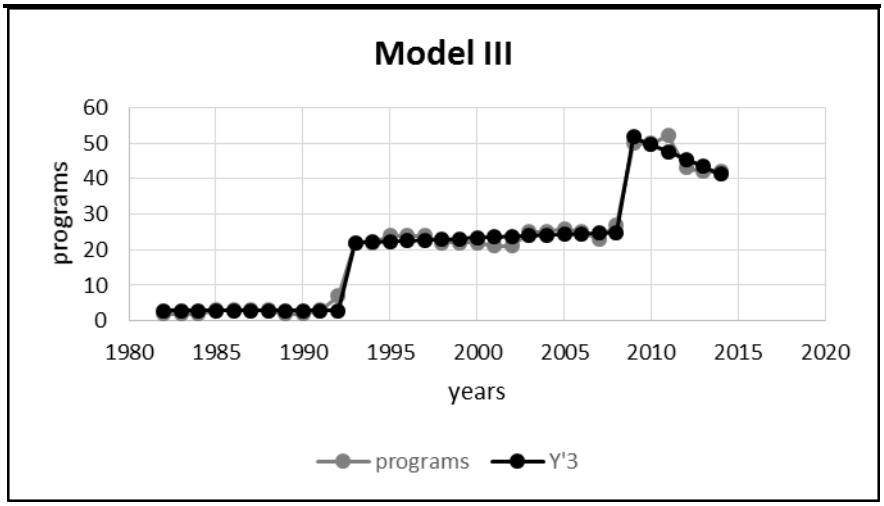

Figure 4: Model III

Model IV: Model of structural changes without a trend in 1st and 2nd, but with trend in the 3rd Period.

$$Y = \beta_0 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \quad (5)$$

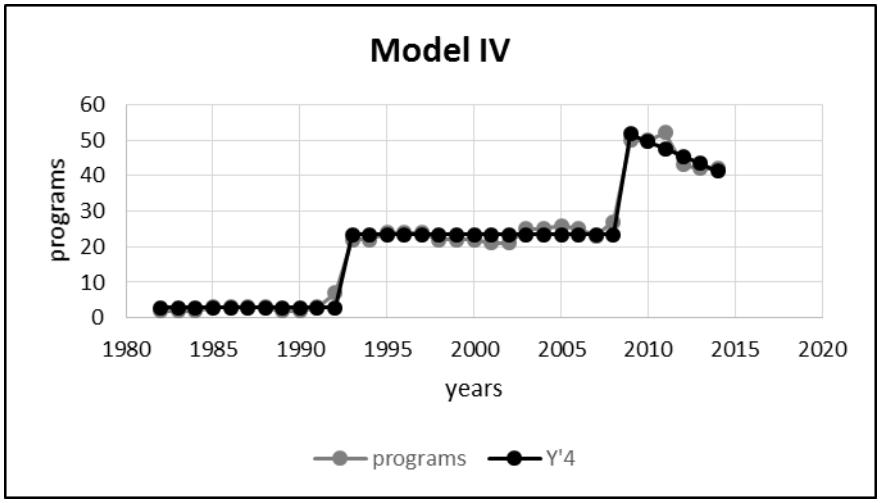

Figure 5: Model IV

Coefficients of models can be seen below; as Table 2.

Table 2: Models

Models	**Model I**		**Model II**		**Model III**		**Model IV**	
Coefficients	Estimated Coefficients (standard error)	t ratio	Estimated Coefficients (standard error)	t ratio	Estimated Coefficients (standard error)	t ratio	Estimated Coefficients (standard error)	t ratio
β_0	1.436 (1.128)	1.273	2.909* (0.735)	3.957	2.909* (0.537)	5.417	2.909* (0,566)	5.139
β_1	0.245 (0.166)	1.476	-	-	-	-	-	-
β_2	0.199* (0.095)	2.098	-	-	0.199* (0.097)	2.055	-	-
β_3	17.567* 1.402	12.526	20.528* (0.955)	21.496	19.039* (1.006)	18.932	20.528* (0.735)	27.917
β_4	-2.086* (0.417)	-5.001	-	-	-2.086* (0.426)	-4.899	-2.086* (0.449)	-4.647
β_5	26.589* (1.559)	17.051	23.063* (1.167)	19.759	26.589* (1.592)	16.704	28.277* (1.438)	19.670
F								
S_y (standard error)	505.331** 1.745		638.789** 2.438		605.658** 1.781		725.468** 1.877	
R^2	0.989		0.977		0.989		0.987	
ADJ R^2	0.987		0.976		0.987		0.985	

*Coefficients are significant at 95% levels.

** Models are significant at 95% levels.

Here the common point in Model III and Model IV, are the existence of a significant decline that occurred between 2009-2014 years. Accordingly, we need to ask this question: In recent years, can AU Open Education Faculty answer the future expectations of wider society on the basis of variety of educational programs?

B. Projections of the Models

Model II, Model III and Model IV are significant with all of their coefficients. The forecast for the models are as follows:

Table 3: Forecast Values of Models

Model II S_y **=2.438**			**Model III** S_y **=1.781**			**Model IV** S_y **=1.877**		
Years	Forecast Value	Forecast Program	Years	Forecast Value	Forecast Program	Years	Forecast Value	Forecast Program
2015	46.5	47	2015	39.205	39	2015	39.198	39
2016	46.5	47	2016	37.119	37	2016	37.193	37
2017	46.5	47	2017	35.033	35	2017	35.026	35

The model with the smallest standard error is the best, as seen here Model III is the best model.

It is clarified in this study that, the Model III, Model IV, is strongly emphasizing the significant decline in the number of programs after 2009. The trend coefficient of the third period is negative. In both models, the results put forth an early warning signal for AU. That is, there is a significant decline in the number of open and distance education programs in recent years.

The management of AU, OEF, must examine and evaluate this falling trend with all aspects. And as mentioned above, answer the question on ''whether the faculty can respond the growing future expectations of the society with this program variety?''.

While asking this question, we need to examine carefully which programs were closed in last 2 or 3 years. In particular, the most significant decline in program numbers was from 2011 to 2012. Seven (7) programs out of 10 which were closed in 2012, were distance education programs. This phenomenon made the decline more obvious. Closing the Distance Learning Programs did not cause serious decrease in the total number of students. Because, there were comparatively small numbers of students in these program. But, the intensive use of information and communication technologies in distance education was first started in 2001 with these programs, so all of them must be considered with great importance for the distance education experience of AU because of their privilege and properties.

Therefore these programs formed an important step in the history of Open Education Faculty through the use of Information and Communication Technology (ICT) in Turkey.

The closure of distance education programs caused a decrease in the overall number of programs and this had a significant impact in AU education policy. In short, this policy created a negative

trend at this stage and closing all of the distance education programs within the same year magnified the coefficient of negative slope.

V. CONCLUSION

We have carried our study within the framework of dummy variables methodology and analyzed the linear relation between the numbers of open and distance education programs and time. Among the models produced, we found that the most statistically significant and distinctive model is the Model III.

$$Y = 2.909 + 0199X_2 + 19.039X_3 - 2.086X_4 + 26.589X_5$$

(6) s.e.: (0.537) (0.097) (1.006) (0.426) (1.592)
t : 5.417 2.055 18.932 -4.899 16.704
F= 605.658 and S_y=1.781; R^2=0.989 and Adjusted R^2 = 0.987

According to Model III and Model IV the estimated number of AU open and distance education programs number will be reduced to 35 by 2016. Basing on Model III, the most important aspect that must be emphasized is that the decline in program numbers must be considered as an early warning signal. The need for increasing the program numbers and varieties must be factored. It can be concluded that, in recent years AU has moved away from the policy of responding to the demands of a wider society. The study limited its estimates for the future with 3years in relation with the change in university administration in 2014. In such case, forecasts for a longer period could not be statistically significant enough. The policy of the new administration on this issue will emerge in the coming years.

If our findings are examined with inadequate regression knowledge, a researcher can argue that Model II is a good model and may even decide that it is the best model. By noticing that there is no trend in last period, one may forecast that after 5 or 10 years University will start new programs and realize a jump in program numbers. But this will be a misconception. When the scope of the study is considered from the point of a statistician, Model III is better than Model II because of its superiority by specifying early warning signal. Furthermore, R^2 and standard error values of Model III also support our argument.

As seen in the figures, AU has experienced three periods when opening distance education programs. Since its establishment, the number of programs has shown sharp increase from 1993 and

2009.Structural breaks occurred in these years and the breaks are reflected in the form of jumps.

Of course, the role of technology is undeniable when open and distance education is considered. It is necessary to increase the number of programs in order to spread to the society over a wider base by following, transferring and applying the technological developments in the world. By answering the different demands of the society and increasing the number of students, unit costs can be reduced so that purchasing and implementing new technologies become possible.

AU by considering the possibilities offered in the world's technological infrastructure increased the number of programs at first, then in order to keep pace with technological advances in the world, realized a new technological breakthrough in his past open and distance education experience. Therefore, University must keep on working in such a loop system, in which the number of programs and the technological developments are associated with progress.

Open and distance learning is classified in 3 generations by, Bates (2005), Nipper (1989) and Sumner (2000). Generally these generations were; **First Generation** - The correspondence model, **Second Generation** - The multimedia model, **Third Generation -** The Tele - Learning model. Then, Sherron and Boettcher (1997) and Taylor (1995) have classified this experience in 4 generations. Especially Taylor described the **Fourth Generation as** the flexible learning model. The approach by Sherron and Boettcher (1997) to this issue was explained in Table.1.

On the other hand, Sumner (2010) according to Haberman's Theory of Communicative Action emphasized the importance of technology in open and distance education and divided the process into three periods: The First Generation- correspondence study; The Second Generation-multimedia distance education; The Third Generation-computer mediated distance education.

In Turkey, AU by initiating open and distance education has started from the Sumner's second generation. Although with some lag, AU could follow the technological improvements, innovations which are related to open and distance education in the world.

AU started open and distance education in 1982 from the second generation and entered the third generation by increasing the number of programs first in 1993 and again in 2009. University is now experiencing the fourth generation. However, all the features of

fourth generation are not yet fully held. It is expected that the university probably will show progress over time.

Though it can be said that AU has been open to technological innovations to make learning more flexible, it can also be noted that policy implementation has been a problem of worry for this institution.

On account of the open and distance education programs, AU is mentioned among the major universities of the world beyond dispute. Its priority still remains to be one of the most important universities of the country and world in open and distance education. However, in order to maintain its place in the globalized world, the university must be more progressive, more professional and more open to the society. This will help the university to comprehend and respond to the demand of the society. In conclusion, the university should be placed in a structure which is more harmonious and always ready to be in cooperation with the public and other public authorities.

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