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Classification and Mathematical Model of Electronic Document Circulation Systems

Bahodir Boltaevich Muminov, Adilbek Yusupbaevich Dauletov

Doctor of Technical Sciences, Associate Professor, Head of the Department of "Computer Science", Tashkent University of Information Technologies and the joint Faculty of Information Technologies of the Belarusian State University of Informatics and Radio Electronics, Tashkent University of Information Technologies named after Muhammad al-Khwarizmi

Assistant, Tashkent University of Information Technologies and Belarusian State University of Informatics and Radio Electronics, Joint Faculty, Department of Computer Science, Tashkent University of Information Technologies named after Muhammad al-Khwarizmi

ABSTRACT: The article classifies electronic archive administration frameworks based on the sort of organization approach and isolates them into 4 classes: local EDCS, corporate EDCS, Regional EDCS, global EDCS. Suitable numerical models of real-time archive handling and administration of each EDCS have been built. Each scientific demonstrate characterizes the preparing and administration of class-appropriate records. This, in turn, serves to characterize and decide the adequacy of report administration frameworks in organizations.

KEYWORDS: Electronic Document Management System (EDCS), Information System, Electronic Document, Document Management, Classification, Mathematical Model, Real Time Mode, Local EDCS, Corporate EDCS, Regional EDCS, Global EDCS, Incoming Document, Outgoing Document.

I. INTRODUCTION

Electronic Document Control (EDC) Frameworks within the Global Community Within the concepts of e-government, computerized economy, open and private teach, legitimate substances and people are centered on performing the capacities of mutual document administration. EDC frameworks are broadly presented within the Republic and in 2004 the Law of the Republic of Uzbekistan on EDC (№ 611-II) was received. This law stipulates that the electronic archive circulation could be a set of forms of sending and getting electronic reports through the data framework.

There are thousands of EDC systems in the world (Documino platform, Microsoft SharePoint, FossDoc, EDC XPages Dynamic, DOCS.UA, Megapolis, Directum, elDoc, ASKOD, Alfresco, INTALEV: Corporate management (DocsVision) and their introduction into a specific network leads to the improvement of information systems. This is because the EDC system introduces specific approaches to the industry in which it is implemented and functional tasks depending on the purpose of the organization.

In Uzbekistan, too, many EDC systems are being created based on the needs of institutions and enterprises (E-DOCUMENT, e-letter, wound).
From the point of see of making and executing a data framework, its design, organizational, specialized, framework program, arithmetic, computer program, security, phonetics, documentation, information purport and trade bolster are imperative.

But today, the issues in electronic report administration frameworks depend on the organization's report preparing and administration times in genuine time. To unravel this issue requires an inter-organizational approach of EDCS, consider of approaching and active archives, development of a scientific show of this prepare to optimize the preparing and administration time of the organization through inside EDCS. Based on the over opinion, the issue ought to be settled as before long as conceivable.

Problem statement. The problem arises in the classification of the EDC system on the basis of the specific features of the document management organizations, the level of organization, and the construction of a mathematical model.

ISSN: 2350-0328
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Vol. 7, Issue 10 , October 2020

II. THE MAIN FINDINGS AND RESULTS

When determining the relationship of organizations in the EDC systems, it is advisable to divide them into X_1 - organizations, X_2 - higher organizations, X_3 - peer organizations, X_4 - lower organizations, X_5 - organizations (branches) (see Figure 1). Their interrelationships, entry-exit documents, are managed equally.

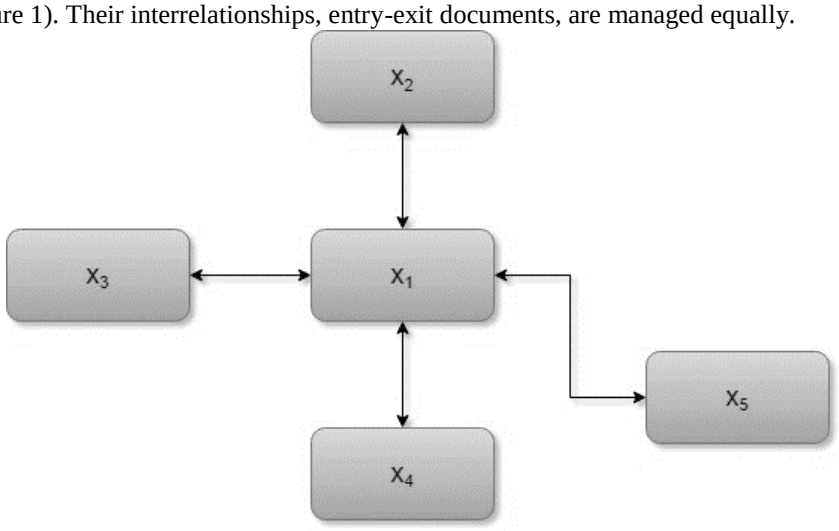

Figure 1. The scheme of mutual document circulation and formation of organizations

In Figure 1, the inter-organizational data, documentation is done in real time and can be expressed as $x_1 = x_1(t)$, $x_2 = x_2(t)$, $x_3 = x_3(t)$, $x_4 = x_4(t)$, $x_5 = x_5(t)$. At the same time, it is essential to present the EDC framework based on the inner capacity of organizations. Based on the standards of planning computerized control frameworks, the EDC framework is isolated into the taking after 4 bunches, based on the nature of shared record circulation in organizations. On the premise of AK Ivanov's numerical models of archive administration in organizations we construct scientific models of each bunch [1].

Local EDC is the organization's inner EDC framework, which is planned for record circulation as it were with inside offices. The record stream of this framework can be decided by depicting the arrangement without outside archives in Figure 2 and the scientific expression (1).

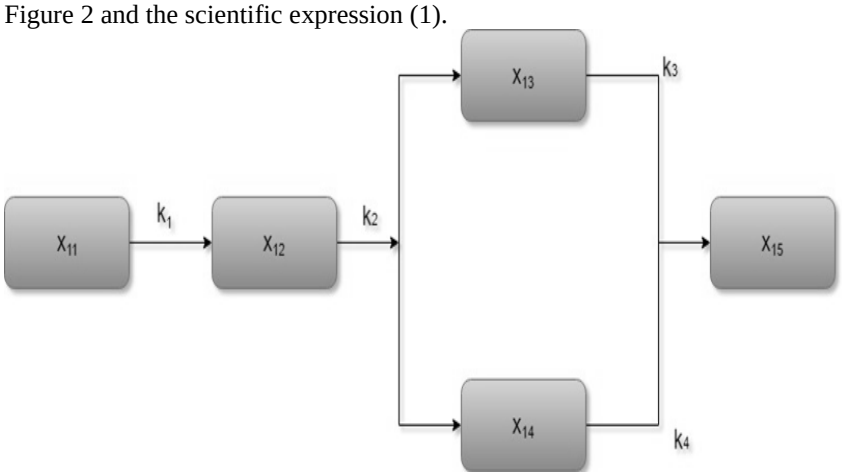

Figure 2. Document management and formatting scheme in a local EDC system.

ISSN: 2350-0328
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Vol. 7, Issue 10 , October 2020

$$\begin{cases} \frac{dx_{11}}{dt} = -k_1 x_{11} \\ \frac{dx_{12}}{dt} = k_1 x_{11} - k_2 x_{12} \\ \frac{dx_{13}}{dt} = k_2 x_{12} - k_3 x_{13} \\ \frac{dx_{14}}{dt} = k_2 x_{12} - k_4 x_{14} \\ \frac{dx_{15}}{dt} = k_3 x_{13} + k_4 x_{14} \end{cases} \quad (1)$$

Figure 2 and (1) within the scientific show $x_{11}, x_{12}, x_{13}, x_{14}$ - real-time data of archives within the inner divisions of the organization, k_1, k_2, k_3, k_4 - the coefficient of report arrangement at the fitting arrange for each department of the organization. (1) The numerical show can be solved by the strategy of persistent variety, and within the Local EDC framework, an explanatory arrangement of the handling and administration of the records in each area is gotten.

Corporate EDC could be an archive administration framework that's proposed and secured on the premise of VPN based on the organizations and their objectives and interface. The archived stream of such a framework can be decided from the portrayal and numerical expression (2) in Figure 3 without inner records.

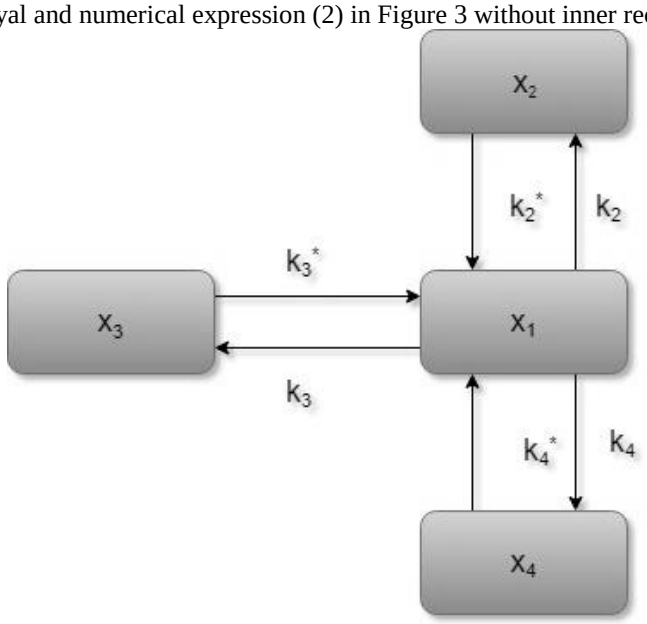

Figure 3. Scheme of document management and formation in the corporate EDC system.

ISSN: 2350-0328
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Vol. 7, Issue 10 , October 2020

$$\begin{cases} \dfrac{dx_1}{dt} = k_2^* x_2 x_1 + k_3^* x_3 x_1 + k_4^* x_4 x_1 - k_2 x_1 x_2 - k_3 x_1 x_3 - k_4 x_1 x_4 \\ \dfrac{dx_2}{dt} = k_2 x_1 x_2 - k_2^* x_2 x_1 \\ \dfrac{dx_3}{dt} = k_3 x_1 x_3 - k_3^* x_3 x_1 \\ \dfrac{dx_4}{dt} = k_4 x_1 x_4 - k_4^* x_4 x_1 \end{cases} \quad (2)$$

Figure 3 and (2) in the mathematical model x_1 - current organization, x_2 - higher organization, x_3 - peer organization, x_4 - real-time data of documents in lower organizations, respectively k_2, k_3, k_4 - formation of outgoing and incoming documents of the current organization at the stage of document flow coefficients. k_2^*, k_3^*, k_4^* - is the coefficient of the arrangement of approaching and active reports of the current organization at the arrange of report circulation of the organization. (2) The scientific demonstrate can be unraveled by the strategy of persistent variety, and an explanatory arrangement of report preparation and administration in each organization within the corporate EDC framework is obtained.

Regional EDC may be a record administration framework, both open and closed, proposed by the administering body, based on the organizations and their diverse / comparable objectives, interface, administration device and participation, operational assets. The report stream of such a framework can be decided from the depiction and numerical expression (3) in Figure 4 with inside and outside archives.

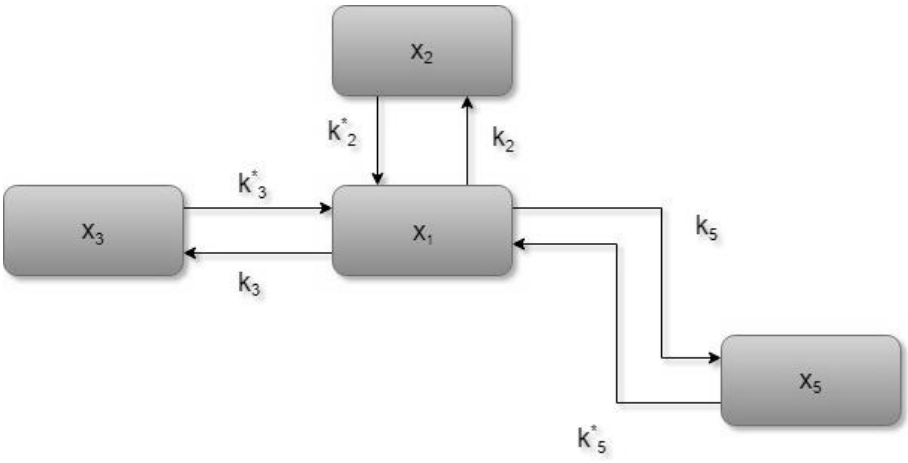

Figure 4. Document management and formatting scheme in the regional EDC system

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 10 , October 2020

$$\begin{cases} \dfrac{dx_1}{dt} = k_2^* x_2 x_1 + k_3^* x_3 x_1 + k_5^* x_5 x_1 - k_2 x_1 x_2 - k_3 x_1 x_3 - k_5 x_1 x_5 \\ \dfrac{dx_2}{dt} = -k_2^* x_2 x_1 + k_2 x_1 x_2 \\ \dfrac{dx_3}{dt} = k_3 x_1 x_3 - k_3^* x_3 x_1 \\ \dfrac{dx_5}{dt} = k_5 x_1 x_5 - k_5^* x_5 x_1 \end{cases} \quad (3)$$

Figure 4 and (3) in the mathematical model x_1 - current organization, x_2 - higher organization, x_3 - peer organization, x_5 - real-time data of documents in the organization (branch) organizations, respectively k_2, k_3, k_5 - current organization outgoing and partner organization the coefficient of formation of incoming documents of the organization. k_2^*, k_3^*, k_5^* - the coefficient of arrangement of approaching and active records of the current organization at the arrange of record circulation of the organization. (3) The scientific demonstrate can be illuminated by the strategy of persistent variety, and an explanatory arrangement of report handling and administration in each organization within the Regional EDC framework is obtained.

The Global EDC may be a record administration framework proposed in participation with global organizations and their distinctive / common objectives and interface, interstate participation approach and management device, interstate participation and the assent of outside bodies, based on operational assets. The record stream of such a framework can be decided by drawing and scientific expression (4) in Figure 5 with outside and control archives.

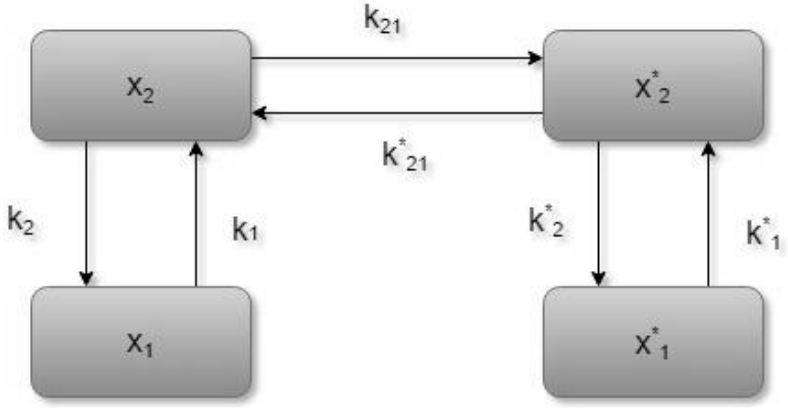

Figure 5. Document management and formatting scheme in the global EDC system

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 10 , October 2020

$$\begin{cases} \dfrac{dx_1}{dt} = k_2 x_2 x_1 - k_1 x_1 x_2 \\ \dfrac{dx_2}{dt} = k_1 x_1 x_2 + k_{21}^* x_2^* x_2 - k_{21} x_2 x_2^* - k_2 x_2 x_1 \\ \dfrac{dx_2^*}{dt} = k_{21} x_2 x^*{}_2 - k_{21}^* x_2^* x_2 + k_1^* x_1^* x_2^* - k_2^* x_2^* x_1^* \\ \dfrac{dx_1^*}{dt} = k_2^* x_2^* x_1^* - k_1^* x_1^* x_2^* \end{cases} \quad (4)$$

Figure 5 and (4) within the scientific show x_1, x_1^* - sub-organization of international higher organizations, x_2, x_2^* - global higher organization. The real-time data of the reports within the organizations are k_1, k_1^*, separately, the coefficient of arrangement of the archives entering and taking off the global organization. k_2, k_2^* - coefficient of arrangement of active and approaching archives of the higher global organization, k_{21}, k_{21}^* - coefficient of arrangement of active and approaching records of the higher universal organization. (4) The mathematical model can be illuminated by the strategy of continuous variation, and an explanatory arrangement of report handling and administration is obtained in each global organization and sub-organization within the global EDC system.

III. DISCUSSIONS

The research was theoretically adapted to the scope of geography of use of EDCS, types of organizations and their structure, and was divided into 4 classes: Local EDC, Corporate EDC, Regional EDC, Global EDC. Regional EDC, Global EDC are separated into classes. This classification serves to supply EDCS in organizations at the nearby, corporate, Regional, and global levels. Time-dependent scientific models of real-time report handling and administration were too built agreeing to the classes. These models speed up the organization's archive stream prepare and permit for expository calculations. On the basis of the mathematical model obtained on the basis of research results in real time "New Star" - computer hardware organization, "ARMAT plus" - software development organization, "E-line press" - commercialization of electronic publications, "TUIT" - higher educational institution, was introduced in the organizations of the Higher Attestation Commission of the Republic of Uzbekistan and the following results were obtained. The results led to an increase in the number of incoming and outgoing documents in the organization based on time control over the processing and management of documents (Figures 1, 2).

In Figure 1, "HAC" is the state before the proposed demonstration is applied, and "HAC +" is the state obtained as a result of applying the solution of the proposed show. Investigation of the comes about appeared that the number of records within the HAC expanded by 250% in 6 months.

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Vol. 7, Issue 10 , October 2020

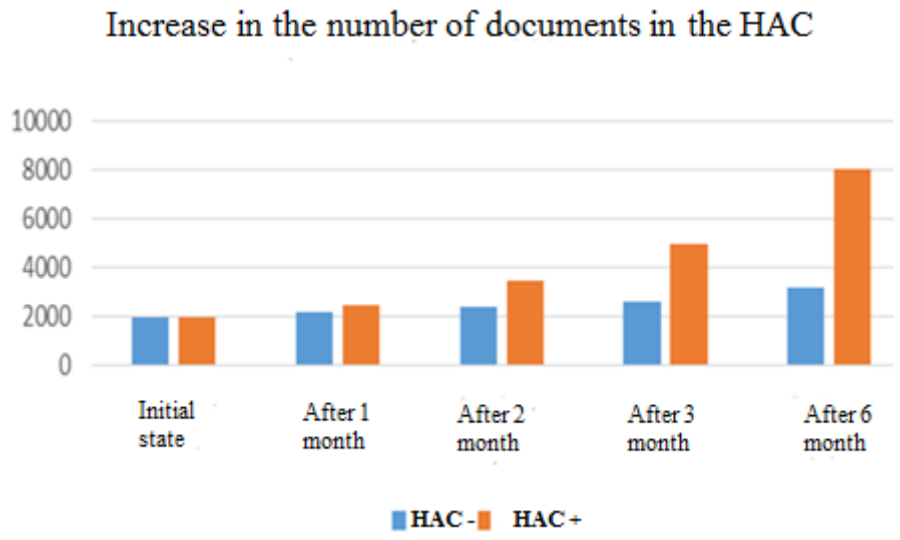

Figure 1. Increase in incoming and outgoing documents in the HAC

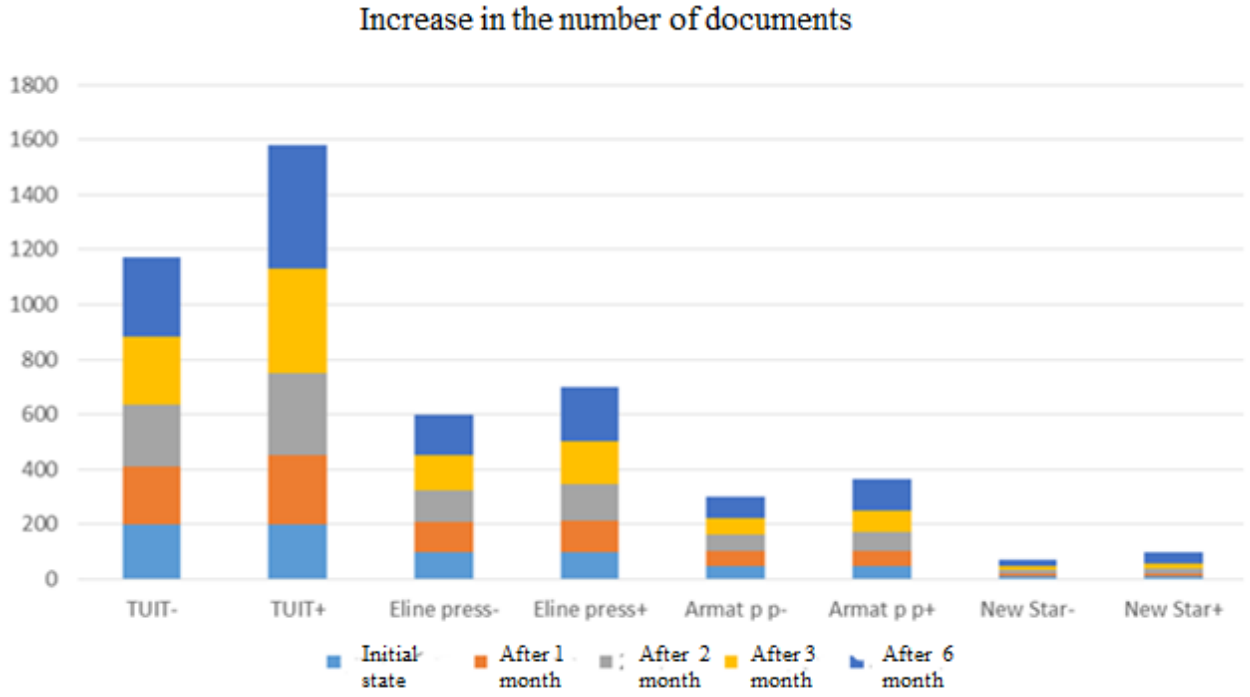

Figure 2. Increase in incoming and outgoing documents in organizations.

Figure 2 also shows the number of documents in the document flow in organizations. "+, -" - the introduction of a model solution accordingly. Discussing these results as a percentage, we obtained the results in Figure 3 below.

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Vol. 7, Issue 10 , October 2020

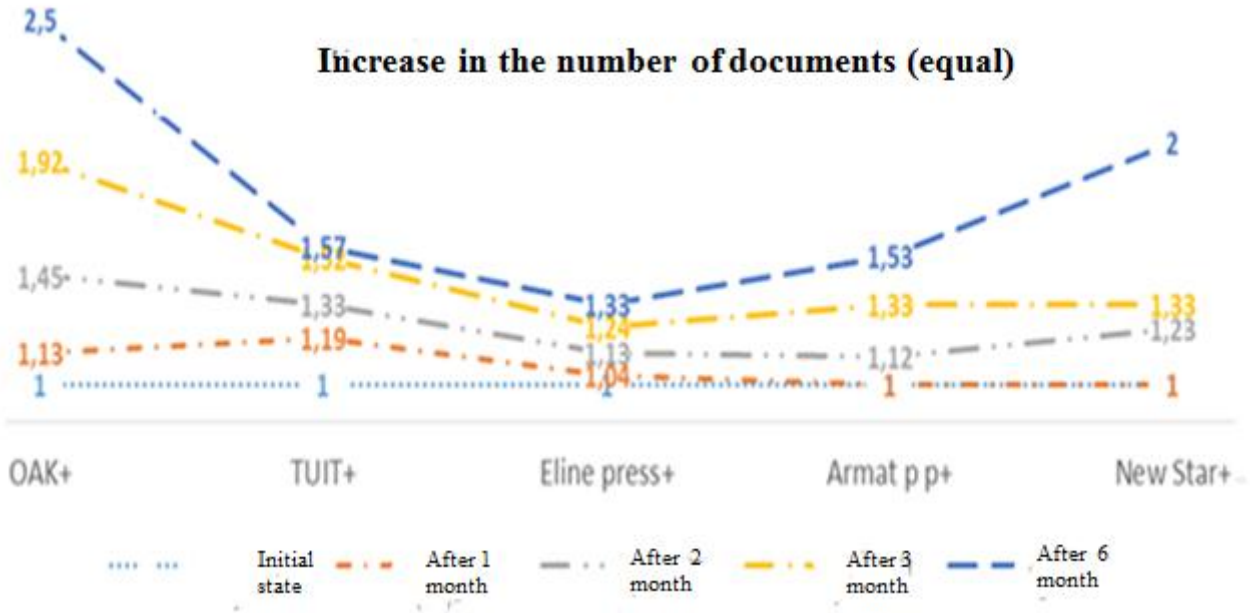

Figure 3. Increase in the number of documents in the circulation of documents in organizations (in equal proportions)

IV. CONCLUSION

Through the classes of classified EDCS and the analytical arrangements of the numerical models (1), (2), (3), (4) respectively, it is conceivable to control the shared precision of the records within the EDC framework. We show the arrangements of these scientific models in our other articles. Based on mathematical models, the organization's Lokal, corporate, Regional, and global (on the off chance that any) EDCSs are anticipated to decide archive turnaround times, expanding organizations 'annual incomes by 5% to 10%. Agreeing to lead specialists and researchers, the significance of these scientific models is hypothetical in terms of exactness and its execution in hone, as well as an approach to building scientific models of real-time information handling and administration of other information systems.

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