ON THE ACCOUNTING SYSTEMS (ACCORDING TO MONUMENTS OF THE ANCIENT NEAR EAST)

Gia Kvashilava President of the Academy of Phasis, Georgian Patriarchate
St. Tbel Abuseridze University, Professor
E-mail: gia.kvashilava@tsu.ge

Presented by the Scientific Committee of the 1st International Conference and the Institute of Economics and Business of the Tskhum-Abkhazian Academy of Sciences

Abstract. The analysis of archaeological material made it possible to answer the following questions: when, where, why, and how accounting systems, mathematics, the art of writing, and script originated and developed producing the social-economic revolution.

The work describes the accounting systems used in Near East since the Neolith Age. The accounting was kept with the help of clay tokens, denoting numbers, and various goods. Sometimes the clay tokens were attached to clay bullae hung on wool ropes or were put into spherical bulla-envelopes and then sealed. They were stamped on the outer surface of the clay bullae and denoted the number of tokens in the bullae.

The process of stamping with the tokens on the outer surface of the clay bullae resulted in the appearance of pictographic, linear and cuneiform scripts in 3500-2800 BC. These scripts are found on numerous clay tablets, the deciphering of which proves that writing is an immediate result of counting goods and was used for economic and administrative registration.

Keywords: *Accounting systems, clay tokens, clay bullae, the origin of writing.*

Introduction. The simultaneous conception and development of economics, applied mathematics, the art of writing and script is confirmed in 3,709 pieces of clay tablets dated back to the 3500-2340 years BC, found around 1928-1976 in the Sumerian city of Uruk at the archaeological site of the Eana complex. The archaeological site of Uruk, which is approximately 250 hectares, is located in Mesopotamia, in the southern province of Iraq, near the city of Nasiriyah, 35 km east of the Buranun (Euphrates) River. Uruk was founded in IV millennium BC. It is known in written monuments as Sumerian Unug, Hebrew ’Erek, Ancient Greek Orékh and Arabic Al-Warka. It is assumed that the word Iraq is derived from the form Erek (www.ancient.eu/uruk). The Sumerians called their country Kiengir / Kiengi and their

language - Emegir / Emegi. The Akkadian Semites mentioned it as Shumeru, the writers of the Old Testament - Shinar.

During the excavations of the Uruk temple in 1929-1930, the German archaeologist Julius Jordan found 1.25-3.25 cm long clay tokens, ("clay tokens", "jetons d'argile"). The small tokens represented e.g. "cow", "ox", "pig", "dog", "goat", "sheep", "sheep's milk", "lamb", "wool", "cloth", "bread", "cereals" ("barley", "wheat"), "oil", "honey", "beer", "dishes" or anything else (Schmandt-Besserat 1996:72-78). Figure-symbols are geometric bodies of different shapes, - "triangle", "quadruple", "disco", "core", "hemicore", "cylinder", "tetrahedron", "ovoid", "cone", "bicone", "Paraboloid", "Pyramid", etc., some of which have lines and dots on it (Schmandt-Besserat 1992, II:xxi-xxxiii; Schmandt-Besserat 1996:15, 16, 18, 20-21, 40, 43, 49, 52, 53, 69-70, 72-78, 128-157).

In 1958, the American archaeologist Vivian Broman-Morales presented material in his master's thesis on clay tokens, such as "cones", "tetrahedrons" and "miniature vessels", discovered in the Neolithic settlement at Jarmo, east of the city of Kerkuk, Iraq, in an archaeological site (Broman Morales 1983:387, 388, 390, 396, Plate 168.3-7, Plate 170.4). Similar clay tokens of the same age were also discovered in Tefe Sarab (Broman Morales 1990:ix, 23-24, 54, Plate 16, i-o, p-s).

Subsequently, valuable archaeological materials were collected in thirty museums of fifteen countries and also in private collections: 8162 pieces of clay tokens and 235 pieces of clay spherical bulla envelope ("bulla", "bulle-enveloppe"). Such tokens and bulla envelopes have been found in 116 archaeological sites of Middle Eastern countries - Iran, Iraq, Syria, Turkey, Jordan, Israel, and Palestine, which date back to the IX-I millennium BC. "For scientists, their purpose remained unclear for a long time, and they were initially considered as some insignificant cult objects" (Gamkrelidze et al. 2008:503).

As a result of the systematic study of these archaeological materials in 1969-1971, the French-American art historian Denise Schmandt-Besserat developed the latest scientific concept and published her fundamental works, in which research questions are depicted in a convincing and well-founded manner, for example, about economic transactions, economic accounting and settlement systems, the origin and development of writing. According to his research, small clay tokens and bulla envelopes were used for essential economic, administrative, social, and religious activities, for accounting agricultural and workshop products. The figure-symbols are counting tokens, by counting the number of tokens the quantity of various exchangeable products or goods were determined. For example, cone-shaped clay tokens representing "a small amount of grain [barley]" represented the number "one", and a core-shaped clay token representing "a large amount of grain [barley]" represented

the number "ten", etc. (Schmandt-Besserat 1992, I:6; Schmandt-Besserat 1996:7, 119; Gamkrelidze et al. 2008:501, 503).

The quantity of these tokens or counting tokens, addition or subtraction was an indicator of the number of items. This system of accounting improved the forms of communication, correspondence, data processing and information storage, which was necessary for optimal, best decision-making. As D. Schmandt-Besserat says, clay counting tokens "were part and parcel of the Neolithic phenomenon; that is, the so-called agricultural revolution" (Schmandt-Besserat 1992, I:41).

At the beginning of the 4th millennium BC, early Mesopotamia farming and herding societies gradually simplified accounting systems for crop yields, products (e.g., grain, milk, dairy products, oil, etc.), land areas, and labor (e.g., sexagesimal system, bi-sexagesimal system, etc.). During the processing of archaeological materials of this period, the following two steps are distinguished:

I. Accounting of products by means of clay tokens;

II. Accounting of products by drawing signs on clay plates.

At the first level, appropriate clay tokens were used to count agricultural products and other types of objects. In some cases, figures and symbols were pierced in order to be attached to the pile of clay poured into the wool. They were often placed in a clay ball, a hollow envelope, at the head of the tokens, which was closed and sealed. The sealed and closed envelope had to be opened later in order to check the number of tokens in it. If the envelope was made of wet, not dry clay, then geometric images - concave figures - were imprinted on its outer surface by firmly holding the tokens, which recorded the number of tokens that were placed in the envelope. These concave figures conveyed the corresponding product and its quantity and it was a step forward in the emergence of the art of writing.

At the second stage, the placing and storage of tokens in clay pots was mostly stopped. Instead of that, they began to flatten raw clay envelopes. Thus, the craft of making clay tablets advanced gradually, which improved and spread in certain areas of ancient Mesopotamia. At this period of time, tokens were printed on the surface of the raw clay plate, which represented the corresponding concave figures. To say shortly, clay tokens were gradually replaced by corresponding concave figures on clay tablets, which, for example, denoted grain and its quantity.

Thus, there were created clay tablets where concave figures were depicted. According to archaeological materials, these concave figures denoted, for example, "one", "ten", "sixty", "sheep", "wool", "cloth", "pot", "milk jar", "cereal" and various other goods. Between the period of 3350 BC and 2800 BC, construction activities expanded, pottery technology

advanced, and works of art were created at Uruk. Cultural development gave birth to economic, religious, political, and social structures. To develop urban economic activity, it was necessary to strengthen the control of work performance, planning, trading and taxation, collection, delivery, and receipt of goods, accounting of taxes and donations, registration of temples, public buildings and land, calculation of area and construction cost, etc. During this period, early farming societies such as the Sumerian Engars / Mungars[1] - "farmers", simplified printing on clay tablets to register economic activity. Some tokens were not used anymore, but for example, concave tokens representing "one", "ten" and "sixty" are attested on clay tablets during the later period as well. They began frequent use of a stylus, a pointed stick. According to the geometric principle, flat figures corresponding to concave figures, so-called pictograms, signs were drawn on raw clay plates with a stick. This was the first important step toward the conception of writing[2] and writing signs. According to many archeological materials, it is confirmed that the accountants of economic accounts of the Uruk temple depicted the tokens of goods and the numbers expressing their quantity on clay tablets.

Since about 3000 BC, the tokens drawn with a stylus on a soft clay plate (Sumerian dub) gradually transformed into nail-like (wedge) marks, which were given phonetic meanings. With this writing system, it was called "cuneiform (wedge) script", the inscriptions on the clay tablets made with the signs were read in the Emegir - Sumerian language.

In the "schools of transcribes" (Sumerian Eduba) Mesopotamia, the signs of the cuneiform script were written and preserved, for example, tables of multiplication of natural numbers in the hexadecimal system, the "Pythagoras theorem", tables of trigonometric functions, accounts of land, goods, dishes, receipt, rxchange and ristribution, balance sheet, irrigation tax, ransom money, interest loans and debts, lists of agricultural products and food rations, etc.

According to the archeological material, the cuneiform script was active since 2800 BC to 63 BC. It was used by: Sumerians, Elamites, Hutterites, Akkadians, Assyrian-Babylonians, Hittites, Urartians, Canaanites, ancient Persians, and other ancient peoples. According to the special literature, 263,659 pieces of clay tablets with cuneiform script have been cataloged in museums, universities, libraries, and private collections in Europe, America, Canada, Iraq, Iran, Syria, Turkey, and other countries.

Conclusion. The maintenance of economic accounting and writing systems is a genius achievement of human beings, which took about 5000 years to develop since the beginning of the Neolithic period in Mesopotamia. According to the research of D. Schmandt-Besserat, it is

[1] Comp. Sumerian engar, mungar - "farmer": Georgian monagari - "offspring".
[2] Comp. Sumerian sar - "writing": Georgian tser-a, Megrelian char-u-a, Laz char-e - "writing".

clear that writing as a socio-cultural phenomenon derives from the type of communication and information exchange that first arose in early farming societies due to the need of recording economic activities for example, due to the need to make an account of the excess amount of agricultural products (Gamkrelidze et al. 2008:500; comp. Tenu 2016:16).

Between the period of 3500 BC and 2800 BC, the appearance of the art of writing and script among accountants in Uruk led us to the end of oral communication and oral arithmetic operations. Since this period of time, quantitative methods began to be used and processed, and the information about the problem was searched, recorded, and analyzed. Creating a possible plan for the problem and the optimal decision-making process. This has caused a socio-economic revolution of society and significantly raised the standard of living.

References:

1. Gamkrelidze et al. 2008: Gamkrelidze T., Kiknadze Z., Shaduri I., Shengelaia N., Theoretical Linguistic Course Tbilisi: Tbilisi University Publishing House
2. Broman Morales 1983: Broman Morales, V., Jarmo Figurines and Other Clay Objects, Prehistoric Archaeology Along the Zagros Flanks, Vol. 105, L. S. Braidwood et al., Eds., Chicago: University of Chicago Press, pp. 369-423
3. Broman Morales 1990: Broman Morales, V., Figurines and Other Clay Objects from Sarab and Cayönü, Oriental Institute Communications, Vol. 25, Chicago: Oriental Institute of the University of Chicago
4. Ebrahim 2019: Ebrahim, A., The Mathematics of Uruk and Susa (c. 3500-3000 BCE), Mathematical Science & Technologies, http://mathscitech.org/articles/mathematics-uruk-susa
5. Jordan 1931: Jordan, J., Zweiter vorläufiger Bericht über die der Notgemeinschaft der deutschen Wissenschaft in Uruk unternommenen Ausgrabungen, aus den Abhandlungen der Preussischen Akademie der Wissenschaften, Jahrgang 1930, Berlin: Verlag der Akademie der Wissenschaften, pp. 3−55
6. Schmandt-Besserat 1992, I, II: Schmandt-Besserat, D., Before Writing, Vol. I: From Counting to Cuneiform, Vol. II: A Catalog of Near Eastern Tokens, Austin: University of Texas Press
7. Schmandt-Besserat 1996: Schmandt-Besserat D., How Writing Came About, Austin: University of Texas Press
8. Tenu 2016: Tenu, A., Les débuts de la comptabilité en Mésopotamie (The emergence of Accounting in Mesopotamia), Comptabilités, Revue d'histoire des comptabilités, pp. 1-21

საბუღალტრო აღრიცხვის სისტემების შესახებ
(უძველესი ახლო აღმოსავლეთის ძეგლების მიხედვით)

გია კვაშილავა

ფაზისის აკადემიის პრეზიდენტი, საქართველოს საპატრიარქოს წმ. ტბელ აბუსერიძის სახელობის უნივერსიტეტი, პროფესორი
E-mail: gia.kvashilava@tsu.ge

წარდგენილია ცხუმ-აფხაზეთის მეცნიერებათა აკადემიის I საერთაშორისო კონფერენციის სამეცნიერო კომიტეტისა და ეკონომიკისა და ბიზნესის ინსტიტუტის მიერ

აბსტრაქტი. არქეოლოგიური მასალის შესწავლის შედეგად, შრომაში პასუხი გაცემულია შემდეგ კითხვებზე: სად, როდის, რატომ და როგორ გაჩნდა და განვითარდა საბუღალტრო აღრიცხვის სისტემები, მათემატიკა, წერის ხელოვნება და დამწერლობა, რამაც გამოიწვია სოციალურ-ეკონომიკური რევოლუცია.

შრომაში განხილულია საბუღალტრო აღრიცხვის სისტემები, რომელიც ნეოლითის ხანიდან გავრცელებული იყო ახლო აღმოსავლეთში. აღრიცხვა ხორციელდებოდა თიხის ფიგურა-სიმბოლოების, საანგარიშო კოჭების სისტემის მეშვეობით, რომლებიც რიცხვებსა და სხვადასხვა ტიპის საქონელს აღნიშნავდა. გარკვეულ პერიოდში ფიგურა-სიმბოლოები თიხის გუნდაზე მატყლის ბაწარზე ასხმული მაგრდებოდა ან ბურთისებური ყულაბების შიგნით იყრებოდა და ილუქებოდა. ზოგ შემთხვევაში ისინი თიხის ყულაბების გარეთა ზედაპირზე იბეჭდებოდა, რაც ყულაბებში მოთავსებული კოჭების, ანუ "პროტო-ფულადი ნიშნების" რაოდენობას აღრიცხავდა.

თიხის ყულაბების გარეთა ზედაპირზე ფიგურა-სიმბოლოების ბეჭდვის პროცესმა ჩამოაყალიბა ნახატ-ნიშნიანი, ხაზოვანი და ლურსმული დამწერლობები, რომლებიც ძვ.წ. 3500-2800 წლებში ჩნდება. ამ დამწერლობებითაა შესრულებული უამრავი თიხის ფირფიტა, რომელთა გაშიფრვით დასტურდება, რომ წერა საქონლის, ანუ შრომის პროდუქტის დათვლის პირდაპირი შედეგია და

გამოიყენებოდა სამეურნეო-ადმინისტრაციული აღრიცხვა-ანგარიშგების შესაქმნელად.

საკვანძო სიტყვები: *საბუღალტრო აღრიცხვის სისტემები, თიხის ფიგურა-სიმბოლოები, თიხის ბურთისებური ყულაბები, წერის ხელოვნების გაჩენა.*