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SEARCHING FOR THE ROOTS OF CONTEMPORARY BRANDING: STUDY OF CYLINDER SEALS FROM THE DAWN OF ANCIENT EGYPT

What has been will be again,
what has been done will be done again;
there is nothing new under the sun.
Ecclesiastes 1:9-10

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Abstract

The paper presents a small part of the outcome of scientific research devoted to the investigation of branding genesis. The study is focused on the cylinder seals that have been used in the economic life during the very beginning of the Egyptian state. The time scope of the study encompasses Dynasties I-III. The thorough investigation of the cylinder seals includes defining their typology on the basis of the text context engraved on them. A comparative analysis of the ancient (proto)brands versus the contemporary analogues is presented. As the research includes hundreds of seals classified in major classes, classes, cluster groups and clusters the total volume of the analysis is huge – because of that the results will be published consecutively in several publications.

Keywords: genesis of branding, cylinder seals, Ancient Egypt

JEL: M31, N00

Introduction

Goal, object of research, subject of research, methods and hypotheses

The research results presented in this paper are part of a bigger scientific research devoted to the genesis and evolution of branding. The **goal of this research** is to investigate the genesis of branding and to establish the time and geographic dimensions of the establishment of branding practices in the early economic life of human civilization.

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The Object of research encompasses Ancient Egypt's cylinder seals and imprints of such seals (dated Dynasty I-III). From archeological reports as well as from museums' online collections we gathered 942 descriptions and translations of artifacts (seals and imprints). Some of them are not readable – there number is 165. The total number of the readable artifacts is 777. Part of them, however, are fragmented – they equal 118. So, the total number of the readable seals is 658. This is the size of the database of our study. In this paper we present an analysis of the so called Official institutional seals – their number is 105. The rest of the analysis will be published in other publications.

The subject of research includes the genesis of branding and mainly the sustainable branding practices dated 4000 – 5000 years ago that have survived and developed during the millennia. The subject of research includes also a comparison between the ancient protobrands and the contemporary ones.

The **research methods** we applied include content analysis and cluster analysis. **The main research hypothesis** is the following: *H: The genesis of branding as a systematic practice (not occasional markings on pots) in the economic life of humankind happened in the Beginning of Antiquity – and more specifically – simultaneously with the birth of the Ancient Egyptian state.*

The proof of the General hypothesis passes through proving the following (specific) **research hypotheses**:

*H1: During Dynasties I-II the **roles/functions** (after Keller 2014) of protobrands are similar (in some cases identical) as the role of contemporary brands.*

*H2: The **linkage between product differentiation (especially geographic) and branding** was born at the Beginning of Antiquity (Ancient Egypt).*

*H3: The **logo** was invented in the dawn of Ancient Egypt. From the point view of graphic design – the idea for a logo has emerged on the basis of Egyptian hieroglyphs.*

*H4: Rudiment brands (protobrands) of **production centers** emerged at the very beginning of the Ancient Egyptian State (4000-5000 years ago).*

*H5: Protobrands of **non-production estates** (palaces, residences, etc.) appeared with the birth of the Egyptian State.*

*H6: Protobrands of **religious institutions and centers** in Ancient Egypt are predecessors of contemporary ones.*

*H7: The protobrands of ancient Egyptian fortresses are the "ancestors" of branding the contemporary **military facilities**.*

Role of cylinder seals in the Ancient Egyptian economic system

At the beginning of Antiquity cylinder seals were used as an administrative tool and personal identification. In personal life they were often a symbol of prestige and even were used as a "jewelry". Cylinder seals were made of wood, stone,

animal bone, minerals and even gold. We are interested in those seals that were used in the economic system of Ancient Egypt. We chose to analyze Egyptian seals because there are many literature resources connected with this topic and translations of the texts are relatively easy to be found. In the process of analyzing the text components of the cylinder seals we used the translations of Peter Kaplony (Kaplony, 1963).

The size of Egyptian cylinder seals for economic purposes is approximately 5-7 cm long with different diameters (usually 1-3 cm).

Figure 1: Replica of a cylinder seal (wood) made by Rumen Kovachev on the basis of Petrie, W.M.F. Griffith, F.L., The Royal Tombs of the First Dynasties, Petrie & Griffith, 1900I, Egypt Exploration Fund, London, 1901, fig. 139.

The technology of sealing included the following: After the ceramic jar had been filled (with wine, beer, olive oil, etc.) the lid of the jar was fixed on the top. The next step was to put wet clay over the top and to form a conus-like shape by hands. This clay was not baked but let to dry naturally. In this way it was easy to remove it later and open the jar. Across the wet clay a cylinder seal was rolled over and in this way the text on the seal was "printed". The texts usually contain information about the Pharaoh's name, title of manager, Production center (winery, fabrics workshop, leather workshop, etc.), temples, palaces, State's institutions (Treasury, Territorial tax offices, Provisioning departments), military facilities (fortresses), professional communities, etc.

Figure 2: Sealing/labeling wine: ceramic jar on the left sealed by a cylinder seal (about 4500 years ago) and a contemporary bottle of wine with banderole (drawing by Rumen Kovachev)

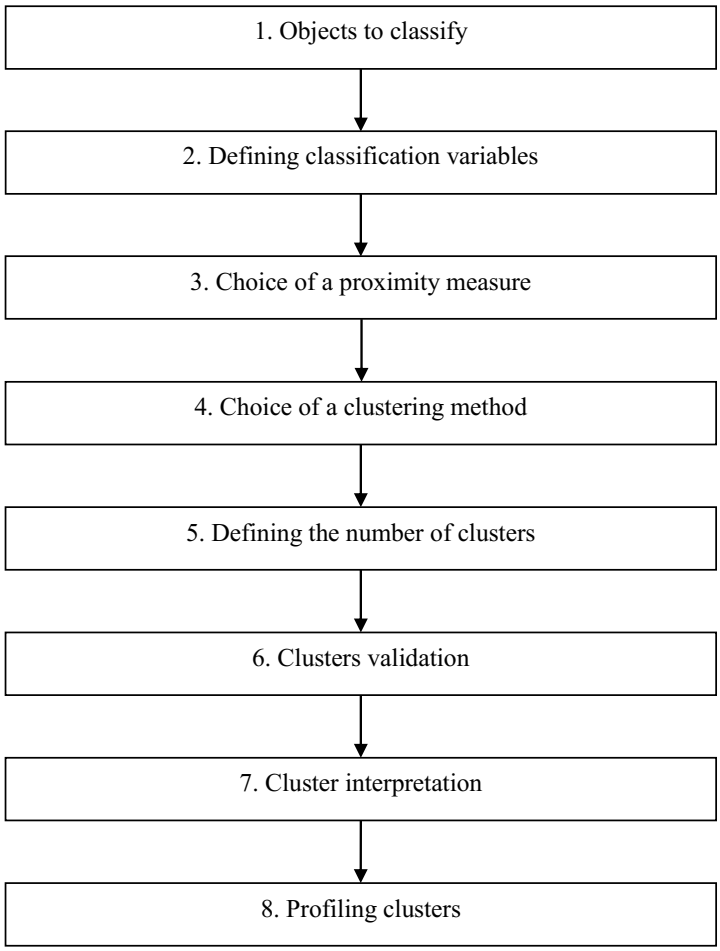
About 4000 – 5000 years ago the use of cylinder seals was spread in the areas of Ancient Egypt, Mesopotamia and Harappa civilization (Indus valley). Figure 2 presents an Ancient Egyptian jar sealed by a cylinder seal.

Classification of Official cylinder seals with Institution

General framework of research methodology

The research methodology includes the application of cluster analysis, which will classify the cylinder seals on the basis of the text components. \

These artifacts were (as mentioned above) described, coded and analyzed. An important part of the overall analysis is the classification. It will contribute to the differentiation of the cylinder seals into homogeneous subgroups and the disclosure of the internal structure of the *a priori* defined groups. Thus the evidence for usage of (proto)brands will be revealed as well as their specifics. The procedure for applying the cluster analysis is shown in Figure 3.



Source: Adapted on the basis of Milligan (1996, pp. 341-375) and Jelev (2000, p. 169).

Figure 3: Procedure of applying cluster analysis

Step 1: Objects to classify

As the task of classifying and analyzing is huge we decided to present part of the results. We follow the previous studies and accept a priori the broad classification of Peter Kaplony (Kaplony, 1963), who defined groups of cylinder seals when translating their text. For the sake of clarity, we named these broad groups "major classes". The most important major class from a branding point of view is the so called Official seals (OS). The reasons for starting with it are:

1) This major class of cylinder seals is one of the most numerous. The entire database could not be presented here because of volume limitations but this will be done in other publications.

2) This major class of cylinder seals contains (as will be seen) signs that are similar to today's brands (or trademarks) and we call them protobrands.

So the cylinder seals belonging to that major class (OS) firstly were extracted from the overall database and secondly each of them was investigated via the method of content analysis and cluster analysis. Within the major class we did a final step of a priori clustering – it was split into two class: (1) cylinder seals with Institution sign/protologo and (2) cylinder seals without Institution sign/protologo (Figure 4). When mentioning Institution in this paper we have in mind any organization mentioned in the seals' text in Ancient Egypt – agricultural farms, workshops, temples, military facilities, fiscal institutions (state treasury), tax collecting offices, logistic departments (supplying certain recipients as King's family, granaries, etc.). It is interesting that at the beginning of the Egyptian state (Dynasties I-III) even the temples and palaces were "branded" as will be shown below.

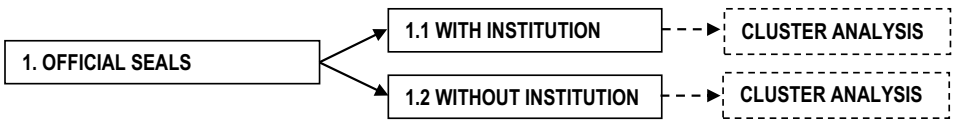


Figure 4: A priori split of the major class "Official seals" into two classes – with and without sign/protologo of an Institution

The total number of the readable Official seals is 156. Within these 156 Official seals there are 105 with Institution and 51 without Institution. The ratio Official seals with Institution: Official seals without Institution is 2,06.

As the research is huge, presenting all results is really impossible in a single paper, so we will focus our attention on the first class (a priori defined) of seals – Official seals with Institution. This decision was taken because this class of seals contains signs/logos of different organizations and in this sense the analysis of the genesis of branding should start exactly from here.

Step 2: Definition of classification variables

In the research process a scheme (checklist) for characteristics coding was developed. Each inscription on a product was registered (for example indication of the manufacturer, location, product type, title of manager, etc.). In other words, a registration form with the classification criteria was filled in for each seal. All text components engraved on all cylinder seals within the database are the following (1) God/ Message: (2) King's name; (3) Personal name (different from King's name); (4) Title; (5) Institution; (6) Product category (Table 1).

Table 1: Classification variables – identity and type

№	Classification variables	Type
1	God/ Message	binary
2	King's name	binary
3	Personal name (different from King's name)	binary
4	Title	binary
5	Location	
6	Institution	binary
7	Product category	binary

Table 1 exhibits the classification variables. All of them are binary: 0 or 1. The presence of a variable in labels is indicated as 1; the absence is indicated as 0. The classification variables were checked for multi-co-linearity (Table 2).

Table 2: Association matrix of classification variables for Class "Cylinder seals with Institution"

God	Cramer's V	*						
	(Approx. Sig.)							
King	Cramer's V	a	*					
	(Approx. Sig.)							
Name	Cramer's V	a	a	*				
	(Approx. Sig.)							
Title	Cramer's V	0,140	a	a	*			
	(Approx. Sig.)	(0,151)*						
Location	Cramer's V	0,110	a	a	0.546	*		
	(Approx. Sig.)	(0,260)*			(0,000)			
Institution	Cramer's V	a	a	a	a	a	*	
	(Approx. Sig.)							
Product	Cramer's V	0,105	a	a	0,144	0.094	0.083	*
	(Approx. Sig.)	(0,280)*			(0,141)*	(0.532)*	(0,338)*	
Variables	**Cramer's V**	**God**	**King**	**Name**	**Title**	**Location**	**Institution**	**Product**
	(Approx. Sig.)							

a – the variable is "a constant" and because of that correlation coefficients are not computed

* – Cramer's V is not significant

The values of Cramer's V coefficient presented in Table 2 indicate that there is a single moderate association – 0,546 (Title-Location). The rest of the coefficients are insignificant /indicate little (if any) association/. On the basis of the association matrix's data we can draw the conclusion that the cluster analysis may be applied because the variables are not associated (except the already mentioned moderate association).

Step 3: Choice of a similarity measure; Why Jaccard index?

Having in mind that all classification variables are binary the choice of a similarity measure needs to match the requirement of taking into account the binary structure of the data. A comparison between two cylinder seals is presented in Table 3 where the matches and mismatches are indicated as follows:

- **a** is the number of variables corresponding to (i,j)=(1,1);
- **b** is the number of variables corresponding to (i,j)=(0,1);
- **c** is the number of variables corresponding to (i,j)=(1,0);
- **d** is the number of variables corresponding to (i,j)=(0,0);
- **n** is the number of all variables.

Table 3: Binary outcomes for two cylinder seals

j \ **i**	**Cylinder seal i**			
Cylinder seal j	**Outcome**	**1 (presence)**	**0 (absence)**	**Total**
	1 (presence)	*a (1,1)*	*b (0,1)*	*a+b*
	0 (absence)	*c (1,0)*	*d (0,0)*	*c+d*
	Total	*a+c*	*b+d*	*n=a+b+c+d*

Source: Developed on the basis of: Everit (2011, p. 47), Drennan (2009), Jaccard (1908, p. 278) and Choi, Cha (2010, p. 42).

In specialized publications one can find numerous similarity measures – for example Gower and Legendre have analyzed the properties of 15 similarity coefficients (Gower and Legendre, 1986) while Choi and Cha have collected and classified 68 similarity measures for binary data (Choi, Cha, 2010). The existence of such a plethora of similarity measures is due to the tricky decision "what to do with the apparent uncertainty as to how to deal with the count of zero–zero matches" (Everitt et al., 2011, p. 46). There are binary variables (as gender) for which the coding is insensitive – any of the two categories (male, female) could be coded as 0. In such cases "0-0" matches are entirely identical to "1-1" matches "and therefore should be included in the calculated similarity measure" (Everitt et al., 2011, p. 46). But in other circumstances the coding "0" means a real absence of an attribute – in the case of this study it may mean absence of any of the

components: (1) God/ Message; (2) King's name; (3) Personal name; (4) Title; (5) Location; (6) Institution; (7) Product category.

Therefore, it is important to evaluate whether the simultaneous absence of a certain feature (text component) in *Cylinder seal i* and *Cylinder seal j* provides appropriate data about the similarity between the two cylinder seals. The question is: is a pair of cylinder seals more similar if they lack a considerable number of text components (matches of type (0,0))? In the context of the classification of Ancient Egypt's cylinder seals the answer is "No". That's why it is reasonable to choose a similarity measure for binary data that eliminates the effect "0-0" (marked as d in Table 3). There are many similarity coefficients of that kind but we chose Jaccard index (Jaccard, 1908) because it has been probed for a long period of time and is "proven" in many studies. The formula for calculating the Jaccard index for assessing the similarity between *Cylinder seal i* and *Cylinder seal j* is as follows:

$$S_{ij} = \frac{a}{a+b+c}, \text{(Everitt, 2011, p. 47)},$$

Other arguments in favor of accepting the Jaccard similarity measure are connected with its integration in most of the software programs for cluster analysis in different scientific areas. The Jaccard similarity measure has been applied in the fields of: (1) ecology; (2) biology; (3) ethnography; (4) geology; (5) chemistry; (6) iris images classification; (7) handwriting recognition (Choi, Cha, 2010, p. 42).

Jacquard similarity measure is also adopted and tested in the sphere of archeology. There are specific publications devoted to the application of clustering algorithms in the context of archeological data that focus attention on the implementation of the Jaccard similarity measure (Hodson, Tyers, 1988). The Jaccard similiarity measure has been used in numerous archeological studies (Marquardt, 1978; Prignano, Morer, Diaz-Guilera, 2017). The Jaccard similarity measure was successfully applied in an archeological study of typology of Actecs' sculputures (Baquedano, 1989).

Step 4: Choosing a clustering method

Cluster methods (procedures) can generally be divided into two main groups – hierarchical and non-hierarchical. These two main groups of methods, as well as their variants, are illustrated in Figure 5.

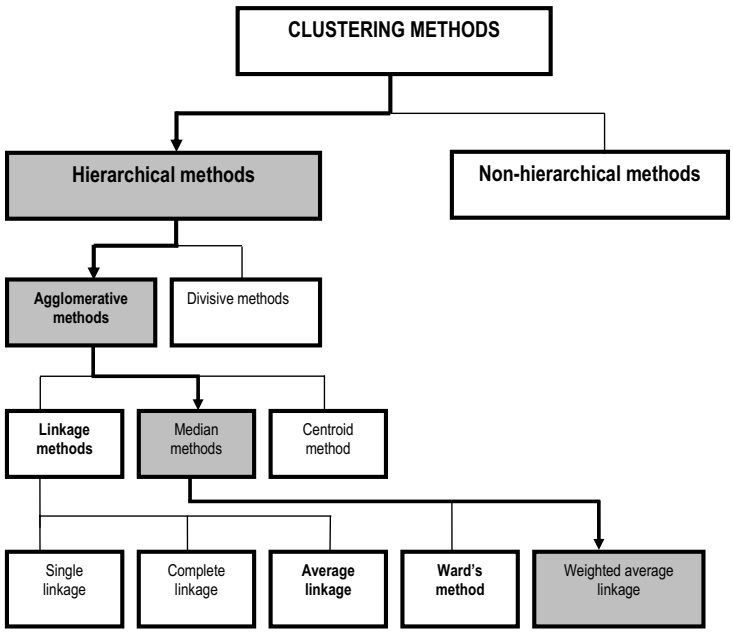


Figure 5: Choosing a clustering method: sequence of decisions

Figure 5 illustrates the sequence of decisions (indicated by arrows) concerning the choice of a clustering method. We have preferred the group of hierarchical clustering methods because of their widespread acceptance, tested algorithms for many years and well developed and accessible software programs. Within the hierarchical methods there are two broad groups – agglomerative and divisive methods. As could be seen (Figure 5) we have chosen the group of agglomerative methods and after that Linkage methods. Within the Linkage methods we chose Weighted Average linkage. Below one can find arguments in favour of these decisions.

Why hierarchical agglomerative clustering?

The hierarchical cluster analysis performs the classification sequential process (step by step), not at once. It may start from a single cluster containing all artifacts and end in n clusters containing single artifacts. This classification process of separating all artifacts into smaller groups is an illustration of the *divisive clustering method*. The opposite approach is the *agglomerative clustering method*: it aims at the same goal but starts from the opposite direction – each artifact (object) is considered as a cluster and a sequence of fusions lead to one cluster containing all artifacts. Hierarchical clustering is important and useful because its output includes a dendogram (known also as a classification tree or diagram tree)

which describes clusters' formation at each stage of the clustering process. It is considered as appropriate for biological studies but the relevance of hierarchical clustering is much broader: "other areas where hierarchical classifications might be particularly appropriate are studies of social systems, and in museology and librarianship, where hierarchies are implicit in the subject matter" (Everitt et al., 2011, pp. 72-73).

Historically hierarchical agglomeration methods are very popular among researchers (Aldenderfer, Blashfield, 1984, p. 35) and this statement is valid in the field of marketing research. Nowadays the development of software programs for cluster analysis has advanced considerably as well as the sophistication of the clustering methods.

Non-hierarchical cluster methods

In non-hierarchical cluster analysis, clusters are formed by grouping objects around specific points, optimizing some predefined criterion. The most important specific feature of non-hierarchical methods is *iteration* – i.e. the classification of an object in a particular cluster is not final. This means that by the end of the clustering procedure an object can be redistributed to other clusters. As the family of non-hierarchical methods has been developing rapidly during the recent decades there are other methods for non-hierarchical clustering, but the K-means is one of the most widespread[2]. The main advantage of nonhierarchical methods is their iterative nature which means that these methods distribute objects into clusters based on an optimization procedure. A typical feature of non-hierarchical clustering is the necessity of preliminary fixing the number of clusters by the researcher. The main risks of non-hierarchical cluster methods are related to the possibility of a subjective intervention of the researcher, which is necessary when determining the number of clusters or when determining the values of cluster centers. These risks can be reduced if the investigator has a reliable theory, a well-founded hypothesis or extensive practical experience of the number of possible clusters. A combination of hierarchical and non-hierarchical cluster methods can be used to avoid the above risks. By initially applying hierarchical clustering on a subsample, it is possible to determine the number of clusters and their centroids, which can then be used as command parameters for the non-hierarchical clustering.

The first decision to be made when choosing a cluster method concerns the type of method – **hierarchical or non-hierarchical**. For the purposes of the present study, the method of hierarchical agglomerative clustering was selected. This method was chosen after comparing the advantages and disadvantages of the hierarchical and non-hierarchical methods, respectively. The reasons for this choice are the following:

[2] For more details about the types of clustering methods one may see: Henning, Meila, Murtagh, Rocci (2016).

1) Good opportunities for cluster visualization of hierarchical cluster analysis. In hierarchical clustering, objects are distributed in clusters after multiple steps. This characteristic feature of the hierarchical methods allows the process of merging/dividing the clusters to be represented graphically in the two-dimensional space by a dendogram, which mathematically represents the process of clustering. The nodes of the dendogram denote the clusters, and the stems (heights) represent the distances at which the respective clusters are formed. The arrangement of the nodes and stems of the dendogram forms its structure.

2) Facilitated interpretation of clusters. It is obvious that the dendogram provides good visualization of the clustering process but it also helps researchers in the process of clusters' interpretation. For example, the dendogram clearly shows when a cluster contains "subclusters" i.e. formations that could be analyzed and interpreted as parts of bigger clusters. The dendogram also helps identify which clusters are more homogeneous than others, etc.

3) Facilitate the complex process of determining the number of clusters. One of the most difficult and controversial issues in cluster analysis is determining the optimal number of clusters. In this context, hierarchical methods have an advantage over non-hierarchical ones, because the optimal number of clusters is defined on the basis of certain rules.

Even in cases where researchers have to assess subjectively the number of clusters, most often they follow the dendogram. Some authors even recommend that the application of a non-hierarchical clustering method be preceded by a hierarchical one. "By initially applying hierarchical clustering to a subsample, it is possible to objectively determine the number of clusters and their centroids, which can then be used as command parameters for the optimal distribution of non-hierarchical clustering" (Aldenderfer, Blashfield, 1984). We applied this approach for the sake of clusters' validation but the results are not presented here because of space limitations.

4) Hierarchical clustering methods are relatively well studied. The most commonly used clustering methods are the hierarchical and more precisely - the agglomerative method. These methods were developed before non-hierarchical ones and have been used for decades to solve various classification problems. They are appropriate for a number of research areas including museology. Clustering procedures have been applied successfully in the area of archeology for decades. Scientists highly evaluate the potential of cluster analysis of archeological data (Aldenderfer, Blashfield, 1978, p. 505), adapt the new clustering methods for the needs of archeological science and develop specialized software for clustering artifacts (Tools for Quantitative Archaeology, 2021).

5) Disadvantages of hierarchical methods and how to overcome them. The main disadvantage of hierarchical methods is related to their characteristic fea-

ture that once the objects are arranged in clusters iterations are no longer performed (in order to optimize the clusters). This feature is characteristic of both agglomerative and divisional methods. Another disadvantage of hierarchical cluster methods is their sensitivity to the arrangement of objects and the possible instability of cluster solutions afterwards. Arranging objects differently (or eliminating some objects) often changes the outcome of cluster analysis. This problem is typical of analyses performed on the basis of small samples.

Having in mind the above mentioned disadvantages of hierarchical cluster analysis we have implemented measures for neutralizing them – among them are validations of hierarchical clustering results.

Why the method of Weighted average linkage clustering?

The method of Weighted average linkage was developed by McQuitty for similarity analysis that is relevant for discrete as well as continuous data (McQuitty, 1966). It is also known as "Weighted Pair Group Method with Arithmetic Mean" – WPGMA.

The reasons for choosing this clustering method are the following:

1) This method is rather effective if cluster sizes differ (Everitt et al., 2011, p. 79). In the present study the situation with clusters sizez is just the same – they differ significantly.

2) The application of Calinski-Harabasz Index indicated a steady decision (for 4 clusters).

3) The interpretation of the clustering decision from the perspective of cluster meaning and potential for logical explanation of defined clusters proved to be highly acceptable.

The above mentioned reasons allowed as to take the decision to apply the Weighted average linkage method in the present study.

Stage 5: Determining the number of clusters

Application of Calinski-Harabasz Index for determining the number of clusters: relevance and essence

Defining the optimal number of clusters is one of the most difficult and complex tasks in the process of cluster analysis. This is due to the lack of clear and proven rules and procedures for defining the optimal number of clusters. Although the scientists are constantly making efforts for developing formal tests for defining the optimal level of numbers there is still much to be desired. In practice "informal and subjective criteria, based on subject expertise, are likely to remain the most common approach" and "in published studies practice could be improved by making such criteria more explicit than is sometimes the case appropriate" (Baxter, 1994).

In order to reduce the subjectivity when determining the number of clusters, we applied the Calinski-Harabasz Index which is **appropriate for binary data** and is calculated "by dividing the variance of the sums of squares of the distances of individual objects to their cluster center by the sum of squares of the distance between the cluster centers" (Baruah, 2020). The VRC (Variance Ratio Criterion) proposed by T. Calinski and J. Harabasz is often marked by CH_k and is calculated by the following formula:

$$VCR = \frac{BGSS}{k-1} / \frac{WGSS}{n-k}$$, (Calinski, Harabasz, 1974, p. 10);

where k is the number of groups (clusters), n represents the number of all objects (seals), BGSS (between groups sum of squares) measures the difference between groups or stated differently – heterogeneity between clusters, WGSS (within cluster sum of squares) calculates inter-group (within cluster) homogeneity.

So, the Calinski-Harabasz Index divides the ***variance of sum of squares*** *of the differences between the cluster centers by the* ***variance of sum of squares*** *of the differences between each specific artifact (seal) and its cluster center.*

The Calinski-Harabasz Index carries the notion that:

1) The clusters themselves consist of similar objects, i.e. there is within cluster homogeneity.

2) The clusters are different from each other, i.e. there is between clusters heterogeneity. This Index gives a foundation for decision making on the basis of the following principle: the higher value of the Index means "better" solution. If a "peak" of the Calinski-Harabasz Index is observed, then the corresponding number of clusters must be chosen.

Determining the number of clusters for "Official Cylinder Seals with Institution"

Determining the number of clusters needs to interpret the value of the Calinski-Harabasz Index. This interpretation is as follows:

A higher index means a higher degree of inter-cluster homogeneity as well as a higher degree of between-cluster heterogeneity. Put differently, the higher value of the Calinski-Harabasz Index "means the clusters are dense and well separated" – "we need to choose that solution which gives a peak or at least an abrupt elbow on the line plot of the Calinski-Harabasz indices (Dey, 2022).

Table 4: Values of the Calinski-Harabasz Index

Data: Cluster with Institution.xls
Similarity measure: Jaccard
Method used: Weighted-average Linkage
Results: . cluster stop _clus_3, rule(calinski)

Number of clusters	Calinski/ Harabasz pseudo-F	
2	42.00	
3	52.87	
4	183.02	<- Optimal number of clusters
5	154.01	
7	544.37	
8	2.38e+17	

The values of index are exhibited in Table 4. The recommended number of clusters is 4 because at this level there is an abrupt peak of the values and the angle of the so called “elbow” is smallest /in other words the peek is higher/.

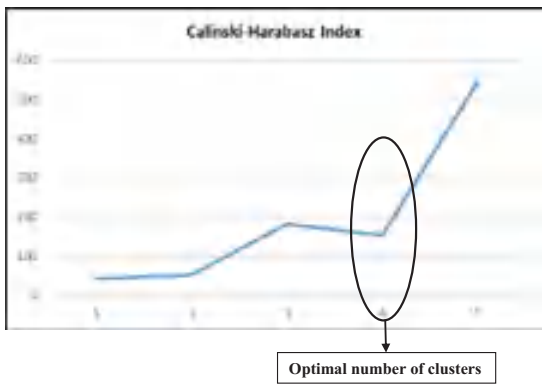


Figure 6: Elbow diagram – values of the Calinski-Harabasz index versus the number of clusters

The “elbow is shown graphically in Figure 6 as well as the determining of the number of clusters. Figure 7 presents the clustering tree (dendogram). We can trace the process of merging objects into clusters and the sequence of cluster formation.

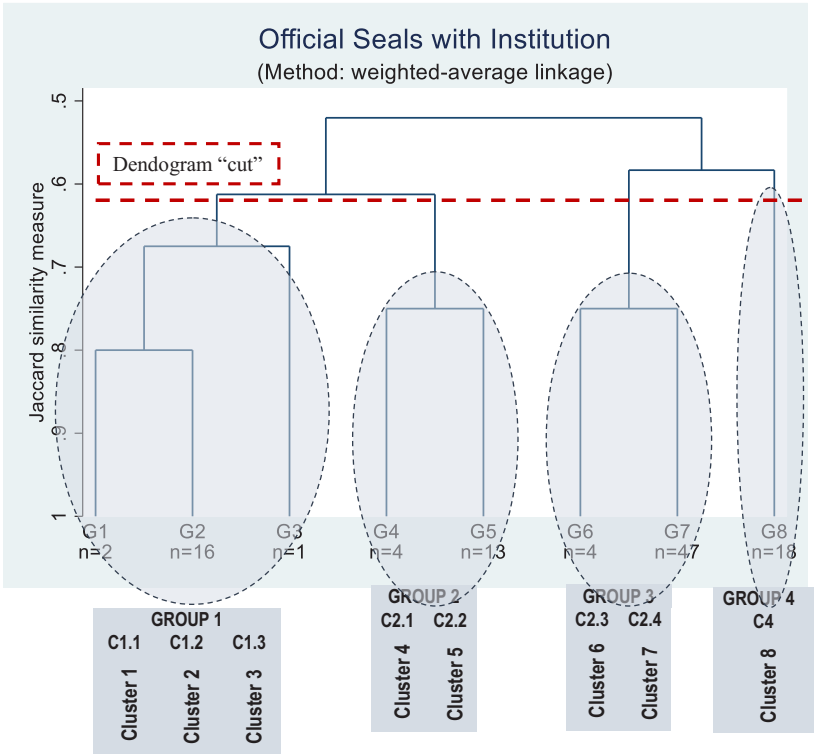


Figure 7: Dendogram

As stated above the number of clusters defined by the rule of the Calinski-Harabasz index is defined at 4. So we have to "cut" the dendogram at that level (Figure 7). The careful analysis however shows that these 4 clusters are not "monolithic", i.e. there is inner structure inside most of them. This inside division of clusters (except Cluster 4) is highly valuable for the analysis of cylinder seals. That's why we will take into consideration the subclusters. From here on the 4 clusters will be named "Cluster groups" and the components (subclusters) of each group will be called "clusters".

Cluster group 1 consists of 3 clusters – Cluster 1.1, Cluster 1.2 and Cluster 1.3. The clusters inside *Cluster group 2* are 2 – Cluster 2.1 and Cluster 2.2. *Cluster group 3* also contains 2 clusters – Cluster 3.1 and Cluster 3.4. The final *Cluster group 4* consists of only one cluster (Cluster 4) – in this case there is a coincidence between the cluster group and the single cluster. In the following sections we are going to analyze the four cluster groups as well as the eight clusters comprising them.

Stage 5: Cluster validation

At this stage of cluster analysis application, we assess the homogeneity of cluster groups as well as clusters (i.e. the homogeneity of objects (seals) belonging to each cluster). The comparison for the variance of each variable for a give cluster group or cluster to the variance for the database is a method for assessing the homogeneity. The assessment can be done by the F-ratio:

$F_{jg} = \frac{\sigma^2_{(j,g)}}{\sigma^2_{(j)}}$, where

$\sigma^2_{(j,g)}$ is the variance of variable j within cluster g, while $\sigma^2_{(j)}$ is the database variance of variable j within the database. When $F_{jg} < 1$ for all variables there is a perfect fit, i.e. the clusters are homogeneous (Anon., 2003).

Table 5: Homogeneity of cluster groups and clusters - evaluation

CLUSTER GROUPS	F - ratio $F_{vj} = \frac{\sigma^2_{(v,j)}}{\sigma^2_{(v)}}$ VARIABLES (j)							CLUSTERS			F - ratio $F_{vj} = \frac{\sigma^2_{(v,j)}}{\sigma^2_{(v)}}$ VARIABLES (j)						
	G	K	N	T	L	I	P				G	K	N	T	L	I	P
1 DIVINE	0 (<1)	-	-	0,231376 (<1)	0,664390 (<1)	-	0 (<1)	1.1	Cluster 1:	Divine Institutional-locational with title	0	-	-	0	0	-	0
								1.2	Cluster 2:	Divine institutional with title	0	-	-	0	0	-	0
								1.3	Cluster 3:	Divine Institutional	0	-	-	0	0	-	0
2 INSTITUTIONAL-LOCATIONAL	1,106918 (>1)*	-	-	0 (<1)	0 (<1)	-	0 (<1)	2.1	Cluster 4:	Divine Institutional-locational	0	-	-	0	0	-	0
								2.2	Cluster 5:	Institutional-locational	0	-	-	0	0	-	0
3 INSTITUTIONAL WITH TITLE	0 (<1)	-	-	0 (<1)	0 (<1)	-	0,426873 (<1)	3.1	Cluster 6:	Institutional with Title and Product	0	-	-	0	0	-	0
								3.2	Cluster 7:	Institutional with Title	0	-	-	0	0	-	0
4 PLAIN INSTITUTIONAL	0 (<1)	-	-	0 (<1)	0 (<1)	-	0	4	Cluster 8:	Plain Institutional	0	-	-	0	0	-	0

Table 5 summarizes the assessment results for homogeneity of cluster groups and clusters:

- ***Cluster Group 1 "Divine cylinder seals"*** is entirely homogeneous – for all variables (G – God; T – Tile; L – location; P – product) F-ratio is lower than 1. The clusters within this cluster group are also entirely homogeneous:
  - *Cluster 1.1* – homogeneous /F-ratio < 1 for all variables/.
  - *Cluster 1.2* – homogeneous /F-ratio < 1 for all variables/.
  - Cluster 1.3 – homogeneous /F-ratio < 1 for all variables/.
- ***Cluster Group 2 "Institutional-locational seals"*** is not entirely homogeneous – for all variables except God/G/ F-ratio exceeds 1. We could make the statement that this cluster group is relatively homogeneous (level of homogeneity is acceptable). However, the clusters inside this cluster group are completely homogeneous:
  - *Cluster 2.1* – homogeneous /F-ratio < 1 for all variables/.
  - *Cluster 2.2* – homogeneous /F-ratio < 1 for all variables/.
- ***Cluster Group 3 "Institutional seals with title"*** is entirely homogeneous – for all variables F-ratio < 1. The clusters belonging to Cluster group 3 are also completely homogeneous:
  - *Cluster 3.1* – homogeneous /F-ratio < 1 for all variables/.
  - *Cluster 3.2* – homogeneous /F-ratio < 1 for all variables/.
- ***Cluster Group 4 "Plain institutional seals"*** is entirely homogeneous – for all variables F-ratio<1. The cluster belonging to Cluster group 4 is also homogeneous:
  - *Cluster 4* – homogeneous /F-ratio < 1 for all variables/.

We can conclude that the levels of homogeneity of cluster groups as well as clusters are high. So the analysis can continue further.

Another approach towards clusters; validation is the analysis of variance on binary data (Kiranchev, 2021). Tha analysis of variance of our data base proved the existence of the same final clusters. The results of this analysis and the specifics of the analysis of variance in the context ot Egyptian cylinder seals will be published in a consecutive paper.

Stage 6: Interpretation of Cluster Groups and Clusters

The interpretation of the cluster groups can be done on the basis of their profiles (Table 6). That means to look for the presence/absence of each of the text components (G; K; N; T; L; I; P).

Table 6: Cluster groups and clusters' profiles: interpretation

CLASSIFICATION AND LABELS			CLUSTERS' SIZES /number of seals/	PROFILE						
CLASS	GROUPS	CLUSTERS		G	K	N	T	L	I	P
CLASS 1: OFFICIAL SEALS WITH INSTITUTION	1 DIVINE	1.1 Divine Institutional-locational with Title	2	1	1	0	1	1	1	0
		1.2 Divine institutional with Title	16	1	1	0	1	0	1	0
		1.3 Divine Institutional	1	1	1	0	0	0	1	0
		Total for Cluster group 1	***19***	*						
	2 INSTITUTIONAL-LOCATIONAL	2.1 Divine Institutional-locational	4	1	1	0	0	1	1	0
		2.2 Institutional-locational	13	0	1	0	0	1	1	0
		Total for Cluster group 2	***17***	*						
	3. INSTITUTIONAL WITH TITLE	3.1 Institutional with Title and Product	4	0	1	0	1	0	1	1
		3.2 Institutional with Title	47	0	1	0	1	0	1	0
		Total for Cluster group 3	***51***	*						
	4 PLAIN INSTITUTIONAL		18	0	1	0	0	0	1	0
		Total for Cluster group 4	***18***							
		TOTAL	**105**	*						

The presence of an element is indicated as "1" while the absence is indicated as "0". Table 6 presents the cluster group as well as the clusters inside each group. The interpretation of the four cluster groups is the following:

- **CLUSTER GROUP 1 – "Divine cylinder seals"**. The common text element within the 3 clusters belonging to that group is a sacred one – most often it is a name of God or Goddess and rarer a sacred message (also mentioning God). Because of that we put the label "Divine" to that cluster group. The comprising cluster are the following:
  - **Cluster 1.1 (1) "Divine Institutional-locational with Title"**. The number of artefacts belonging to that cluster is rather small (2) but their uniqueness determines the existence of the cluster. Its profile could be presented like that: (G; K; T; L; I). As one may see, the profile defines the name of this cluster. This type of seal contains as text elements a name (protologo) of an institution as well as a name of geographic location (logo-like sign of a city or region). This cluster is very interesting from a branding point of view and detailed analysis will be presented below.
  - **Cluster 1.2 (2) "Divine Institutional seals with Title"**. The size of this cluster equals 16 artefacts and the text profile is the following: (G; K; T; I). These seals contain a sign or a protologo of an ancient institution (agricultural farm, workshop, palace, fiscal institution, military facility,

etc.). They give valuable insights concerning the investigation of branding genesis.

- **Cluster 1.3 (3) "Divine Institutional seals"**. Only one artefact belongs to this cluster. The text components are not as many as they are for the previous clusters – its profile could be expressed like this: (G; K; I). No matter the small size this combination of text elements of this cluster is unique and it deserves special attention when searching for the roots of branding.

➢ **CLUSTER GROUP 2 – "Institutional-Locational Seals"**. The artifacts pertaining to that group possess 2 common elements – Institution and location. This combination is important when analyzing brand elements even nowadays. The comprising clusters are as follows:

- **Cluster 2.1 (4) Divine Institutional-locational seals.** The profile of that cluster is: (G; K; L; I). Its size equals 4 artefacts. The careful exploration of this type of seals renders interesting an important discourse concerning the connection between branding and product differentiation in ancient times.
- **Cluster 2.2 (5) Institutional-locational seals.** The number of artefacts within this cluster is 13 and its profile could be expressed in this way: (K; L; I). Obviously the single difference between that cluster and the previous one is the text element God. Of course the notion of the idea about geographical product differentiation in branding is also inside the text meaning of this kind of seals. Interesting parallels between ancient and contemporary labels/logos will be discussed later.

➢ **CLUSTER GROUP 3 – "Institutional Seals with Title"**. The common text element on sells' texts in that group are Institution and Tile. There are 2 clusters inside that group:

- **Cluster 3.1 (6) "Institutional with Title and Product".** Cluster's size equals 4 artifacts and its profile is (K; T; I; P). The profile determines the name of that cluster. The explicit mentioning of product category on a cylinder seals is not usual. That is why the seals containing "P" in the profile are so rare. The reasons for that are discussed later but now we would mention briefly an author's hypothesis. The ancient variety of products is not as big as today and at the same type ceramic containers (amphorae, pots, jars, etc.) were shaped differently – one shape for wine, another shape for beer, etc. This is a possible reason for not mentioning explicitly the Product type inside the container. In favour of this hypothesis is the fact that the products mentioned on seals belonging to Cluster 3.1 (6) are specific or unusual - "gold", "flint knives for everyday use", "beef fat", "animal fats".

- **Cluster 3.2 (7) "Institutional seals with Title".** This is the biggest cluster among all – it contains 47 artefacts. Its profile looks like this: (K; T; I). These seals are also interesting – they resemble some contemporary administrative seals and at the same time they carry a branding potential.

➢ **CLUSTER GROUP 4 – "Plain Institutional seals."**. The seals within this group are the simplest among all from the point of view of the number of text components. There is no further splitting of the cluster group, i.e. there is only one cluster within it. Stated differently the cluster group and the pertaining cluster are one and same from the perspective of artefacts inside them.

- **Cluster 4 (8) "Plain Institutional seals"**. Cluster's size equals 18 artefacts. The simple profile (K; I) should not mislead the reader about the branding potential of this type of seals. The presence of a sign of institution/organization only strongly resembles contemporary branding. This issue will be given more attention further.

The profiles of the cluster groups and their clusters will be analyzed from a branding point of view. The analysis will include also contemporary parallels and graphic design perspectives.

Profiling cluster groups and clusters

In this section an exemplar for each cluster is presented. The idea is to show what is the typical vision for each cluster. The data is shown in table format – a separate table for each exemplar. Each table contains an imprint of the seal, hieroglyphic sign and translation.

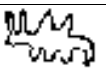
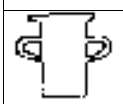
Cluster group 1

As mentioned above Cluster group 1 consists 3 clusters: Cluster 1.1 "Divine Institutional-locational cylinder seals with Title; Cluster 1.2 "Divine Institutional cylinder seals with Title"; Cluster 1.3 "Divine Institutional cylinder seals with Title". All of them contain a name of a God and because of that Cluster group 1 was named "Divine Cylinder seals".

Cluster 1.1: Divine Institutional-Locational Cylinder Seals with Title

This type if cylinder seals contain the following elements: 1) God's sign; 2) King's name; 3) Title of an administrator; 4) Location; 5) Logo sign of an Institution (Table 7).

Table 7: Typical exemplar of Cluster 1.1 "Divine Institutional-locational cylinder seals with Title"

Cylinder seal's imprint	Hieroglyphs	Translation
		1) Sign of Goddess Neith
		2) Horus name of King Den
		3) Title of a Sealer who seals/signs the commodities
		4) Geographical area: Lower Egypt (bjtj)
		5) Logo/sign of a Production center: Wine press /Wine cellar
* Translation after Kaplony (1963, p. 1134).		

The text components connected with branding are the Production center (wine press) and the Location. It is interesting that all seals (100%) containing information about wine production (Vineyards, wine press, wine cellar) contain also a geographic location: without a single exception. We can draw the conclusions that this practice is connected with product differentiation. Nowadays it is well known that the geographic origin of wine influences the quality. Obviously the ancient seals comply with the idea of product differentiation (in the case of wine).

Cluster 2: Divine Institutional Cylinder Seals with Title

This type of seals contains a sign of an institution but do not contain information for a location. They are called "divine" because there is an information about a God/Deity (Table 8).

Table 8: Typical exemplar of Cluster 1.2 "Divine Institutional cylinder seals with Title"

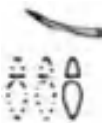
Cylinder seal's imprint	Text components	
	Hieroglyphs	**Translation**
 ***Source:*** *Morgan, J., Recherches sur les Origines de l'Egypte, Ethnographic Prehistorique et Tomb Royal de Negada II, Paris 1897: fig. 819*		1) God Ash (ꜣs) – Protector of agricultural holdings
		2) God ꜣš / "Life and salvation (?) gives"
		3) Horus-Seth name of Pharaoh Khasekhemwy
		4) Title: High level manager with delegated authority to implement decisions (ḫrj-wḏꜣ). Similar to today's CEO.
		5) Logo of the Domain (big farm) "Horus, the star of souls" (Ḥr-sbꜣ-bꜣw) (translation after Wilkinson, 1999, p. 112)
*Translation after Kaplony (1963, p. 1134). Exception is the translation of the Domain's name.		

It is worth mentioning that some Egyptian Gods or Goddesses are connected with a certain geographical area – for example God Ash was connected with the Western Delta Region of Early Dynastic Egypt. However, the geographic location is not explicitly shown.

Cluster 3: Divine Institutional Cylinder Seals

The difference between this type of a seal and the previous one is the presence of a manager's Title (Table 9).

Table 9: Typical exemplar of Cluster 1.3 "Divine Institutional cylinder seals"

Cylinder seal's imprint	Text components	
	Hieroglyphs	**Translation**
 *Source:* Emery, W.B., Great Tombs of the First Dynasty III: Excavations at Saqqara, Egypt Exploration Society & Oxford University Press, London, 1954, 3505, 2.		1) Goddess or Deity – in this case the visualization is a ram with feathers on the head. According to Peter Kaplony this is an Egyptian Goddess (Kaplony, p. 1133).
		1) Horus name of Pharaoh Ka (Dynasty I)
		2) Logo of a temple: a hieroglyphic symbol for a Temple (ḫwt-nṯr)
		3) Sign of "Storehouse for sacrifices (i.e. donations) (dbḥ)"
*Translation after Kaplony (1963, p. 1133).		

The institution presented on this imprint is the sign/logo of a temple. Together with the sign of a temple there is a sign/hieroglyph for "Storehouse for sacrifices/ donations" pertaining to that temple. In other words, the institution is designated in a more specific way.

As this is interesting from a branding point of view we will discuss it later.

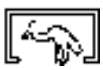
Cluster group 2

Cluster group 2 consists of 2 clusters. Their common feature is that they contain two text elements: Institution and Location. This combination is rather strong from a branding point of view.

Cluster 2.1: Divine Institutional-Locational Cylinder Seals

This type of seals contains information about the production unit (in this case Vineyards) and the geographical origin of the product (in this case the ancient city of Grgt-Nḫbt (gereget-nehebet), not known nowadays). A typical exemplar is show in Table 10.

Table 10: Typical exemplar of Cluster 2.1 "Divine Institutional-locational cylinder seals"

Cylinder seal's imprint	Text components	
	Hieroglyphs	Hieroglyphs
 *Source:* Quibell, J.E, Excavations at Saqqara 1912-1914: Archaic Mastabas, (Service des Antiquites de l'Egypte), Cairo, 1923, t 15:3.		1) Goddess of Protection
		2) The Horus name of Pharaoh Ninetjer (Dynasty II)
		3) City of Grgt-Nḫbt (gereget-nehebet) –name of an ancient city not existing today, exact location unknown
		4) Producer of Grapes (Vineyards)
		5) Treasury (pr-dšr)
		6) Cullers Logo/sing of Palace of the King in the city of Buto (Butic palace)
* Translation after Kaplony (1963, p. 1185).		

Another component is the sign of the Goddess of Protection. In ancient times this component was the most important one. It symbolizes the divine protection over the vineyards and the King itself.

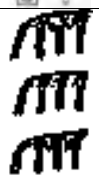
These seals are very interesting not only from the perspective of branding. It is worth paying attention to a peculiarity connected with the presence of 3 institutions: the first one is the already commented Vineyards; the second is the Treasury House of Upper Egypt; the third is Butic Palaces. The logical question is "Why more than one institution?" The answer is obvious: the presence of more than one institution traces the movement of the commodities: 1) from the producer (Vineyards) through (2) Treasury House and then to 3) King's Palace in

the city of Buto. This may be interpreted as an ancient form of tracing the inter-product relations. Later more attention will be paid to that suggestion.

Cluster 2.2: Institutional-Locational Cylinder Seals

The seals belonging to this cluster are similar to the previous one (Table 11). The only difference is the lack of a divine element (God/Goddess).

Table 11: Typical Exemplar of Cluster 2.2 "Institutional-locational cylinder seals"

Cylinder seal's imprint	**Text components**	
	Hieroglyphs	**Hieroglyphs**
 *Source:* Garstang, J., Sethe, K., Mahasna and Bet Khallaf., 1903, Egyptian Research Account, Memoir 7, London, 1903, plate IX, 5b.		1) Horus name of King Djoser (III Dynasty).
		2) City of Memphis. Geographical location: This is the place of origin of the product (on this seal - wine).
		3) Vineyards (Production unit)
		4) Provisioning Department (iz-ḏf3) /within the State Treasury/
* Translation Kaplony (1963, p. 1136).		

This type of seals (Cluster 2.2) as well as the seals belonging to the previous cluster (Cluster 2.1) possess a high branding potential. In both cases the shown typical exemplars are connected with wine (vineyards). The components of these seals are analogous to contemporary wine labels or more precisely – the contemporary wine labels are analogous to the ancient seals.

Table 12: Ancient versus contemporary wine label – comparison

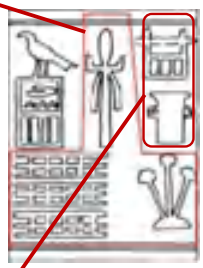
Contemporary wine label 2016	Common elements		Cylinder seal – wine (2970 – 2930 BC)
	**Location:**		
	Karabunar	Northwestern region	
	Production unit:		
	Winery "Via Vinera" – Winepress since 1903	Winery - Winepress	
Source: https://www.vivino.com/DE/en/via-vinera-karabunar-estate-cabernet-sauvignon/w/8875792			*Source:* Petrie & Griffith, 1900: fig. 38

Table 12 illustrates the parallel between a contemporary wine label and an ancient cylinder seals imprint. This (proto)branding is typical of Cluster 4 as well as for Cluster 5 and is an example of geographical product differentiation. This example is not the only one – in fact they are much more. In the context of wine, the approach to identify the geographic location on label (cylinder seal) is common. It is also typical of olive oil and other vegetable oils. Obviously products whose quality varies considerably according to geographical location inevitably bear the locational sign. This is a proof of hypothesis "*H2: The linkage between product differentiation (especially geographic) and branding was born at the Beginning of Antiquity (Ancient Egypt)".*

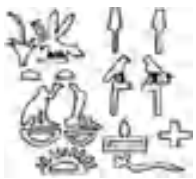
Cluster group 3

Seals belonging to Cluster group 3 are relatively simpler compared to the previous groups (Table 13). They carry information about the King's name, institution and a title (of a manager). In the case of Cluster 3.1 a product category is mentioned (fats).

Cluster 6: Institutional Cylinder Seals with Title and Product

Seals belonging to that cluster carry information about an institution, a title and a product. The explicit designation of a product category is rare in the context of cylinder seals. A possible explanation of that fact is the following: first, the shape or type of the ceramic container suggests the type of product inside – for example the shape of the pots containing beer is different (bulging), while the shape of the pots containing wine or olive oil are elongated; second, the number of product categories was not that prolific as it is nowadays; third, the institution marked on the seals suggests the type of product inside (for example: vineyards or wine press indicates wine).

Table 13: Typical exemplar of Cluster 3.1 "Institutional cylinder seals with Title and Product"

Cylinder seal's imprint	**Text components**	
	Hieroglyphs	**Translation**
 *Source:* Morgan, J., Recherches sur les Origines de l'Egypte, Ethnographic Prehistorique et Tomb Royal de Negada II, Paris 1897, fig. 820.		1) Throne name of King Khasekhemwy
		2) Title: Sealer of fat products
		3) Department responsible for supplying the King
		4) Provisioning Department within Treasury (iz-ḏf3)
* Translation after Kaplony (1963, p. 1121).		

Cluster 7: Institutional Cylinder Seals with Title

These seals contain information about the King's name, Institution and Title of a manager. The only difference between this type of seals (Cluster 7) and the other type (Cluster 6) is the lack of information about product category (Table 14).

Table 14: Typical cluster exemplar of Cluster 3.2 "Institutional cylinder seals with title"

Cylinder seal's imprint	Text components	
	Hieroglyphs	Translation
 *Source:* Petrie, W.M.F. Griffith, F.L., The Royal Tombs of the First Dynasties, Petrie&Griffith, 1900, Egypt Exploration Fund, London, 1900, fig. 83.		1) Horus name of Pharaoh Qa'a
		2) Title: ḥrj-wḏ3 (an official with delegated authority to implement decisions)
		3) Logo of Domain (very big agricultural farm). Name of the domain: "Horus, the gold one of the corporation (of Gods)" (translation after Wilkinson, 1999, p.112)
* Translation after Kaplony (1963, p. 1130). Exception is the translation of the Domain's name.		

In spite of that the seals within Cluster 3.2 possess a high branding potential. As seen at Table the sign of an Institution (in this case – a (proto)logo of a big agricultural farm).

Group 4 "Plain institutional seals"

Within this Cluster group there is only one cluster. Its specifics are discussed below.

Cluster 4.1: Institutional Cylinder Seals with Title

The seals belonging to Cluster 8 are the simplest among all: the text components they include are 2: King's name and an Institution (Table 15).

Table 15: Typical exemplar of Cluster 8 "Plain Institutional Seals"

Cylinder seal's imprint	Text components	
	Hieroglyphs	Hieroglyphs
 Source: Petrie, W.M.F. Griffith, F.L., The Royal Tombs of the First Dynasties, Petrie & Griffith, 1900, Egypt Exploration Fund, London, 1900, fig. 126.		1) Horus name of King Den
		2) "House of Life" (pr-ˁnḫ): Organization/Department for supplying the Palaces
* Translation after Kaplony (1963, p. 1104).		

Despite their simplicity the branding potential of these seals should not be underestimated. The presence of a sign/logo of an institution (domains, production centers, treasury or treasury departments, supplying departments, etc.). The typical exemplar shown in Table 15 contains the sign of a Department that was specialized in supplying the palaces.

The roots of branding

Hereafter we present ancient protobrands from Egyptian cylinder seals (Dynasties I-III). The whole database of seals could not be shown here because the volume will become unacceptable. The (proto)brands or (proto)logos presented as follows:

1. Branding Domains
2. Branding Estates
3. Branding production centers (smaller compared to Domains)
4. Branding palaces
5. Branding temples
6. Branding military facilities
7. Branding fiscal institutions
8. Branding provisioning institutions
9. Branding redistribution institutions

1. Branding Domains (agricultural farms) (H4)

The domains of Ancient Egypt are big agricultural farms that produced grain, fruits, milk, honey, etc. They were owned by the King. These ancient institutions lasted about 1800 years. On the seals in our database logos of domains were found (Table 16).

Table 16: Domain brands – names

№	Logo	Name	Source
1		Domain “Horus who advances the mountain (?)” - Ḥr-sḫntj-ḏw	Emery, 1958: 3506, 11 (fig. 11) 203b
2		Domain “Horus, first of the corporation (of Gods)” - Ḥr-tpj-ḫt	Petrie & Griffith, 1900: 23, 93
3		Domain “Horus, the gold one of the corporation” - Ḥr-nb-ht	Petrie & Griffith , 1900: 84, 228
4		Domain “Horus risen as a star” Ḥr-ḫʿj-(m-) sbȝ	Maspero, 1902: fig. 187, № 9 (bottom)
5		Domain “Horus, the star of souls” Ḥr-sbȝ-bȝw	Petrie & Griffith, 1900I: 200, 291
6	 *variant 1*	Domain “Horus flourishes” - Wḏ-Ḥr	Quibel, 1923
	 *variant 2*	Domain “Horus flourishes” - Wḏ-Ḥr	Petrie Museum: Online Catalogue: museum numbers 67, 68
7		"King of the Ships"/”Boats of the sovereign” Wiȝw-iti (?)	Petrie & Griffith, 1900: fig. 88
8		Domain “Horus, the foremost star of the sky”Ḥr-sbȝ-jntj-pt	Garstang & Sethe, 1903: K 1.4 (p. IX, 4)

It is very interesting that these logos have a distinctive logo design similar to contemporary logos (i.e. the contemporary logos are similar to the ancient ones). They have a standard logo shape (except Variant 2 of Domain 6) – elliptical with curves. Inside this shape the name of the domain brand name) is written. All Egyptian domains had specific names (Table 16). This approach is consistent with contemporary branding practices. The graphic design approach of the logos of Ancient Egyptian domains supports the acceptance of hypothesis "*H3: The logo was invented in the dawn of Ancient Egypt. From the point view of graphic design – the idea for a logo has emerged on the basis of Egyptian hieroglyphs.*

Table 17: Contemporary analogues to the (proto)logos of domains in Ancient Egypt

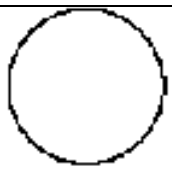
1)		+		=	
	Circular shape		Name, picture		Logo of the family name "Five Spprouts"

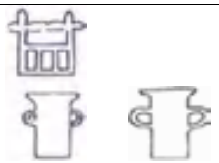
Table 17 illustrates the overall construction of a contemporary farm logo. Obviously the basic approach is identical and we may accept hypothesis "*H4: Rudiment brands (protobrands) of production centers emerged at the very beginning of the Ancient Egyptian State (4000 – 5000 years ago)".*

1. Branding Estates

Estates are smaller units compared to Domains. Usually they are depicted by a rectangular shape symbolizing building (sometimes the building itself plus the surrounding lands). Usually these surrounding lands are connected with a palace.

2. Branding production centers (H4)

Table 18: Logos of production centers

№	Logo	Name	Source
1		Cattle rearing farm: "The Estate of the Golden Cattle of the Dual King" *ḥwt ihw-nbw nswt-bity Mr-(p-)bi3* (Wilkinson, 1999, p. 105)	Wilkinson, 1999, p. 105, p. 102 - fig. 5; Petrie & Griffith, 1900, fig. 73-74
2		Leather workshop (?) - ḫwt-ʿ3(t)-gsw	Emery, 1949: fig. 45
3		King's ship (?) ḫwt-ḥptj	Emery, 1958: 3505, 1
4		Natron House (ḫwt?) – Production center for natron	Petrie & Griffith, 1901: 145
5	 Variant 1 Variant 2	Wine press (Production center for wine)	Var. 1: Petrie & Griffith, 1900: fig. 37 Var. 2: Petrie & Griffith, 1900: fig. 39
6		Vineyards – Production center for grapes	Petrie & Griffith, 1901: fig. 193
7		Workshop for nṯrj - fabric (?)	Petrie & Griffith, 1901, 1900: fig. 79

In this study several estates were detected: cow farm, leather workshop, King's ship (although the interpretation is not confirmed. Some authors (Kaplony, 1963) suggest that the institution on seal Emery, 1958: 3505, 1 (figure 1), 260 (Table 18) is an institution servicing the King's ship, Natron house (an institution for producing and/or supplying natron).

We have also included here some smaller production centers that are not designated as estates (rectangular frame). Strictly speaking these institutions are not

estates but we have included them in the analysis because they bring value to it. So, these centers are Vineyards, wine press and workshop for fabrics.

Table 19 presents a comparison between an ancient logo of a cow farm and contemporary ones.

Table 19: Logos of Cattle rearing farms: Ancient Egypt versus contemporary

Egypt - First Dynasties -	**USA**	**Bulgaria**
		
Petrie & Griffith, 1900, fig. 73-74	*https://www.springerhillranch.com/*	*https://www.facebook.com/fermaIzvorsko/*

The logo of the ancient cow farm has a specific (brand) name: "The Estate of the Golden Cattle of the Dual King". The rectangular hieroglyph (Estate) surrounds the name of the cow farm. Finally, the sign/logo of the ancient cow farm looks pretty close to today's brand design. Ageing this is proving hypothesis "*H3: The* ***logo*** *was invented in the dawn of Ancient Egypt. From the point view of graphic design – the idea for a logo has emerged on the basis of Egyptian hieroglyphs.*

The contemporary analogues are "Springerhill Ranch Brand" (USA) and cow farm "Izvorsko" (Bulgaria). *We have exhibited only 2 contemporary analogues but in reality they a numerous. All these examples prove hypothesis "H4: Rudiment brands (protobrands) of production centers emerged at the very beginning of the Ancient Egyptian State (4000-5000 years ago)*".

1. Branding Palaces (H5)

The palaces during the Early Dynastic Egypt were indicated explicitly on the seals. The reason is that they were recipients for various products and for the sake of accountability and tracing the product flows. The logo design was analogous to that of other institutions (temples, military facilities, etc.) analyzed above. The logo consists of two major parts – a rectangular frame plus the name of the palace (Table 20).

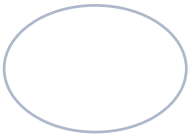
Table 20: Logos of Ancient Egyptian palaces

№	Logo	Name	Source
1		Butic Palace of King Anedjib (ḥwtp-Ḥr-wʿj-njswt-bjtj-Mrj-pw-bjȝ)	Petrie & Griffith, 1900: fig. 58
2		"Harem place" *ḥwt iptỉ* (?) (Wilkinson, T., p. 105)	Petrie & Griffith, 1900: fig. 77
3		Palace of King Semerkhet probably the palace itself plus the income and the surrounding lands hwt p-Hr[-msn] iri-nbty (Wilkinson, 1999, p. 105)	Petrie & Griffith, 1900: fig. 72
5	 	King's Palace /in city Buto/	Quibel, 1923: t 15, 3, 748

The palaces mentioned on the seals we are analyzing here include (Table 19): 1) Palace of Ling Anedjib in the city of Buto; 2) Harem palace /Queen's household/; 3) Palace of King Semerkhet; 4) King's Palace in city Buto /King's name not mentioned/.

Contemporary analogues could be the logos of the following type: Élysée Palace (France); The White house (USA), etc. (Table 21).

Table 21: Contemporary analogues to the logos of King's palaces in Ancient Egypt

1)		+		=	
	Elliptical shape		Name, picture of the building, city		Logo of "The White House"
2)		+		=	
	Circular shape outlined by the text "Président de la République"		Symbol (emblem) of Élysée Palace		Logo of **Élysée Palace** – "Presidential Office of the French Republic and the official residence of the President"

These institutions are similar to the ancient King's palaces because they are places where the rulers live and work. As shown in Table 20 the design approach is the same as the ancient one. The same could be stated for the purpose of these buildings. That's why we could accept hypothesis "*H5: Protobrands of non-production estates (palaces, residences, etc.) appeared with the birth of the Egyptian State*" as well as hypothesis H3.

2. Branding Temples (H6)

Here the institution is presented by a Temple which, in fact, is a kind of a building (Table 22) and its logo is also rectangular. It is a different institution from the so called Domains which are big farms including huge agricultural area. The protobrand of these Domains is presented by an oval logo (discussed above). In Early Dynastic Egypt however there were smaller (compared to Domains) units that some Egyptologists call Estates. These Estates started their existence during the reign of Djet. These Estates are presented by a rectangular hieroglyph and indicate "specialized production centers or particular institutions closely associated with the King and his household" (Wilkinson, 1999, p. 105). So, when speaking about production centers their text, graphic or text & graphic indications are in fact (proto)brands that are closer to later maker's mark (or brand).

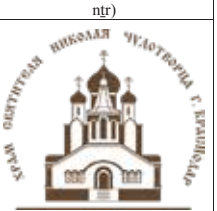
Table 22: Logo of a temple

№	Logo	Name	Source
1		Temple (ḫwt-nṯr)	Emery, 1958, 3505, 2

In addition to Wilkinson's comment about Estates we would like to add the religious institutions of Ancient Egypt and mainly the Temples. Although they are very different from production centers and Royal institutions they are designated by a similar rectangular hieroglyph. Something else – The Temples of Ancient Egypt accumulated revenues (commodities) due to the sacrifices (donations). These commodities could be redistributed, sought in the market, etc. In all cases their origin is designated by a cylinder seal on the top of the jar, bag or another container. The logo design of an Egyptian temple (Table 23) is exhibited in Table 23: it consists of two symbols – a rectangular shape (house) and the sign for God, i.e. "The House of God"

From the point of view of the graphic design the shape of the hieroglyph symbolizing Estate is rectangular. The building is presented by the rectangular shape that means ḫwt – home, house. The Ancient Egyptian word for God is nṯr. The combination of the two hieroglyphs presents the idea of a Temple (Table 23).

Table 23: Logo design of ancient (proto)logo of a temple and a logo of contemporary orthodox temple: comparison.

1)		+		=	
	House, building - ḫwt		God - nṯr		Temple (House of God - ḫwt-nṯr)
2)		+		=	
	Oval shape		Name, picture of the Temple/building		Logo of a Temle: St. Nicholas the Wonderworker Church in the city of Krasnodar

Source: Emery (1958, p. 3502), 2 (for cylinder seal) and internet (for the contemporary logo.

The contemporary religious institutions use seals and logos to identify themselves visually. This is typical of all major religions. The identification may be found at different levels – temples, geographic areas (metropolis), organizational structures. Put differently we could accept the hypothesis "*H6: Protobrands of* ***religious institutions and centers*** *in Ancient Egypt are predecessors of contemporary ones*".

3. Branding military facilities (H7)

It was really surprising when in the course of the research process a proto(logo) of a military facility was indicated (Table 24).

Table 24: Ancient Egyptian fortress – (proto)logo

№	Logo	Name	Source
1		Fortress: "Respect to the two Lands" Nrw-tɜwj	Garstang & Sethe, 1903: K 1.2 (p.V III, 2)
2		mnw-Fortress? – No name, not branded	Petrie & Griffith, 1900: fig. 82
Translation after Kaplony (1963)			

As can be seen the military facilities (fortresses) are also presented on the seals in a way similar to today's logos. Figure 8a and Figure 8b show how the logo design is constructed in:

4. Ancient Egypt – about 4700 years ago: (1) Rectangular shape with rectangular-oval curves symbolizing "Fortress" + (2) Fortress's name: Nrw-tɜwj – "Respect to the Two Lands. The text "Two Lands" means "Upper and Lower Egypt" – the two major parts of the ancient Egyptian state (Figure 8a).

Curved rectangular shape – walls of a fortress

Fortress's name: "Respect to the two Lands" – Nrw-tɜwj

Fortress: "Respect to the Two Lands" – Nrw-tɜwj

Source: Translation after Kaplony (1963).

Figure 8a: Logo design of a fortress dated from the reign of Djoser – the first ruler of Dynasty III (4700 – 4720 years ago).

In order to be honest we have to state that not all fortresses in Ancient Egypt were branded. There were also, if we can say like that, "unbranded" fortress.

Source: Petrie & Griffith (1900, fig. 82).

Figure 8b: Hieroglyphic sign of a fortress without a name

Figure 8b exhibits the sign of such a fortress. It does not contain an explicit name. It just states that this is a military facility. This (proto)logo is taken from a seal that does not belong to this cluster. The reason for presenting them here is to compare different Fortress's logos.

2. Bulgaria – XX century: (1) Shape of a military shield + (2) Number and name of a military unit (number: 24269 and name: Elhovo 1885) (Fig. 8c).

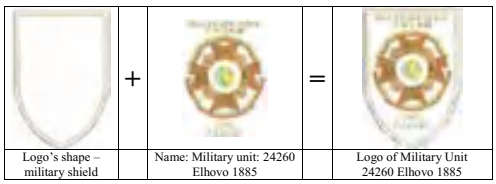


Figure 8c: Logo design of a XXth century military unit (Bulgaria)

The similarities between the two approaches to logo design are obvious. Table 25 exhibits contemporary logos of military facilities from different countries all over the world. Again we have a proof in favour of hypothesis *H2*.

Table 25: Contemporary military logos from different countries and locations.

	1	2	3	4
LOGO				
NAME	68 Special Forces Brigade (Bulgaria)	Airbase Hmeimim: military commandant's office (Russia)	Fort Bragg, USA	Chinese PLA Support Base in Djibouti (China)

Source: Internet

The practice of branding military bases, units, facilities, etc. is obvious – its roots are deep and can be found more than 5000 years ago in the branding of ancient Egyptian fortresses. Today logos of military units are widespread over the world. Stated differently "*H7: The protobrands of ancient Egyptian fortresses are the "ancestors" of contemporary branding of* ***military facilities***" is proven.

Conclusion

The roots of systematic branding practices began at the Beginning of Antiquity. At that time the world's population increased and steady urbanization development came to life. Simultaneously with these tendencies strong states appeared in the territories of Egypt, Mesopotamia and the Indus Valley (the Harappa civilization). Division of labour and production methods were improved. Not only agricultural products were received but also a push of the manufacturing processes (weaving, construction, wine and beer making, carpentry, shipbuilding, furniture making, metal works, production of olive oil, etc.). The trade intensified and even international trade roots appeared; for example, Egyptians amphorae and imprints of cylinder seals were excavated on today's territories of Syria, Palestine, Iraq, Afghanistan, Crete, etc. The trade relations need a good management and administration of the commodity flows. The need of exact and relevant marking of each commodity was realized. At the same time the sophisticated fiscal system appeared. The taxes were collected in produce and it was sent to state Treasury to be stored – this practice also needed punctual marking of each commodity. So, the first official and systematic markings of commodities appeared. In the context of Ancient Egypt – cylinder seals, the so called annual labels, small labels and scratches on the ceramic container (for the last 3 options we will explain in another paper). The major roles of these early brands (or protobrands) were connected with (after Keller, 2014, pp. 34-57): 1) from the side of the consumer: "identification of source of product; "assignment of responsibility to product maker"; "promise, bond, or pact with maker of product", "signal of quality"; 2) from the side of the producer: "means of identification to simplify handling or tracing"; "signal of quality level to satisfied customers: "means of endowing products with unique associations". This conclusion proves hypothesis "*H1: During Dynasties I-II the roles/functions (after Keller 2014) of protobrands are similar (in some cases identical) as the role of contemporary brands*". We use the word "similar" in order to indicate that not all contemporary brand functions are fulfilled by the ancient protobrands. But those roles, that ancient protobrands played are, are exactly the same as nowadays.

The rudiment role of brand image emerged also. When speaking about product differentiation and branding we noticed that in the context of wine 100% of seals mention a geographical place of origin of the wine (luxury commodity dur-

ing that time). Obviously in these ancient times the role of wine labels, the image of the producer and the geographic location played a similar role in the economic life as the the role they play today.

The birth of branding is seen also from the perspective of logo design. Above were given numerous examples of (proto)logos that definitely differ from the standard text of that time – the shapes, the contours and the overall approach towards signs domains, palaces, workshops, fortresses, cow farms, etc. Obviously we notice a targeted effort to identify graphically one institution or another. As a result – the graphic concept of a logo is created.

At the end of the analysis we could state that the General hypothesis is confirmed, i.e. "*H: The genesis of branding as a systematic practice (not occasional markings on pots) in the economic life of humankind happened at the Beginning of Antiquity – and more specifically – simultaneously with the birth of the Ancient Egyptian state*".

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