ISSN NO.2395-0692

International Journal of Arts, Humanities and Management Studies

System Modeling of the Ethiopian Geopolitical System

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ABSTRACT

Various hierarchy political structural systems are known. The main objective of this study is to develop a basic structural model which can be used as apparatus for experimentation to present a unique structure of the Ethiopian political system. To achieve the said objective, an interpretive structural modeling (ISM) technique was applied. Where, sixty experiments were carried out on the developed topological surfaces. The criterion used in this paper is the statistical (exploratory tool), which is called the stem-and-leaf technique. The decision for determining the hierarchical structure as a model was carried out through selection. Sixty structural models were the outcomes. From among these models, a unique hierarchical structure with three levels (strategic, tactical and operational) is accepted to present the real world of the Ethiopian political system.

KEYWORDS: *Interpretive Structural Modeling (ISM), Basic Structure, Topological, Exploratory, Stem-and-Leaf.*

I. INTRODUCTION

The sole of this paper is to develop a hierarchical structure of the Ethiopian political system through system- model – approach, Easton, David (2014). The proposed system- model-approach is directed towards the geopolitical of trilogy (territory – state –nation of Ethiopia may point towards a redirection of political geography)Taylor (1989). This is thought of because the demise and rise of geopolitics since World War II has been remarkable.

For most of the time geopolitics has been virtually abandoned as an academic discourse. One result of this demise has been the cutting-off of political geography from its distinguished heritage of "founding fathers" such as Friedrich in Germany, Halford in Britain and Isaiah Bowman in the United States. Those political geographers have been willing to take such an extreme step is testimony to the profound impact of German geopolitics in the 1930s on political geography in particular and geography in general, Hugget, R(1980), Short, John Rennie (2003),Short, John Rennie (2003). Martin Jones, Rhys Jones and Michael Wood (2004).

However, the term geopolitics became an embarrassment to be from 'respectable' political geography. Cohen (2003) has been the major exception to be distinguished among political geographers in keeping global thinking alive in political geography. He understood that geopolitical issues were too important subject for geographers to abandon. Today, many other geographers joined him in an overdue, but no less welcome revival of geopolitics.

ISSN NO.2395-0692
IJAHMS International Journal of Arts, Humanities and Management Studies

The revival of geopolitics has taken distinct forms. First, and perhaps most intriguingly, geopolitics has become a popular term for describing global rivalries in world politics [Agnew, J., Katharyne, M. and Gerard, Toal (2008 Ed)]. Hepple (1986); traces this recent usage of this term to the extensive references to "geopolitics" in former U.S secretary of state; Henry Kissinger's widely quoted memoirs.

Political geography must analyze and inform the political issues of the day Agnew (2002). Taylor (1989) effort is an example of modeling political geography. He tried to restructure political geography as part of the holistic framework that Wallerstein and his associates have proposed. The scale of study at hand is at a national level, namely the trilogy territory-state-nation of Ethiopia, Wolde-Mariam, M. (1972), Habib Muhammad edited by Abdulkader M. Yusuf (2011):. Needless to say, that traditional political geography was and largely organized around the trilogy of territory-state-nation so that behind every successful territorial state there was a vibrant nation. Hence, territory becomes national "homeland" or even "fatherland" imbued with the symbolic significant nationalism, and the state becomes the nation-state as the ideal expression of the political will of nationalism,Abate, Y. (2013).

II. METHODOLOGY

To describe the function and nature of the Ethiopian political system, an interpretive structural modeling (ISM) technique was selected. In fact, this technique is a combinatorial that serves as a judgment criterion of numerous variations of inductive and deductive systems. The (ISM) tool has the capabilities of changing the vague, poorly expressive mental model of systems into well-defined models, Malone, D. W. (1975), Sage, A. P. (1977),Warfield (1982) and Dawood (1987).

The process of the (ISM) approach is based upon the one-to-one correspondence between a binary matrix and a graphical representation of a direct graph (digraph) network. The notions of this process are based on an element set and contextual relation. The element set is to identify within some location context. The contextual relation is to pick as much as possible the existing relationships among the system elements. Therefore, chosen elements may be presented by nodes on a network model.

In as much, the presentation of the relation between any two elements is denoted by a directional line (link or path); connecting any two elements. In a topological surface, the elements are represented by points (nodes). On the other hand, the structured topological surface is converted into matrix form by the tools of a binary matrix. The presented elements are the contents of the index set for rows; while columns' matrixes indicate the presence of a directed relation.

To quantify the relationships, the following basic languages and mathematical operations were studied: The directed relation sensed from element (i) to element (j). Where; the directional sense was indicated by placing (1) in the corresponding interaction of row (i) and column (j). Accordingly, the (ISM) process was adopted and the systematic and logical thinking was used as an approach to a complex issue. In this manner; the (ISM) helps to communicate the result of that thinking to others.

The goal of the whole exercise is to speed the process of creating a digraph as an initial step; on which the basic structure and the exercise of the experimental tests were carried.

Development of basic structural model of Ethiopian political system

The data belonging to the Ethiopian political system is massive. It reflects the existing situation. There is the need to determine the appropriate data in the first place and secondly to explain what it means.

However, the communication of scientific knowledge includes the elements and the relations among them. There are different kinds of elements and relations. A set of elements and set of relations make up a system model. If a system model includes a large sum of elements and relations, then; communication by verbal means solely is usually quite insufficient. Therefore, communication must be enlarged to include not only verbal but also tabular, graphic, mathematical or some combination of these. The selected basic structural elements of Ethiopian political system are:(1) chief political executive (CPE), (2) legislative system (LS), (3) administrative system (AS), (4) judiciary system (JS), (5) associations groups (AG), (6) ethnic groups (EG), (7) social classes (SC), (8) size of nation (SN), (9) economic development level (EDL), (10) political organizations (PO), (11) natural resources (NR), and (12) economic interests groups (EIG), [Schwab Peter, (1985), Clapham, C.(2004,2009, 2010, 213,and 2017),United Nations (2004). Berhe, K.M.(2013) Abate, T.(2012), Elias, N. and Steb, M. A (2013), World Bank (2004),Abate Yohanis (2013) ,Rogers J. A (2015).].

A system map that presented below describes of the basic structural elements, the topological structure domain of Ethiopian political system. This structural model is an apparatus for the system experiment tests which will be commenced in the following section.

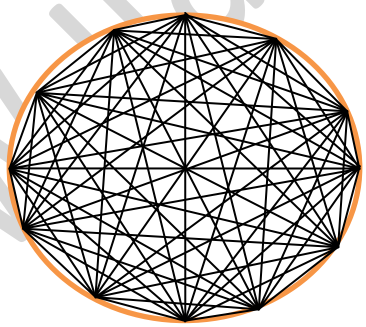

Fig. (1) Shows the network structure of Ethiopian political system

Fig. (1) Portrays the graph network structure of the Ethiopian political system. It is static snapshot of the existing system. The portrayed structure shows the main structural elements of the system as nodes. Where the existing relationships among the structural elements will be tested in the following section.

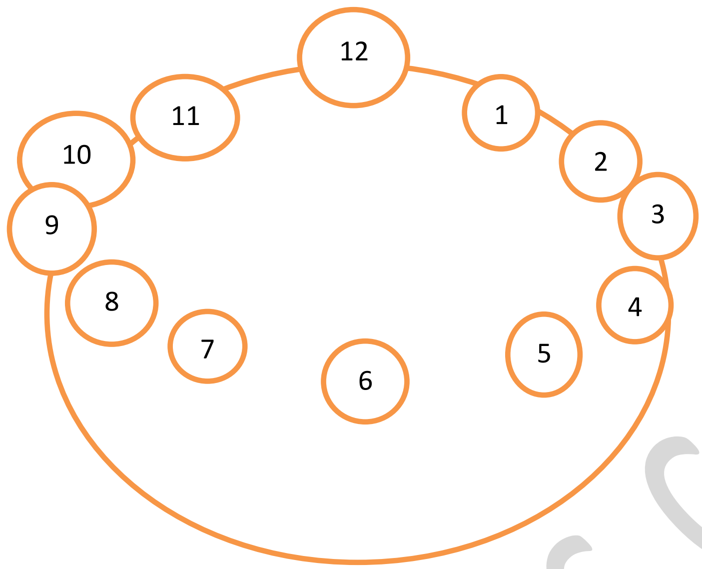

Fig.(2): The serial loop topological structure representing experimental apparatus

To start the system experiment on the basic structural model, there is a requirement to show the elements of the Fig. (1), with numbers. These numbers are represented in Fig. (2). All numbers are arranged and displayed as: (a) Node #.1: chief political executive (CPE), (b) Node #. 2: legislative system (LS), (c) Node # 3: administrative system (AS), (d) Node # 4: judiciary system (JS), (e) Node # 5: associations groups (AG), (f) Node # 6: ethnic groups (EG), (g) Node # 7: social classes (SC), (h) Node # 8: size of nation (SN), (i) Node # 9: economic development level (EDL), (j) Node # 10: political organizations (PO), (k) Node # 11: natural resources (NR), (l) Node # 12: economic interests groups (EIG).

To study a system, system elements and their relationships shall be recognized. The modeling technique is a way through which we draw out systematically the said relationships among the elements of the said system under the relevant contextual relations Dawood (1987).

The element S = [,,…,], and the a contextual relation (R). The (ISM) methodology first produces a square binary matrix, called matrix B, of relations among the elements of the system and indicated by one (1) in the (*i* , *j*) the element of matrix (B) if Si is related to Sj and zero (0) otherwise.

To fulfill the deliberate methodology with the set (S), and the relation (R) to the Ethiopian political system, the next phases and allegories are required to be deliberate: Firstly, the Ethiopian political system of Fig. (2) comprises of twelve elements. Accordingly, the elements set of the Ethiopian political system is:

S = [, , , , , , , , , , ,],

Where, …, describe the twelve elements. The relation (R) attributes to the phrase related to the methodology orderly creates a succession of inquiries and generates the binary matrix B, found on the experimenter's answers to inquiries. There is a potentiality for very numerous binary matrices and structures. In some cases it is necessary to convert binary matrix to the structure that confirms the basic structural model. There will be several experimental attempts. Each attempt will be called an experiment. The total numbers of the experiments in this study are sixty. In these experiments every binary matrix will be given the letter (B). To set off the binary matrices, a subscript referring to experiment number will be utilized.

Fig. (2), portrays the apparatus for the experiment. Following this adjacency matrix (A) for every binary illustration is developed from matrix (B) by adding an identity matrix (I), that is, A = (B+I).

For each experiment to be operated, there will be an adjacency matrix (A), with a subscript referring to experiment number, that is, 1,2,3,…, 60. Also, the reachability matrix or transitive closure (M) of adjacency matrix (A) can be established by taking Boolean powers of (A) up to A =A = M. the use of reachability matrix is that it can be utilized to evolve a multi-level model or hierarchical restructures of the digraph. This is performed by prescribing a reachability set, R (Si) for each element) in (S), comprising all elements (S) misleading on paths that is commence from) and antecedent set an), comprising all elements of (S) misleading on paths that end at).

The intersection of R) and A) designated by R) ∩ A), comprises all elements that are common to both R) and). Those elements) for which R) ∩ A) = R) are not reachable from remaining elements of (S), and therefore, can be designated as first level elements. Repeated use of this concept allows all the elements to be arranged in levels. So, the hierarchical model is an effect of an experiment. This result will be used to portraying the Ethiopian political system.

A reorder of the content of every multi-level into standard or accepted form will be performed following every multi-level modeling approach. This can be completed by generating a digraph. Accordingly, the digraph can be built by acknowledging a vertex on a digraph to represent the system element, and the path joining two elements to represent a relation (R). Then the relation can be shown in this manner, R as to be portrayed in digraph. Accordingly, the relation (R) can be portrayed as: —R—>

III. RESULTS AND DISCUSSION

The experiment operated on the machine (Fig. 2), which produces circumstantial information about the relationships between the elements of the Ethiopian political system. The arrows represent the existing relations (Fig. 3). In Fig. (3), each vertex is a delineated one of the Ethiopian political system element and the path connecting the two elements are delineated by one (1) in a binary matrix (B_1).

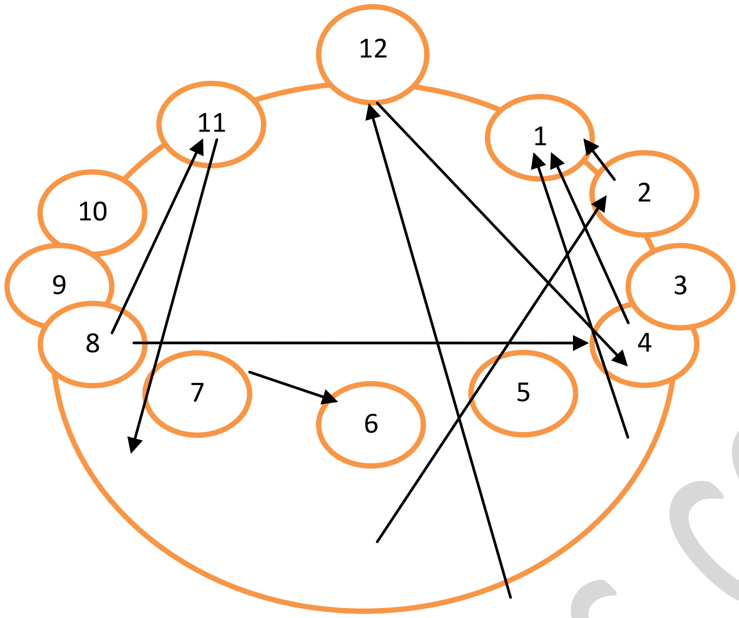

Fig. (3) Experiment on Ethiopian political system (basic structural elements)

Table 1: Binary matrix (B_1) = 1.

i↓&j→	1	2	3	4	5	6	7	8	9	10	11	12
1	0	0	0	0	0	0	0	0	0	0	0	0
2	1	0	0	0	0	1	0	0	0	0	0	0
3	1	0	0	0	0	0	0	0	0	0	0	0
4	1	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	1
6	0	1	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	1	0	0	0	0	0	0
8	0	0	0	1	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	1	0
10	0	0	0	0	0	0	1	0	0	0	0	0
11	0	0	0	0	0	0	0	1	0	0	0	0
12	0	0	1	0	0	0	0	0	0	0	0	0

Table 2: Identity matrix (*I*)

i↓&j→	1	2	3	4	5	6	7	8	9	10	11	12
1	1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0	0	0	0	0
3	0	0	1	0	0	0	0	0	0	0	0	0
4	0	0	0	1	0	0	0	0	0	0	0	0
5	0	0	0	0	1	0	0	0	0	0	0	0
6	0	0	0	0	0	1	0	0	0	0	0	0
7	0	0	0	0	0	0	1	0	0	0	0	0

8	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
9	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
10	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**
11	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**
12	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**

Table 3: Adjacent Matix: $A_1 = B_1 + I$

↓i &j→	1	2	3	4	5	6	7	8	9	10	11	12
1	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2	**1**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
3	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
6	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
7	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**
8	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
9	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**
10	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**
11	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**
12	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**

Table 4: Reachability Matrix: $M^2_1 = (B_1+I)^2$

↓i &j→	1	2	3	4	5	6	7	8	9	10	11	12
1	1	0	0	0	0	0	0	0	0	0	0	0
2	1	1	0	0	0	1	0	0	0	0	0	0
3	1	0	1	0	0	0	0	0	0	0	0	0
4	1	0	0	1	0	0	0	0	0	0	0	0
5	0	0	0	0	1	0	0	0	0	0	0	1
6	0	1	0	0	0	1	0	0	0	0	0	0
7	0	0	0	0	0	1	1	0	0	0	0	0
8	0	0	0	1	0	0	0	1	0	0	0	0
9	0	0	0	0	0	0	0	0	1	0	1	0
10	0	0	0	0	0	0	1	0	0	1	0	0
11	0	0	0	0	0	0	0	1	0	0	1	0
12	0	0	1	0	0	0	0	0	0	0	0	1

For the reachability matrix, $M+I = M =$
Persisting with the R (), A () and R () ∩ A () is provides by table (4):

Table 5: Level Partitioning of the Reachability Matrix

	R ()	A ()	R () ∩A()
1	**1**	**1,2,3,4**	**1**
2	**1,2**	**2,6**	**2**
3	**1,3**	**3,12**	**3**

4	1,4	4,8	4
5	5,12	5	5
6	2,6	6,7	6
7	6,7	7,10	7
8	4,8	8,11	8
9	9,11	9	9
10	7,10	10	10
11	8,11	9,11	11
12	3و12	5,12	12

From table (5), it can be seen that the element) is in the first level. By depriving) from the set (S), it is therefore, probable to discover the first level elements of the reduced system, which are in fact second level elements of the first system. By examination, this operation is to reorder and to distribute the first element set .

S= [),))),)),),),),)]

Into hierarchical components of:

= [),))),)),),),),)].

There an additional method to develop the hierarchical model. And there is essential connected additional subordination matrix (N), portrays just one hierarchy. This matrix is index-listed-horizontally by the index set, and vertically by the index set. The total of these two sets is S= [+] which includes all the visible indexes on the developed hierarchy.

For every level in the hierarchy, there will be a subset of (S) portraying the indexes that become visible at that level. The subset of the top level, level 1, is named. The second level subset is , etc. The bottom level subset is . At any level except the first; there may be some numbers of subset for that level that have nothing subordinate to them. Name level i [i =1, 2, 3, … n].

The subset as the subset of composing of those elements of which have at the least one element subordinate to them. The level 1, is formed by =, and (N) is a link.

All that is required to build a hierarchy by examination is a set of subordinate matrices exhibited below:

$\hat{}S_1$ $\hat{}S_2$ $\hat{}S_3$ $\hat{}S_{N-1}$

$N_1= S_2$ $N_2= S_3$ $N_3=S_4$ . . . $N_{N-1}= S_N$

Fig.(4) Formation of matrices for levels of hierarchy

The knowledge required to construct each of these matrices is included in the first matrix N. Progressing, the following methodology will exhibit below i.e levels hierarchy of the system. The operation to establish from the equation [1] below:

= - ……………………………………. (1)

ISSN NO.2395-0692

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To establish , the experimenter can commence by masking those columns of (N) indexed by. Masking is performed for example by cutting some paper strips in the width and length of matrix column and laying these over the columns corresponding to. By drawing heavy lines through columns of a spare copy of matrix (N). Accordingly, the analyst can recognize the indexes of those rows in the remaining part of (N) that do not hold any 1's. These indexes make up set (). So, to establish the equation [2] below is utilized:

= ………………………………… (2)

To establish , mask those column of the (N) indexed by the set and those rows of (N) indexed by . Accordingly, the analyst can recognize the indexes of those rows remaining part of (N) that do not hold any 1's. These indexes make up set (). So, to establish , the equation [3] below is utilized:

……………………………………(3)

To establish () mask those columns of (N) indexed by the set. Accordingly, hold any 1's. These indexes make up set. So, the recognition of = [i= 2, 3, …,n-1] is established from equation [4] below:

[i= 2,3,…,n-1]……… ………..(4)

Ever the subsets and the subsets establish the required matrices associated with diverse levels are determined by examination of matrix (N). Let matrix () be the subordinate matrix that exhibits level (i) is linked to level i+1[i= 1,2,…n-l].Accordingly, () is developed from (N) and one uses the horizontal index set for () the elements that constitute (+1). The entries in matrix () are taken directly from matrix (N). Consequently, following the foresaid operation, the multi-level model or hierarchical structure is constructed below. By examination to the binary matrix () or reachability matrix (), the following order is masked so as to determine a subordinate matrix () below:

Table 6: M^*_1

i&j	1	2	3	4	5	6	7	8	9	10	11	12
1	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
3	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
6	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
7	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
8	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
9	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**
10	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
11	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
12	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
12	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Two sets of elements that are subsets of the original element are of exceptional interest. These two sets are quickly recognizable from the matrix . To illustrate this, commence with matrix (). Hence, to establish the top-level, determine which rows of matrix are filed with zeros. Draw a dotted line (a circle) to the corresponding indices. These indices are the top – level set. To recognize the bottom level set, the analyst need to establish which columns of are filed with zeros. Draw a hairline (or a rectangular) around the corresponding indices. These indices are the bottom – level set. The outcomes of this operation are exhibited in matrix. Accordingly, the top – level set or the system matrix is [1] and the bottom – level set is [5, 9, and 10]. The remaining rows and columns are ordered in the following matrix below:

Table 7: N_1

i & j	**1**	**2**	**3**	**4**	**6**	**7**	**8**	**11**	**12**
2	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
3	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
6	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
7	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
8	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
9	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**
10	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
11	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**
12	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**

From the matrix above we get thus:
= [1, 2, 3, 4, 6, 7, 8, 12]…………… ……(5)
= [2,3,4,5,6,7,8,9,11,12]………… …..(6)
Use (5) and (6) to get thus:
= [2, 3, 4, 5, 6, 7, 8, 11, 12]…………… ….(7)
Use (1), (5), and (7) to get thus:
= [1]…………… … ……………(8)
Masking the columns of corresponding to elements of. There are no 1's in the rows indexed by 2, 3, and 4, thus is:
= [2, 3, 4]…………………… ……….(9)
Use (2), (5), and (9) to get thus:
= [2, 3, 4]……………………… ……….(10)
Masking the columns on (corresponding to elements of and rows corresponding to elements of . There are no 1's in the rows indexed by 6, 8, and 12. Thus:
= [6, 8, 12]……………………… ……..(11)
Use (3), (5), and (11) to get. Thus:
= [6, 8, 12]…………… ………………….(12)
Masking the columns of corresponding to elements of
, and the rows corresponding to elements of. There are no 1's in the rows indexed by 5, 7, and 11. Thus:

ISSN NO.2395-0692
IJAHMS International Journal of Arts, Humanities and Management Studies

= [5, 7, 11]……….. …………..(13)
Use (4), (5), and (13) to get . Thus:
= [5, 7, 11]…………… …………….(14)
Masking the columns of corresponding to elements of , and the rows corresponding to elements of . There are no 1's in the rows indexed by 9 and 10. Thus:
= [9, 10]………………… … (15)
Immediately it is easy to erect the hierarchy in the form shown below by examination of the above matrices as:

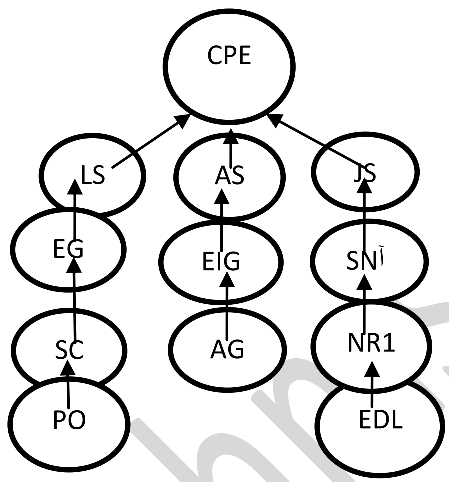


Fig.(5) The Interpretive Structural Model (ISM) of the Ethiopian political system

The exploratory tools are going to tell which one is the unique model to be selected. To carry out the said selection, the so-called batch and unit analysis as a procedure will be carried out in the section below:

(i) **Batches and Unit Analysis:** The tabulated sets of elements concerning the resulting sixty models. Each of these sets conveys the frequency of occurrences and their distributions. Each set of these frequencies is called batch. In other words a batch is a set of related numbers. The sole relatedness parameter for each set is the rank level of the hierarchy. The said frequency occurrence of the rank level in each structure for every political system models is searched. For each model the main system, its subsystems and the elements are ranked at certain level. The different levels are labeled by ordered numbers such as numerals; 1, 2, 3, 4, etc. These different frequencies are considered as a single batch since they are all of the same kind. Numbers appears to go together in a batch because they belong to one thing or one issue. Table (8) shows the batches and the corresponding elements. The corresponding elements are shown in four columns. Thus, table (8) is generated to aid the said selection via stem-and-leaf criteria. In this manner the analyst can carry both an evaluative and comparative approach to the said table. Each of the numbers in the batch stands for the same kind of thing: here, occurrence level of the structural elements of the model. Since the numbers in the four batches, are alike, the analyst can compare the batches. In short, each batch has a data set contains numbers corresponding to the frequency of occurrence at each level of the structural elements of the said political system. The structured elements are the units of analysis or units observations, the things that were observed to get the abstracted numbers.

Table 8: shows batches and corresponding elements

Elements	Batch 1	Batch 2	Batch 3	Batch 4
CPE	25	8	16	10
LS	3	27	10	16
AS	6	23	18	10
JS	4	21	13	21
AG	2	5	11	33
EG	1	11	29	18
SC	5	7	21	22
SN	4	10	14	20
EDL	2	5	10	26
PO	3	19	25	9
NR	2	5	19	17
EIG	3	18	25	7
Total	60	159	211	209

Source: From Sixty Experiments

Table (8) represents the batches and the corresponding structured elements of the Ethiopian political system with their different frequency occurrences of the hierarchical levels of the developed models. Each batch of the developed models is shown at a certain level. The table reflects the hierarchy order of the batches. When ranking the main systems, analyst detects the chief political executive (CPE) is the primary element with (25) different occurrences; administrative system (AS) is the second element with (6) frequencies; social classes (SC) is the third with (5)frequencies; coupled with both the judiciary system element (JS) and size of nation element (SN) are the fourth with (4) frequencies for each; legislative system element(LS), political organizations element (PO) and economic interests groups (EIG) are the fifth with (3) frequencies for each; associations groups element (AG), economic development level element (EDL) and natural resources element (NR) are the sixth with (2) frequencies for each; and ethnic groups element (EG) is the seventh with (1) occurrence. These are the major twelve main systems. Among these main systems the exploratory technique suggests to analyst the chief political executive (CPE) as the main system. Thus, (CPE) represents main system of the hierarchical structure model of the Ethiopian political system. For other subordinates of the selected main system the analyst elaborates exploratory tools below:

(ii) Ordering Batches: In ordering the batches, there are tools used for this purpose. The most significant tools used frequently are as follow: (a) The frequency distribution tools (b) The histogram tools (c) The stem- and -leaf. The analyst prefers the stem-and - leaf tools as selection criteria in this research. The said criterion is used to select the unique model of the Ethiopian political system. Since the stem -and- leaf technique is thought to be more powerful than other two. It tells the analyst more detail than the capability of the other two can. The stem – and – leaf can be converted to either form quickly as well as to make communication easier. Moreover,

ISSN NO.2395-0692

IJAHMS International Journal of Arts, Humanities and Management Studies

stem -and - leaf is much superior for two reasons: firstly, it is quicker to do and it contains more information. Secondly, it tells the analyst not only how many frequencies there are per each stem but what they are intended to use the stem- and- leaf as his basic of the preliminary data organization and selection criteria in this paper. But, the final question is how stem- and- leaf is done? The stem -and- leaf is very little work and gives a lot of information in ordered form. It is one of the basic tools of exploratory analysis, especially batch analysis. Here, is a list of steps to follow when doing stem-and- leaves technique: (1) choose your stems: detect the biggest and the smallest numbers as well as make sure your stem cover that range. In table (4) it was easy to see that the case went from 1 to 33, so, the stems from 0 to 3 would handle all the numbers. (2) Order your stems: analyst prefers to put the biggest one at top, so that, numbers "higher" on page are "higher" in size as well. (3) Always make a note of stem – and – leaf "stems are in tens, leaves are in units".4) Check quickly. To be sure you have not skipped a number, count the numbers of leaves. In table (10), each stem-and- leaf should and does have [12] leaves since there were [12] elements. The following tables show stem-and-leaf for other batches.

Table 9: shows stem- and -leaf of batch two

Stem-and-leaf	
2	**7**
2	**13**
1	**89**
1	**01**
0	**55578**
0	

Stem: tens Leaf: units

source: From Sixty Experiments

Table (9) shows stem -and- leaf for batch number two. The batch represents subsystems of the main system. The stem - and- leaf suggests administrative (AS), legislative system (LS), and judiciary system (JS) as subsystems with their biggest numbers [27, 23, and 21]. The others occurrences of subsystems are neglected.

Table10: shows stem-and-leaf of batch number three

Stem-and-leaf	
2	**559**
2	**1**
1	**689**
1	**00134**
0	**456**
0	**123**

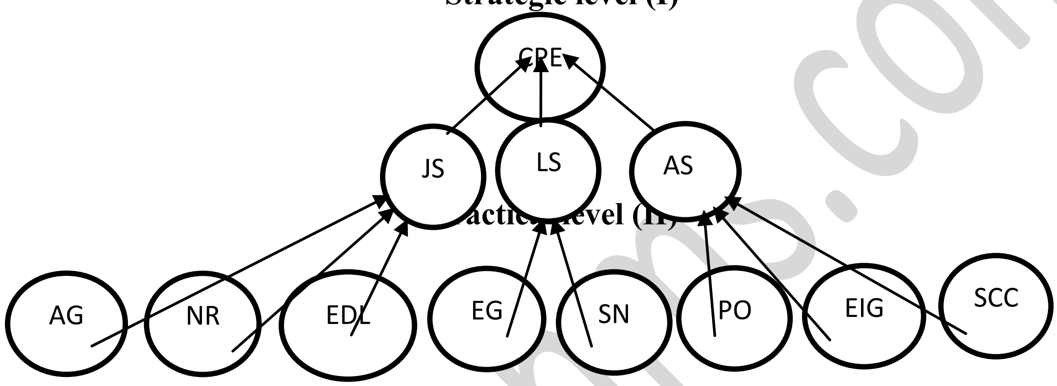
Leaf: units Stem: tens

source: From Sixty Experiments

Table (10) shows stem- and -leaf for batch number three. The batch number three is the component of the subsystem. The subsystem has been suggested by the stem-and -leaf of table

(10). Consequently, the stem-and-leaf here suggests political organizations (PO), economic interests groups (EIG), ethnic groups (EG), social classes (SC), size of nation (SN), natural resources (NR), economic development level (EDL), and associations groups (AG) and the others are disregarded since they have been suggested. The other way of displaying stem- and-leaf is using name s instead of numbers. Table (8) shows a combination of the three batches stem-and-leaf with one main stem and leaves are names. This combination approach makes the selection more obvious. All the stem -and- leaves are portrayed in one plot. As a result, the exploratory technique suggests the model of the result of the experiment number forty-eight as the unique model for the Ethiopian political system. At this stage the analyst achieved the selection of the optimum model among alternatives.

Strategic level (I)



Operational level (III)

Fig. 6: Shows Ethiopian political system's model (hierarchical structure with three levels

The Fig. (6) Represent the hierarchical structure of the Ethiopian political system. It is a hierarchical model which portrays the Ethiopian political structure. This structure is a simplified and generalized statement of what seem to be the most important elements of the real- world situation of the said political system in a graphical form,Easton D. (2014). At the top of the selected structural model of Ethiopian political system and shown in Fig (6), the chief political executive element dominates the hierarchy level (**I**). At the second level (**II**) the judiciary system element coupled with both the legislative system element and the administrative system element are displayed. The lower level (**III**) is dominated by associations groups, natural resources, economic development level, ethnic groups, and size of nation, political organizations, economic interests groups, and social classes, elements. A closer look to this model shows the schema, the political institutions sub-systems or subordinates the socio-political and the political economy sub-systems. These subordinates describe the Ethiopian political system more in-depth. Thus, the model reflects the levels of the Ethiopian political system elements. The strategic level is occupied by the main system. At the strategic the geopolitical codes and decisions are formulated Taylor (1989). Their information requirements are often one-time request reports "what if", and trend analyses. The information available for strategic level decision is almost never conclusive. At the tactical level, concentration is on the series of goals as formulated at the strategic level are required to meet the objectives set is the functional activity of this level. The tactical level is concern primarily with operations from year to yearCohen (2003). The information available for a tactical level is seldom conclusive. At the operation level, the personnel have well-defined tasks, but their tasks are essentially of short term. Their information requirements are directed at operational feedback. So, the sudy recommends this interpretive structural model to be as a bench mark or standard for future research on Ethiopian political system.

IV. CONCLUSION AND RECOMMENDATION

The study concludes that the ISM is a powerful technique to study the political systems. By applying the said technique, a unique hierarchical model consists of twelve elements with three hierarchical levels representing the Ethiopian political system was obtained.
Therefore, it recommends that an ISM is a useful technique for analyzing the complex political systems.

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