# Derivation of Formulas for Position Change of Entities in Power Inductive Distribution

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***Abstract-*** This paper shows the mathematical analysis involved in the derivation of a unified formula for position change of entities in power inductive distributions of Kola analysis. This paper proved that in power inductive distributions of distributive regeneration of ordered system, where the total number of ordered entities [n(E)] could be expressed in exponential form of $C^a$, and where C is the number of columns with each column having the same number of entities, the mathematical formula connecting the horizontal position ranking value [$P^h{}_{dx}$] of an entity at distribution (x) and the vertical position ranking value [$P^v{}_{d(x+1)}$] of the same entity at distribution (x + 1) obeys a rectilinear equation.

***Index Terms-*** Power inductive distributions, Kola analysis, position change of entities, distributive regeneration of ordered system

## I. Introduction

The mathematical analysis of the distributive regeneration of ordered system is termed Kola Analysis, and it involves derivation of formulas for solving problems associated with an ordered system by using the phenomenon of distributive regeneration of ordered system [1]. Distributive regeneration of ordered system occurs when a given system of entity arrangement, comprising a number of entities that are grouped into two or more columns and rows, is made to undergo a Logico-Sequential Distribution until all the entities return to their starting arrangement before being distributed [2]. Three major distribution patterns have been discovered so far in the phenomenon of distributive regeneration of ordered system in simple dimension, and they are the quadratic distribution patterns [3], the column inductive distribution patterns [4], and the power inductive distribution patterns [4]. Further research work is needed to discover more patterns in this phenomenon of distributive regeneration of ordered system. This paper models and shows the steps involved in the derivation of a unified formula for position change of entities in Power Inductive Distributions of Kola Analysis.

## II. Power Inductive Distributions

Power Inductive Distribution refers to the distribution phenomenon of ordered system of entities, in which the total number of entities n (E) in the ordered system could be expressed in exponential form of $C^a$, where C is the number of columns with each column having the same number of entities, and ‘a’ is an whole number value. The arrangement formula $n(E) = C^a$ has a mathematical relationship with the regenerative distribution number (t) [5]. The Regenerative Distribution Number (t) is defined as the number of transformed distributions it takes for the regeneration of the starting state of an ordered system [3]. The regenerated distribution of the starting arrangement (d0) in the distributive regeneration distribution cycle is denoted by (dt). In figure 2, the entities are denoted by numbers, and the distribution goes thus: d0, d1, d2, d3, and d4 (dt). The number of rows is denoted with r. Table 1 shows some power inductive distribution arrangements and their corresponding regenerative distribution numbers (t). The arrangement and regenerative distribution number formulas for power inductive distributions in Kola Analysis are stated as follows [5]:

If a is an even number, then $$n(E) = C^a = C^{t/2} \quad (1)$$

If a is an odd number, then, $$n(E) = C^a = C^t \quad (2)$$

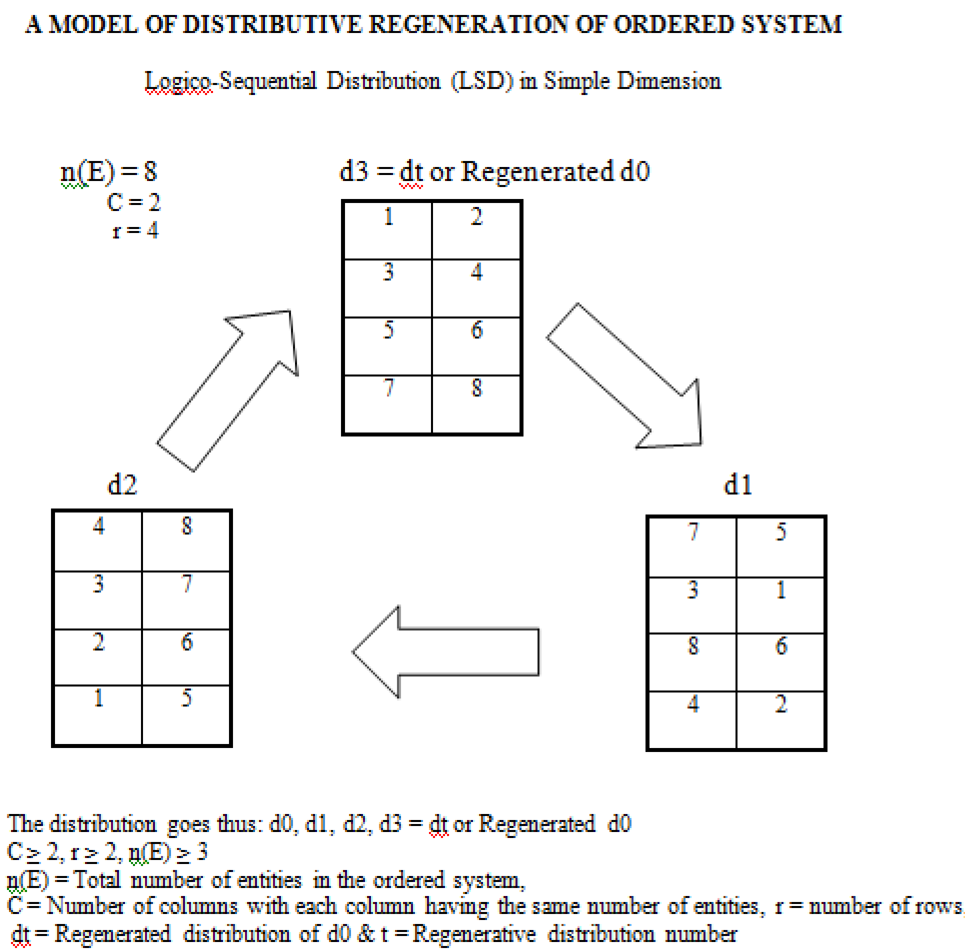


**Figure 1: Schematic Representation of Phenomenon of Distributive Regeneration of Ordered System using Logico-Sequential Distribution**

## III. DATA COLLECTION AND POSITION RANKING VALUES OF ENTITIES IN POWER INDUCTIVE DISTRIBUTIONS

Mathematical analysis of the position change, correlation, and location of entities in distributive regeneration of ordered system cycle in Kola Analysis is called Positiomatics [4]. According to Taylor, the mathematical equations connecting the horizontal and vertical position ranking values of entities in distributive regeneration of ordered system at any particular distribution obey either linear or rectilinear equations [1]. Let numbers represent the entities in an ordered system as shown in Figure 3. The ordered system in Figure 3 has total number of entities [n(E)] = 16, number of columns (C) = 4, number of rows (r) = 4, and d0 represents the starting arrangement. The arrangement is in simple dimension with each column having four entities. Let $P^{v}_{dx}$ denotes vertical position ranking value at distribution (x), $P^{v}_{d(x+1)}$ denotes vertical position ranking value at distribution (x + 1), $P^{h}_{dx}$ denotes horizontal position ranking value at distribution (x), and $P^{h}_{d(x+1)}$ denotes horizontal position ranking value at distribution (x + 1). Let $K^{v}_{dx}$ denotes rank value of vertical class interval of entities at distribution (x), $K^{v}_{d(x+1)}$ denotes rank value of vertical class interval of entities at distribution (x + 1), and $K^{h}_{dx}$ denotes the rank value of horizontal class interval of entities at distribution (x), and $K^{h}_{d(x+1)}$ denotes the rank value of horizontal class interval of entities at distribution (x + 1). Table 2 shows the vertical position and horizontal position ranking values of the entities designated by numbers in Figure 3.

| d0 | | | d1 | | | d2 | | | d3 | | | d 4 = dt | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 7 | 4 | 1 | 9 | 8 | 7 | 3 | 6 | 9 | 1 | 2 | 3 |
| 4 | 5 | 6 | 8 | 5 | 2 | 6 | 5 | 4 | 2 | 5 | 8 | 4 | 5 | 6 |
| 7 | 8 | 9 | 9 | 6 | 3 | 3 | 2 | 1 | 1 | 4 | 7 | 7 | 8 | 9 |

Figure 2: An Example of Power Inductive Distribution, $n(E) = 9$, $C = 3$, $r = 3$, $t = 4$, and $n(E) = C^2$

Table 1: Some Power Inductive Distribution Arrangements and their Corresponding Regenerative Distribution Numbers ($t$).

| $n(E)$ | $C$ | $C^x$ | $t$ | $n(E)$ | $C$ | $C^x$ | $t$ |
|---|---|---|---|---|---|---|---|
| 9 | 3 | $3^2$ | 4 | 16 | 2 | $2^4$ | 8 |
| 16 | 4 | $4^2$ | 4 | 81 | 3 | $3^4$ | 8 |
| 25 | 5 | $5^2$ | 4 | 256 | 4 | $4^4$ | 8 |
| 64 | 4 | $4^3$ | 3 | 32 | 2 | $2^5$ | 5 |
| 512 | 8 | $8^3$ | 3 | 243 | 3 | $3^5$ | 5 |
| 729 | 9 | $9^3$ | 3 | 1024 | 4 | $4^5$ | 5 |

| d0 | | | |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 |

Figure 3: Arrangement of entities in an ordered system at starting distribution ($d0$)

Subjection of entities in the ordered system of Figure 3 to Logico-sequential distribution leads to distributive regeneration of ordered system in Figure 4. Let consider the position change of an entity designated by number 1 in the distributive regeneration system in Figure 4. The horizontal position ranking value ($P^h_{d0}$) of the entity designated by 1 at distribution (d0) = 1st, while also its vertical position ranking value ($P^v_{d1}$) = 16th based on position ranking. Since the graph of $P^h_{dx}$ against $P^v_{d(x+1)}$ is to be plotted, therefore, for entity (E) = 1 the following ranking values are gotten as stated in Table 3.

For entity (E) = 1, ($P^h_{d0}$, $P^v_{d1}$) = (1, 16), ($P^h_{d1}$, $P^v_{d2}$) = (4, 13), ($P^h_{d2}$, $P^v_{d3}$) = (16, 1), and ($P^h_{d3}$, $P^v_{d4}$) = (13, 4). The same procedure is applied to E = 6 and E = 12 as shown in Table 3. It should be noted that the graph of $P^v_{dx}$ can also be plotted against $P^h_{d(x+1)}$ to obtain a similar equation.

Table 2: Position Ranking Values of Entities in Figure 3

| $(E)$ | $P^v_{dx}$ | $P^h_{dx}$ | $(E)$ | $P^v_{dx}$ | $P^h_{dx}$ |
|---|---|---|---|---|---|
| 1 | 4th | 1st | 9 | 2nd | 9th |
| 2 | 8th | 2nd | 10 | 6th | 10th |
| 3 | 12th | 3rd | 11 | 10th | 11th |
| 4 | 16th | 4th | 12 | 14th | 12th |
| 5 | 3rd | 5th | 13 | 1st | 13th |
| 6 | 7th | 6th | 14 | 5th | 14th |
| 7 | 11th | 7th | 15 | 9th | 15th |
| 8 | 15th | 8th | 16 | 14th | 16th |

| d0 | | | | d1 | | | | d2 | | | | d3 | | | | d4 = dt | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 2 | 3 | 4 | 13 | 9 | 5 | **1** | 16 | 15 | 14 | 13 | 4 | 8 | **12** | 16 | **1** | 2 | 3 | 4 |
| 5 | **6** | 7 | 8 | 14 | 10 | **6** | 2 | **12** | 11 | 10 | 9 | 3 | 7 | 11 | 15 | 5 | **6** | 7 | 8 |
| 9 | 10 | 11 | **12** | 15 | 11 | 7 | 3 | 8 | 7 | **6** | 5 | 2 | **6** | 10 | 14 | 9 | 10 | 11 | **12** |
| 13 | 14 | 15 | 16 | 16 | **12** | 8 | 4 | 4 | 3 | 2 | **1** | **1** | 5 | 9 | 13 | 13 | 14 | 15 | 16 |

Figure 4: Distributive Regeneration of Ordered System, $n(E) = 16$, $C = 4$, $r = 4$, $t = 4$, and $n(E) = C^2$

Table 3: Table of position ranking values for entities designated by numbers 1, 6 and 12 respectively

| $dx$ | $d0$ | $d1$ | $d2$ | $d3$ | $d4$ | $d0$ | $d1$ | $d2$ | $d3$ | $d4$ | $d0$ | $d1$ | $d2$ | $d3$ | $d4$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P^h_{dx}$ | 1 | 4 | 16 | 13 | 1 | 6 | 7 | 11 | 10 | 6 | 12 | 14 | 5 | 3 | 12 |
| $P^v_{dx}$ | 4 | 16 | 13 | 1 | 4 | 7 | 11 | 10 | 6 | 7 | 14 | 5 | 3 | 12 | 14 |

By using position ranking values of Table 3, a graph of $P^h_{dx}$ against $P^v_{d(x+1)}$ was plotted. The graph is a linear graph as shown in Figure 5.

$n(E) = C^2$

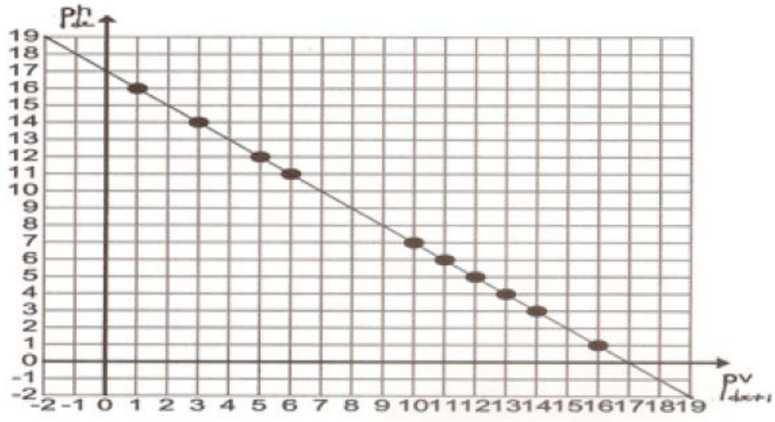

Figure 5: A graph of $P^h_{dx}$ against $P^v_{d(x+1)}$

The equation of the graph in Figure 5 is derived as follows:

$$\frac{P^h_{dx}}{17} + \frac{P^v_{d(x+1)}}{17} = 1$$

$$P^h_{dx} = -P^v_{d(x+1)} + 17$$

but $C = 4$, $n(E) = C^2 = 4^2 = 16$

then

$$P^h_{dx} = -P^v_{d(x+1)} + C^2 + 1 \quad (3)$$

| d0 | | d1 | | d2 | | d3 = dt | |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 7 | 5 | 4 | 8 | 1 | 2 |
| 3 | 4 | 3 | 1 | 3 | 7 | 3 | 4 |
| 5 | 6 | 8 | 6 | 2 | 6 | 5 | 6 |
| 7 | 8 | 4 | 2 | 1 | 5 | 7 | 8 |

Figure 6: Distributive Regeneration of Ordered System, $n(E) = 8$, $C = 2$, $r = 4$, $t = 3$, and $n(E) = C^3$

Considering the position change of entities designated by numbers 1, 4, and 5 in the distributive regeneration of ordered system in Figure 6 from d0 to d3, position ranking values were gotten as shown in Table 4. By using position ranking values of Table 4, a graph of $P^h_{dx}$ against $P^v_{d(x+1)}$ was plotted. The graph is a rectilinear graph with two straight lines as shown in Figure 7.
$n(E) = C^3$

Table 4: Table of position ranking values for entities designated by numbers 1, 4 and 5 respectively

| $dx$ | $d0$ | $d1$ | $d2$ | $d3$ | $d0$ | $d1$ | $d2$ | $d3$ | $d0$ | $d1$ | $d2$ | $d3$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P^h_{dx}$ | 1 | 4 | 7 | 1 | 4 | 7 | 1 | 4 | 5 | 2 | 8 | 5 |
| $P^v_{dx}$ | 4 | 7 | 1 | 4 | 7 | 1 | 4 | 7 | 2 | 8 | 5 | 2 |

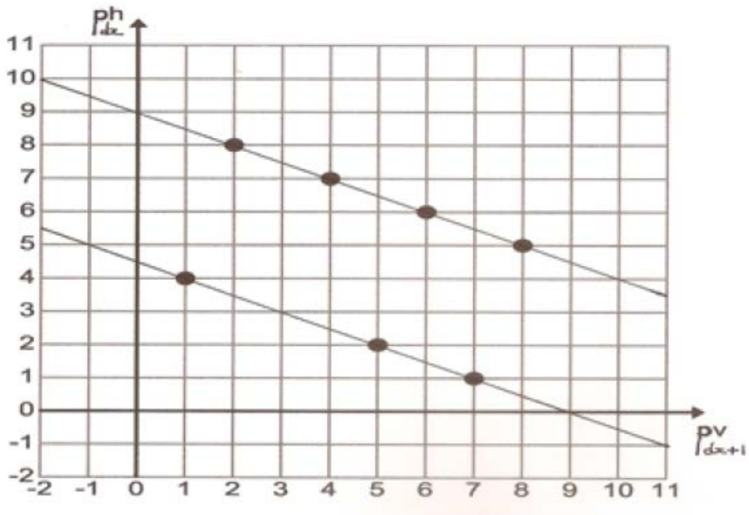


Figure 7: A graph of $P^h_{dx}$ against $P^v_{d(x+1)}$

The equation of the graph in Figure 7 is derived as follows:

$$\frac{P^h_{dx}}{4.5} + \frac{P^v_{d(x+1)}}{9} = 1$$

$$P^h_{dx} = -\frac{1}{2}P^v_{d(x+1)} + [4.5] \qquad (4)$$

$$\frac{P^h_{dx}}{9} + \frac{P^v_{d(x+1)}}{18} = 1$$

$$P^h_{dx} = -\frac{1}{2}P^v_{d(x+1)} + [4.5]2 \qquad (5)$$

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The unified formula for equations 4 and 5 from the graph in figure 7 is derived as follows: Since $C = 2$,

therefore $\frac{C^3+1}{C} = 4.5$

then

$$P^h_{dx} = -\frac{1}{C}P^v_{d(x+1)} + \left(\frac{C^3+1}{C}\right)K^h_{dx} \tag{6}$$

where $K^h_{dx}$ = Rank of horizontal position value of entities in the same class interval. For equation 4,

$$K^h_{dx} = 1$$

For equation 5,

$$K^h_{dx} = 2$$

Therefore, the unified formula for equations 4 and 5 from the graph in figure 7 is given as:

$$P^h_{dx} = -\frac{1}{C}P^v_{d(x+1)} + \left(\frac{C^3+1}{C}\right)K^h_{dx}$$

Table 5: Table of position ranking values for entities designated by numbers 3, 4 and 13 respectively

| $dx$ | $d0$ | $d1$ | $d2$ | $d3$ | $d4$ | $d5$ | $d6$ | $d7$ | $d8$ |
|---|---|---|---|---|---|---|---|---|---|
| $P^h_{dx}$ | 3 | 7 | 5 | 6 | 14 | 10 | 12 | 11 | 3 |
| $P^v_{dx}$ | 7 | 5 | 6 | 14 | 10 | 12 | 11 | 3 | 7 |
| $dx$ | $d0$ | $d1$ | $d2$ | $d3$ | $d4$ | $d5$ | $d6$ | $d7$ | $d8$ |
| $P^h_{dx}$ | 4 | 15 | 1 | 8 | 13 | 2 | 16 | 9 | 4 |
| $P^v_{dx}$ | 15 | 1 | 8 | 13 | 2 | 16 | 9 | 4 | 15 |
| $dx$ | $d0$ | $d1$ | $d2$ | $d3$ | $d4$ | $d5$ | $d6$ | $d7$ | $d8$ |
| $P^h_{dx}$ | 13 | 2 | 16 | 9 | 4 | 15 | 1 | 8 | 13 |
| $P^v_{dx}$ | 2 | 16 | 9 | 4 | 15 | 1 | 8 | 13 | 2 |

Considering the position change of entities designated by numbers 3, 4 and 13 in the distributive regeneration of ordered system in Figure 8 from d0 to d8, position ranking values were gotten as shown in Table 5. By using position ranking values of Table 5, a graph of $P^h_{dx}$ against $P^v_{d(x+1)}$ was plotted. The graph is a rectilinear graph with four straight lines as shown in Figure 9.

$n(E) = C^4$

| d0 | | d1 | | d2 | | d3 | | d4 | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 15 | **13** | **4** | 8 | 9 | 1 | 16 | 15 |
| **3** | **4** | 11 | 9 | 12 | 16 | 10 | 2 | 14 | **13** |
| 5 | 6 | 7 | 5 | **3** | 7 | 11 | **3** | 12 | 11 |
| 7 | 8 | **3** | 1 | 11 | 15 | 12 | **4** | 10 | 9 |
| 9 | 10 | 16 | 14 | 2 | 6 | **13** | 5 | 8 | 7 |
| 11 | 12 | 12 | 10 | 10 | 14 | 14 | 6 | 6 | 5 |
| **13** | 14 | 8 | 6 | 1 | 5 | 15 | 7 | **4** | **3** |
| 15 | 16 | **4** | 2 | 9 | **13** | 16 | 8 | 2 | 1 |

| d5 | | d6 | | d7 | | d8 = dt | |
|---|---|---|---|---|---|---|---|
| 2 | **4** | **13** | 9 | 8 | 16 | 1 | 2 |
| 6 | 8 | 5 | 1 | 7 | 15 | **3** | **4** |
| 10 | 12 | 14 | 10 | 6 | 14 | 5 | 6 |
| 14 | 16 | 6 | 2 | 5 | **13** | 7 | 8 |
| 1 | **3** | 15 | 11 | **4** | 12 | 9 | 10 |
| 5 | 7 | 7 | **3** | **3** | 11 | 11 | 12 |
| 9 | 11 | 16 | 12 | 2 | 10 | **13** | 14 |
| **13** | 15 | 8 | **4** | 1 | 9 | 15 | 16 |

Figure 8: Distributive Regeneration of Ordered System, $n(E) = 16$, $C = 2$, $r = 8$, $t = 8$, and $n(E) = C^4$

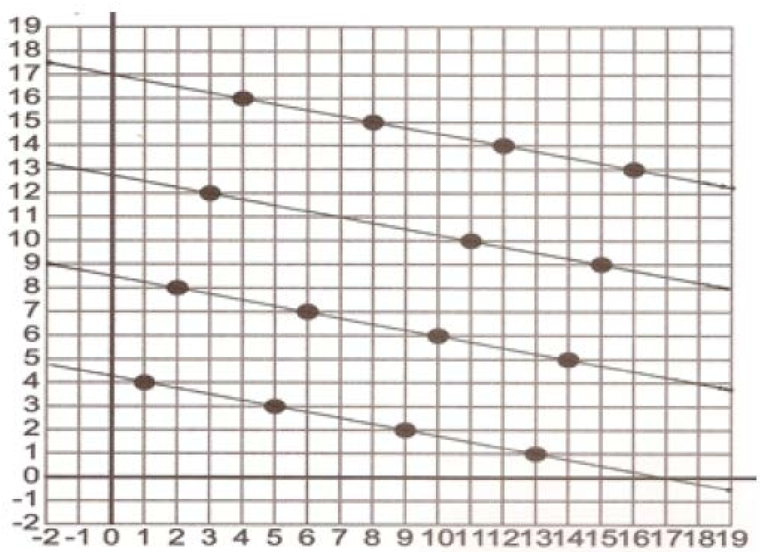

Figure 9: A graph of $P^h_{dx}$ against $P^v_{d(x+1)}$

The equation of the graph in Figure 9 is derived as follows:

$$\frac{P^h_{dx}}{4.25} + \frac{P^v_{d(x+1)}}{17} = 1$$

$$P^h_{dx} = -\frac{1}{4} P^v_{d(x+1)} + [4.25] \tag{7}$$

$$\frac{P^h_{dx}}{8.5} + \frac{P^v_{d(x+1)}}{34} = 1$$

$$P^h_{dx} = -\frac{1}{4} P^v_{d(x+1)} + [4.25]2 \tag{8}$$

$$\frac{P^h_{dx}}{12.75} + \frac{P^v_{d(x+1)}}{51} = 1$$

$$P^h_{dx} = -\frac{1}{4} P^v_{d(x+1)} + [4.25]3 \tag{9}$$

$$\frac{P^h_{dx}}{17} + \frac{P^v_{d(x+1)}}{68} = 1$$

$$P^h_{dx} = -\frac{1}{4} P^v_{d(x+1)} + [4.25]4 \tag{10}$$

The unified formula for equations 7, 8, 9 and 10 from the graph in figure 9 is derived as follows: Since $C = 2$,

therefore $\frac{C^4+1}{C^2} = 4.25$

then

$$P^h_{dx} = -\frac{1}{C^2} P^v_{d(x+1)} + \left(\frac{C^4+1}{C^2}\right) K^h_{dx} \tag{11}$$

where $K^h_{dx}$ = Rank of horizontal position value of entities in the same class interval. For equation 7,

$$K^h_{dx} = 1$$

For equation 8,

$$K^h_{dx} = 2$$

For equation 9,

$$K^h_{dx} = 3$$

For equation 10,

$$K^h_{dx} = 4$$

Therefore, the unified formula for equations 7, 8, 9 and 10 from the graph in figure 9 is given as:

$$P^h_{dx} = -\frac{1}{C^2} P^v_{d(x+1)} + \left(\frac{C^4+1}{C^2}\right) K^h_{dx}$$

By considering the unified formulas derived from the graphs of figures 5, 7 and 9, an overall unified formula is derived for the horizontal position ranking value [$P^h_{dx}$] of an entity at distribution (x) and the vertical position ranking value of [$P^v_{d(x+1)}$] of the same entity at distribution (x+1) in Power Inductive Distribution in Kola Analysis as follows: The unified formula, equation 3, derived from the graph in figure 5:

$$P^h_{dx} = -P^v_{d(x+1)} + C^2 + 1$$

The unified formula, equation 6, derived from the graph in figure 7:

$$P^h_{dx} = -\frac{1}{C} P^v_{d(x+1)} + \left(\frac{C^3+1}{C}\right) K^h_{dx}$$

The unified formula, equation 11, derived from the graph in figure 9:

$$P^h_{dx} = -\frac{1}{C^2} P^v_{d(x+1)} + \left(\frac{C^4+1}{C^2}\right) K^h_{dx}$$

Analyzing these three unified formulas derived from the graphs in figures 5, 7, and 9: if $a = 2$, and $n(E) = C^a = C^2$, then $K^h_{dx} = 1$

$$P^h_{dx} = -\frac{1}{C^{2-2}} P^v_{d(x+1)} + \left(\frac{C^2+1}{C^{2-2}}\right) K^h_{dx}$$

Therefore,

$$P^h_{dx} = -P^v_{d(x+1)} + C^2 + 1$$

if $a = 3$, and $n(E) = C^a = C^3$, then

$$P^h_{dx} = -\frac{1}{C^{3-2}} P^v_{d(x+1)} + \left(\frac{C^3+1}{C^{3-2}}\right) K^h_{dx}$$

Therefore,

$$P^h_{dx} = -\frac{1}{C} P^v_{d(x+1)} + \left(\frac{C^3+1}{C}\right) K^h_{dx}$$

if $a = 4$, and $n(E) = C^a = C^4$,
then

$$P^h_{dx} = -\frac{1}{C^{4-2}} P^v_{d(x+1)} + \left(\frac{C^4+1}{C^{4-2}}\right) K^h_{dx}$$

Therefore,

$$P^h_{dx} = -\frac{1}{C^2} P^v_{d(x+1)} + \left(\frac{C^4+1}{C^2}\right) K^h_{dx}$$

Therefore, the overall unified formula for the mathematical relationship between $P^h_{dx}$ and $P^v_{d(x+1)}$ for Power Inductive Distribution in Kola Analysis is given as:

$$P^h_{dx} = -\frac{1}{C^{a-2}} P^v_{d(x+1)} + \left(\frac{C^a+1}{C^{a-2}}\right) K^h_{dx} \qquad (12)$$

where,

$$\frac{r}{C} \geq K^h_{dx} \geq 1$$

Calculating $K^h_{dx}$
if $a = 2$, and $C = 4$, then $n(E) = 4^2 = 16$, and $r = 4$
Therefore,

$$\frac{n(E)}{[\frac{r}{C}]} = 16\left(\frac{4}{4}\right) = 16$$

Therefore, horizontal class interval is from $(1-16)$, and from $(1-16)$, $K^h_{dx} = 1$.

$$\frac{4}{4} \geq K^h_{dx} \geq 1$$

if $a = 3$, and $C = 2$, then $n(E) = 2^3 = 8$, and $r = 4$
Therefore,

$$\frac{n(E)}{[\frac{r}{C}]} = 8\left(\frac{2}{4}\right) = 4$$

Therefore, horizontal class interval is from $(1-4)$, from $(1-4)$, $K^h_{dx} = 1$, and from $(5-8)$, $K^h_{dx} = 2$.

$$\frac{4}{2} \geq K^h_{dx} \geq 1$$

if $a = 4$, and $C = 2$, then $n(E) = 2^4 = 16$, and $r = 8$
Therefore,

$$\frac{n(E)}{[\frac{r}{C}]} = 16\left(\frac{2}{8}\right) = 4$$

Therefore, horizontal class interval is from $(1-4)$, and from $(1-4)$, $K^h_{dx} = 1$, from $(5-8)$, $K^h_{dx} = 2$, from $(9-12)$, $K^h_{dx} = 3$, and from $(13-16)$, $K^h_{dx} = 4$.

$$\frac{8}{2} \geq K^h_{dx} \geq 1$$

**A Practical Problem:** A mathematics tutor wanted to perform a card mathematical magic game with 256 cards which were to be grouped into 4 columns with each column having 64 cards. If his plan was to put a spectator's card at the horizontal position ranking value ($P^h_{d0}$) = 125$^{th}$ at the starting distribution (d0) and to pick it up vertically at distribution 1 (d1), what would be the vertical position ranking value ($P^v_{d1}$) of the spectator's card at d1?

## IV. CONCLUSION

Positiomatics, which is the aspect of Kola analysis that deals with derivation of formulas for position change of entities in distributive regeneration of ordered system, opens an innovative way of programming, encrypting, and tracking of information, objects, and entities in an ordered arrangement. Moreover, the method of analysis involved in the derivation of formulas in this paper exemplifies the basics of formula derivation in physics which could promote inductive-deductive reasoning among students. It provides a practical mathematical approach to students to be acquainted with the fundamentals of mathematical methodology, and application of mathematical manipulative and critical thinking skills in formulating and creating scholarly works in the field of science and technology. However, further research is needed to discover more applicable phenomena of distributive regeneration of ordered system to enhance teaching, training, research, and innovation, manipulative and conceptual skills in the field of mathematical sciences.

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