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## CONTENTS OF THE ISSUE

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- i. Copyright Notice
- ii. Editorial Board Members
- iii. Chief Author and Dean
- iv. Contents of the Issue
  
1. The Stable Bounded Theory an Alternative to Projecting Populations: The Case of Mexico. ***1-12***
2. The Real Causes of the Turkish Crisis: From the Social-Democratic Consensus to Neoliberal Globalization - Will Turkey Fall to its Knees?. ***13-20***
3. Analysis of ATM Service Performance by using ARENA Simulation: The Case of Commercial Bank of Ethiopia, Sabyan Branch. ***21-27***
4. A Study on the Impact of Plastic Money on Consumer Spending Pattern. ***29-36***
5. Adopting Bioinformatics and Neural Network Deductions to Extrapolate the Structure and Evolutionary Dynamics of Helix Partnerships. ***37-44***
  
- v. Fellows
- vi. Auxiliary Memberships
- vii. Preferred Author Guidelines
- viii. Index



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# The Stable Bounded Theory an Alternative to Projecting Populations: The Case of Mexico

By Javier González-Rosas & Iliana Zárate-Gutiérrez

*National Population Council*

**Abstract-** Nowadays the population data of countries as Japan, India, China, United States and Mexico, at glance seem to evolving over time according to a logistic pattern. In this context arises the following research question: will there be any form to prove the hypothesis of the logistic pattern? But this question implies three questions more, is there exist a minimum and a maximum for population growth? Will be able to be the values of the maximum and minimum determined numerically? And how can this information be used to projecting the population? In order to answer above questions we use the Stable Bounded Theory. The data we used in this paper were elaborated by National Institute of Statistic and Geography from Mexico and they cover last 225 years. Key results of the paper indicate that; first, in Mexico the assumption about the logistic pattern is true, second, minimum value for population growth of Mexican population is 7.1 million, while maximum is 153.6; and third, using the minimum and maximum values estimated and the Logistic pattern we forecasted México's population, so that, in 2020 will be 125.18 million, in 2030 will be 134.51 million, for 2040 will be 141.1, and in 2050 will it arrive to 145.56.

**Keywords:** *forecast, population, stability, logistic pattern, gaussian pattern.*

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Javier González-Rosas <sup>α</sup> & Iliana Zárate-Gutiérrez <sup>σ</sup>

**Abstract-** Nowadays the population data of countries as Japan, India, China, United States and Mexico, at glance seem to evolving over time according to a logistic pattern. In this context arises the following research question: will there be any form to prove the hypothesis of the logistic pattern? But this question implies three questions more, is there exist a minimum and a maximum for population growth? Will be able to be the values of the maximum and minimum determined numerically? And how can this information be used to projecting the population? In order to answer above questions we use the Stable Bounded Theory. The data we used in this paper were elaborated by National Institute of Statistic and Geography from Mexico and they cover last 225 years. Key results of the paper indicate that; first, in Mexico the assumption about the logistic pattern is true, second, minimum value for population growth of Mexican population is 7.1 million, while maximum is 153.6; and third, using the minimum and maximum values estimated and the Logistic pattern we forecasted México's population, so that, in 2020 will be 125.18 million, in 2030 will be 134.51 million, for 2040 will be 141.1, and in 2050 will it arrive to 145.56.

**Keywords:** forecast, population, stability, logistic pattern, gaussian pattern.

## I. INTRODUCTION

The forecast of Mexico's population have been traditionally done using the demographic components method, which is based on the estimation of births, deaths, migrants and immigrants, which are elements that determine the change in human populations. This method estimates births and deaths, projecting traditionally fertility and mortality using logistic functions (Partida, 2006). However, emigrants and immigrants have not been projected using mathematical models; their forecast has been restricted only to establishing assumptions about their behavior in future.

The demographic components method also provides us demographic dynamics of the country through predicting the future behavior of its components such as fertility, mortality and international migration. Due to this, the method can introduces for each component (fertility, mortality and migration) several sources of error such as: 1) Errors in data, since if the data are not reliable or accurate, they will produce biased forecasts; 2) Logistic functions used to projecting mortality and fertility are often not adequate, and 3) The minimum and maximum that are set in order

to projecting fertility and mortality are not statistical estimations, but are fixed in an ambiguous way.

So that, if all above error types are present in the three components, nine error sources would be introduced. But if is projected the total population only is introduced three error sources and so, the projections may be more accurate. So, purpose of this paper is firstly, demonstrate that the population growth in Mexico follows mathematical laws very accurate that allows estimate the maximum and minimum of the growth and besides determine the evolution pattern of Mexico's population through time, and secondly, use the results to obtain forecasts of the Mexican population until year 2050.

## II. LITERATURE REVIEW

The United Nations (UN) publishes projections of populations around the world. Traditionally, The UN produced them with standard demographic methods based on assumptions about future fertility rates, survival probabilities, and net migration. Such projections, however, were not accompanied by formal statements of uncertainty expressed in probabilistic terms. In July 2014 the UN for the first time issued official probabilistic population projections for all countries to 2100 (Alkema, 2015).

There exist several methods to project the population. Some of them project the total population using an initial population and future rates of population growth. Other which is called components method, projects the population by age and sex using an initial age and sex structure of the population and projections of fertility and mortality (The Cohort Component Method for Making Population Projections, 2017).

Some international organizations prepare population projections for the world, regions and countries. One of them organizations is the UN and the U.S. Census Bureau. Other organizations as World Bank and the International Institute for Applied System Analysis (IIASA) also prepare populations projections for world, major regions, and for individual countries. Each of these organizations uses slightly different methodologies, makes assumptions also different about the future demographic trends, and begins with slightly different estimates of current population size. Nevertheless, for the next 50 years their results fall within a relatively small band (Population Reference Bureau, 2017).

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According to the World Population Prospects: the 2015 revision, nowadays world's population is 7.3 billion and is expected to reach 8.5 billion in 2030, 9.7 in 2050, and 11.2 in 2100. China and India continue being the two countries with more population in the entire world, representing 19 and 18% of the world's population respectively. However, projections indicate by 2022 the India's population will be greater than the China's population. Today, one of the ten countries that have more population worldwide is in Africa (Nigeria), five are in Asia (Bangladesh, China, India, Indonesia and Pakistan), two are in Latin America (Brazil and Mexico), one is in Northern America (USA) and one is in Europe (Russian Federation) (United Nations, 2017).

Currently, the world population continues to grow although more slowly than in the recent past. Ten years ago, world population was growing by 1.24 per cent per year. Today is growing by 1.18 per cent per year or approximately an additional 83 million people

annually. The most demographers worldwide expect this growth will continue during the rest of this century (World Population History, 2017).

Also is very important consider that a projection is not a prediction about what it will happen, it is indicating what will happen if the assumptions which underpin the projection actually occur. These assumptions are often based on patterns and data trends which we have previously observed (Australian Bureau of Statistics, 2017).

### III. METHODOLOGY

#### a) Data used

Data we used in this paper were Mexico's population of the last 225 years and they covered 1790-2015 period. Source of these data is the National Institute of Statistic and Geography (INEGI by its acronym in Spanish) (Table 1).

*Table 1:* The population in Mexico, 1790-2015

Year	Population	Year	Population
1790	4.64	1910	15.2
1803	5.76	1921	14.33
1810	6.12	1930	16.66
1820	6.2	1940	19.7
1827	8.0	1950	25.8
1830	7.996	1960	34.9
1838	7.004	1970	48.2
1842	7.015	1980	66.8
1850	7.5	1990	81.25
1858	8.6	1995	91.16
1870	8.78	2000	97.48
1880	9.0	2005	103.26
1893	11.99	2010	112.34
1900	13.6	2015	119.51

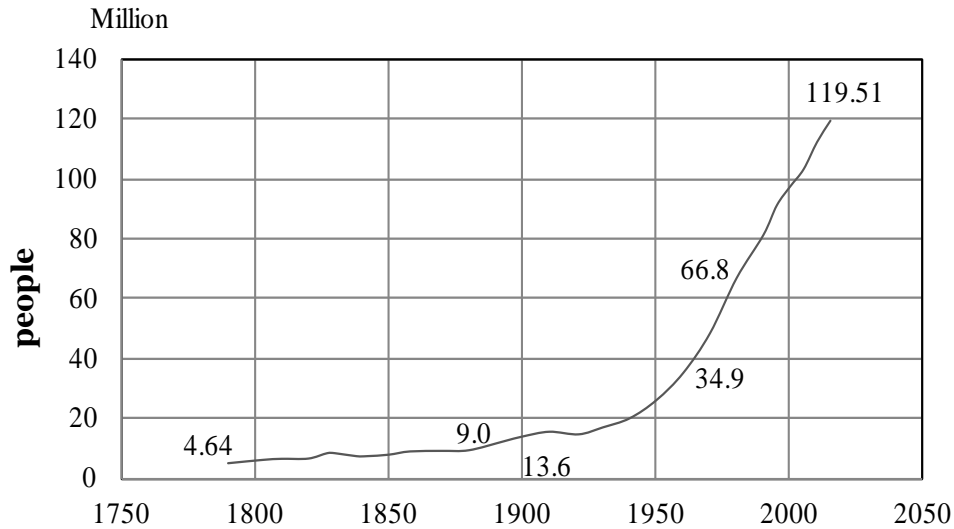
*Source:* 1790-2010 INEGI, 2017a; 2015 INEGI 2017b

It is very important point out that the most data of the table 1 were calculated by a population census.

#### b) Evolution of Mexico's population at last 225 years

At last 225 years Mexico's population has grown under effect of conditions socials, politics and economic very different. Through this period we can identify three scenarios that undoubtedly have contributed to establish the demographic dynamic and the population volume that has the country nowadays.

The first scenario is located in the nineteenth century in which the growth of the population was very slow. The second scenario refers to a part of the twentieth century in which growth continued slowly, but from the year 1930 began an exponential growth. The third scenario is located at end of the 20th century and what goes of century XXI, in which the exponential growth of the population has ended to giving pass to slower growth than the exponential (Figure 1).



Source: Table 1

Figure 1: The population in Mexico, 1790-2015

As we can see in the figure 1, in 1790, Mexico had only 4.64 million of inhabitants and had to passing little more than 90 years for the population reached the double. For 1900, the population was 13.6 million of persons, while in 1960 reached 34.9 million, this is, 7.7 million more than the double of 1900, this means that, a process that took more than 90 years in century XIX, in century XX it took a little more than 50 years. But the rapid growth of the population in century XX continued to increasing, so that, in 1980 Mexico reached 66.8 million, only 3 million less than double of 1960, what indicated that in a few more of 30 years the population would duplicate again. However, since 1980 to 2015 have passed 35 years and the population has not duplicated, what seems to indicating the rapid growth of the population has been stopped.

We can also see in figure 1 that Mexico's population has been growing since 225 years ago continuously, so that arise follow question: will continue growing and growing in future? We think no, and alike a lot of demographers in our country and in worldwide we expect the population will stabilize or reach a maximum value and will start to decreasing. In both cases implies that it must exist a maximum value to population's grow and the answers regarding its existence and the calculation of this value seem to being in the Stable Bounded Theory (Gonzalez-Rosas, 2012).

c) *The maximum of the Mexican population*

The Stable Bounded Theory rests in two fundamental postulates, first, that in each year the population is a random phenomenon, so, according to the probability theory in each year must have a mean and a variance. Second, the mean of the population is equal to a mathematical function which depends on time, what implies then by properties of the mean that in each year the observations of the population will be

equal to a quantity determined by the mathematical function plus a certain random deviation which it will happen according a probabilistic law. Medhi (1981) called to the mathematical function, the deterministic component and the random deviation, the stochastic component. Such that, under these postulates the behavior equations of the observations and the mean of the population in each time would be:

$$P_t = f(t) + \varepsilon_t \tag{1}$$

$$\mu_P^t = f(t) \tag{2}$$

Where,

$P_t$ , Denotes population in time  $t$ ,

$f(t)$ , Is an unknown mathematical function,

$\varepsilon_t$  Are random variables that we suppose independents, with distribution law Normal, mean

$\mu_\varepsilon = 0$ , And constant variance  $\sigma_\varepsilon^2$ , and

$\mu_P^t$ , Denotes population's mean in time  $t$ .

In order to proving that value maximum exists the Stable Bounded Theory uses the population's change amount respect time. Due to population's change amount between a time and other is measured with the slope of the straight line that joins two points of the bi-dimensional space defined by time and the population, we calculated the slopes and middle values of two consecutive population values of following way:

$$\nabla_i^P = \frac{P_{t_{i+1}} - P_{t_i}}{t_{i+1} - t_i} \tag{3}$$

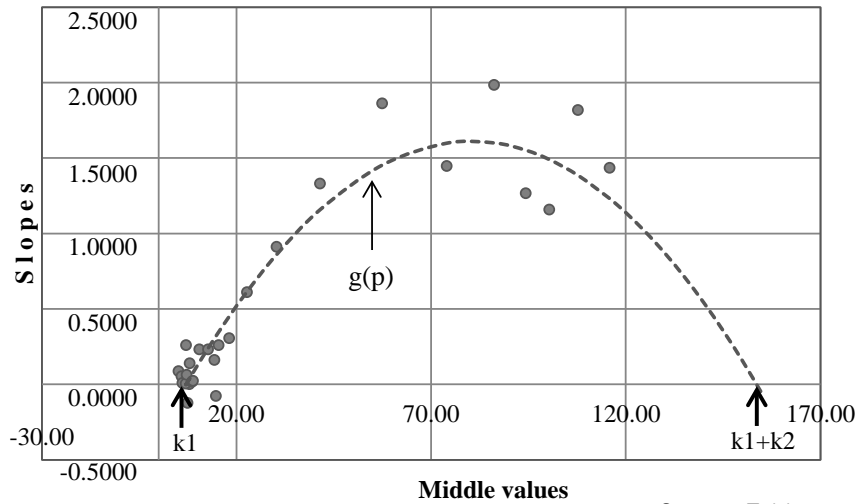
$$MV_{t_i}^P = P_{t_i} + \frac{P_{t_{i+1}} - P_{t_i}}{2} \tag{4}$$

Where,

$\nabla_i^P$ , Denotes the slope of the straight-line between  $(P_{t_i}, t_i)$  and  $(P_{t_{i+1}}, t_{i+1})$  of the two dimensional space

defined by time and the population (Leithold, 1973, p. 137), and  $MV_{t_i}^p$  Represents the middle value between the population data denoted as  $P_{t_i}$  and  $P_{t_{i+1}}$

The table 2 has the results of the calculations and in figure 2 in X axis are middle values of the population, and the slope values are in Y axis.



Source: Table 2

Figure 2: The slopes and middle points of the population in México, 1792-2015

As we can see in figure 2 the behavior of slope in terms of the middle values is also random, so that, according to the probability theory must also have a mean and a variance, and as a consequence of the second postulate of the Stable Bounded Theory its mean must be equal to other unknown mathematical function that we will denote with the letter g. It is important also to point out that function g depends of population.

is true must there be two values of the population where the g function's curve intersect the X axis. Those values we will denote them as  $K_1$  and  $K_1 + K_2$ . But besides, is important point out that in those values the change amount regard time is zero, what implies  $K_1 + K_2$  is a maximum value for the population and  $K_1$  is a minimum value. This fact proves empirically that mean of Mexico's population is bounded by those values.

In figure 2, we can also observe that function g seems to be a parabola, so that, if this assumption

Table 2: Time, population, middle points and slopes in Mexico 1790-2015

Year	Time	Population	Middle Points	Slopes
1790	0	4.64	5.20	0.0862
1803	13	5.76	5.94	0.0514
1810	20	6.12	6.16	0.0080
1820	30	6.2	7.10	0.2571
1827	37	8.0	8.0	-0.0013
1830	40	7.996	7.50	-0.1240
1838	48	7.004	7.01	0.0028
1842	52	7.015	7.26	0.0606
1850	60	7.5	8.05	0.1375
1858	68	8.6	8.69	0.0150
1870	80	8.78	8.89	0.0220
1880	90	9	10.50	0.2300
1893	103	11.99	12.80	0.2300
1900	110	13.6	14.40	0.1600
1910	120	15.2	14.77	-0.0791
1921	131	14.33	15.50	0.2589
1930	140	16.66	18.18	0.3040
1940	150	19.7	22.75	0.6100
1950	160	25.8	30.35	0.9100
1960	170	34.9	41.55	1.3300
1970	180	48.2	57.50	1.8600

1980	190	66.8	74.03	1.4450
1990	200	81.25	86.21	1.9820
1995	205	91.16	94.32	1.2640
2000	210	97.48	100.37	1.1560
2005	215	103.26	107.80	1.8160
2010	220	112.34	115.93	1.4340
2015	225	119.51		

Source: Table 1 and own calculations based on equations 3 y 4; Time was calculated as Year-1790

To proving mathematically existence of the maximum and minimum and besides to finding estimators of them, we adjust a regression model to the data of figure 2, this is,

$$\nabla_{t_i}^p = AP_{t_i}^2 + BP_{t_i} + C + \omega_{t_i} \tag{5}$$

$$\mu_{\nabla}^p = AP_{t_i}^2 + BP_{t_i} + C \tag{6}$$

Where,

$\nabla_{t_i}^p$ , Denotes the slope,

$P_{t_i}$ , Denotes the population,

$A, B$  and  $C$ , are unknown constants,

$\omega_{t_i}$ , are random variables that we suppose independents, with distribution law Normal, mean  $\mu_{\omega} = 0$ , and constant variance  $\sigma_{\omega}^2$ , and

$\mu_{\nabla}^p$ , Denotes the mean of population.

From the mathematical point of view, the maximum and minimum values are equal to those

Table 3: Parameters estimated of the equation 6 and p-values to prove its statistical significance

Parameter	Estimation	Estandar Error	t-Value	p-Value
A	-0.0003	0.00005	-5.8	0.000
B	0.0482	0.00558	8.64	0.000
C	-0.3257	0.08217	-3.96	0.001

Source: Own calculations based on the middle points and slopes of table 2 and Stata/SE 11.1

As we can seen, the three coefficients are significantly different from zero, so that, to estimate the maximum and minimum values of the population, the

$$k_1 = \frac{-0.0482}{2(-0.0003)} + \frac{\sqrt{0.0482^2 - 4(-0.0003)(-0.3257)}}{2(-0.0003)}$$

$$k_1 = 7.1$$

$$k_1 = \frac{-0.0482}{2(-0.0003)} - \frac{\sqrt{0.0482^2 - 4(-0.0003)(-0.3257)}}{2(-0.0003)}$$

$$k_1 + k_2 = 153.6$$

In addition to the significance of the parameters, value of the F Statistic was 121.87 with a p-value of 0.0000, which proves that the parabola assumption in 6 is true with a determination coefficient 90.29%<sup>1</sup>. These results together with the fulfillment of the

<sup>1</sup> The residual analysis indicates that the random variables of the model are distributed normal, are independent and have constant variance.

values of the population that make the slope of deterministic component of 5 is zero, that is,

$$0 = AP_{t_i}^2 + BP_{t_i} + C$$

and after, using the formulas to calculating the roots of a parabola we have that

$$k_1 = \frac{-B}{2A} + \frac{\sqrt{B^2 - 4AC}}{2A} \tag{7}$$

$$k_1 + k_2 = \frac{-B}{2A} - \frac{\sqrt{B^2 - 4AC}}{2A} \tag{8}$$

These results indicate that formulas 7 and 8 are estimators of the minimum and maximum values of the population respectively. The following table 3 presents the estimates of least squares ordinary of the constants A, B and C, and the p-values to determining their statistical significance.

estimations of the coefficients were substituted in 7 and 8, obtaining that,

assumptions of the residuals of 5 prove mathematically the existence of the maximum and minimum of the Mexican population.

Finally, it is important to clarify that the values  $K_1 = 7.1$  and  $K_1 + K_2 = 153.6$  are bounds for the mean of the population, but not for the observations, which according to the probability theory they will deviate a certain amount around the mean depending on its

variance, therefore they can be greater or lesser than  $K_1 = 7.1$  and  $K_1 + K_2 = 153.6$ , but their occurrence will be governed by a probabilistic law.

d) *The pattern of population growth in Mexico*

According to the postulates of the Stable Bounded Theory, the behavior equations of the observations and mean of the population in each time are,

$$P_t = f(t) + \varepsilon_t$$

$$\mu_P^t = f(t)$$

The problem is that in practice the function  $f(t)$  is unknown, however, the trend of data and the existence of the maximum and minimum values can give us idea of how is its derivative, and the theory of differential equations can help us to deducing its mathematical equation. Firstly, according to trend of observed data, the function  $f(t)$  has to be increasing, and so, its derivative will be positive. Secondly, due to existence of the maximum and minimum values its derivative will have to be zero in those values. Based on these properties the Stable Bounded Theory deduces a function which satisfies those properties mentioned.

The Stable Bounded Theory begin supposing that derivative of the unknown function is given by the product of two functions  $h_1(P)$  and  $h_2(t)$ , one that depends of the population and other that depends of time, forming a differential equation of separable variables (Wilye, 1979), which has as solution a function that relate the population and time, namely,

$$\frac{dP}{dt} = h_1(P) h_2(t) \tag{9}$$

Where

$\frac{DP}{dt}$ , denotes the derivative of  $f(t)$

Now since the derivative must be positive and equal to zero in the minimum and maximum values, then the function  $h_1(P)$  can be as follows:

$$h_1(P) = (P - k_1)(P - k_1 - k_2)$$

And so,

$$\frac{dP}{dt} = (P - k_1)(P - k_1 - k_2)h_2(t)$$

Where  $h_1(P)$   $K_1$  and  $K_1 + K_2$  are the minimum and maximum values.

We can observe that due to  $K_1$  and  $K_1 + K_2$  are bounds inferior and superior respectively of the population, then quantity  $(P - K_1)$  is always positive, but quantity  $(P - K_1 - K_2)$  is negative, therefore  $(P - K_1)(P - K_1 - K_2)$  is negative, what implies  $h_2(t)$  must be negative in order to the derivative be positive as we require. By other hand, we can also see that when the

population is equal to  $K_1$  and  $K_1 + K_2$  and then the derivative is zero, the other condition we require.

Now separating variables we have

$$\int \frac{1}{(P - k_1)(P - k_1 - k_2)} dP = \int h_2(t) dt$$

Solving by partial fractions the indefinite integral of the left hand we have that

$$P = k_1 + \frac{k_2}{1 + e^{\lambda(t)}} \tag{10}$$

Where  $\lambda(t)$  is an unknown function such that its derivative is equal to  $h_2(t)$  and which can be determined by using the observed data, since,

$$\text{Ln}\left(\frac{k_2}{P - k_1} - 1\right) = \lambda(t) \tag{11}$$

What implies if the Stable Bounded Theory is true that variable  $\frac{K_2}{P - K_1} - 1$  must be a function of time  $t$ . Gonzalez - Rosas (2010) call to this variable the transformed of the population.

e) *Estimation of the  $\lambda(t)$  function*

In order to estimate the function  $\lambda(t)$  first we estimated  $K_2$  and after substitute estimations on equation 11, this is,

$$k_1 = 7.1$$

$$k_1 + k_2 = 153.6$$

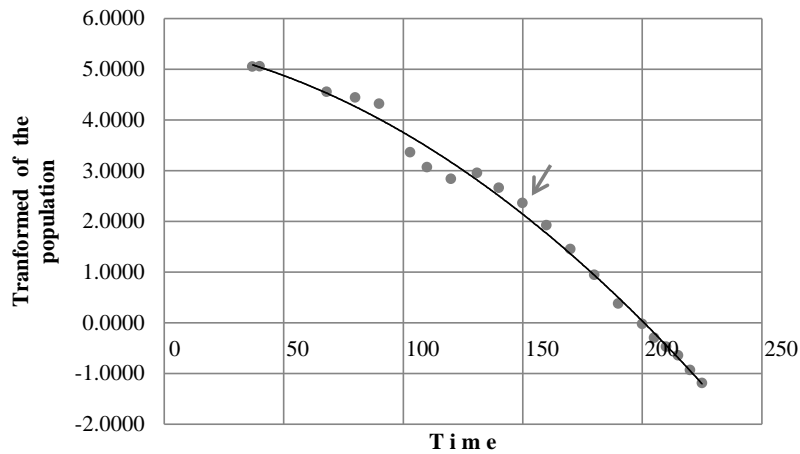
$$k_2 = 146.5$$

After that, we assign the values observed of the population and calculated the transformed of population. In table 4 we can see results and in figure 4 the behavior of the transformed and time.

Table 4: Year, time, population and transformed of the population in Mexico, 1827-2015

Year	Time	Population	Transformed of the Population
1827	37	8.00	5.0515
1830	40	8.00	5.0558
1858	68	8.60	4.5503
1870	80	8.78	4.4379
1880	90	9.00	4.3155
1893	103	11.99	3.3594
1900	110	13.60	3.0650
1910	120	15.20	2.8344
1921	131	14.33	2.9538
1930	140	16.66	2.6586
1940	150	19.70	2.3609
1950	160	25.80	1.9202
1960	170	34.90	1.4504
1970	180	48.20	0.9410
1980	190	66.80	0.3737
1990	200	81.25	-0.0250
1995	205	91.16	-0.2977
2000	210	97.48	-0.4769
2005	215	103.26	-0.6476
2010	220	112.34	-0.9367
2015	225	119.51	-1.1935

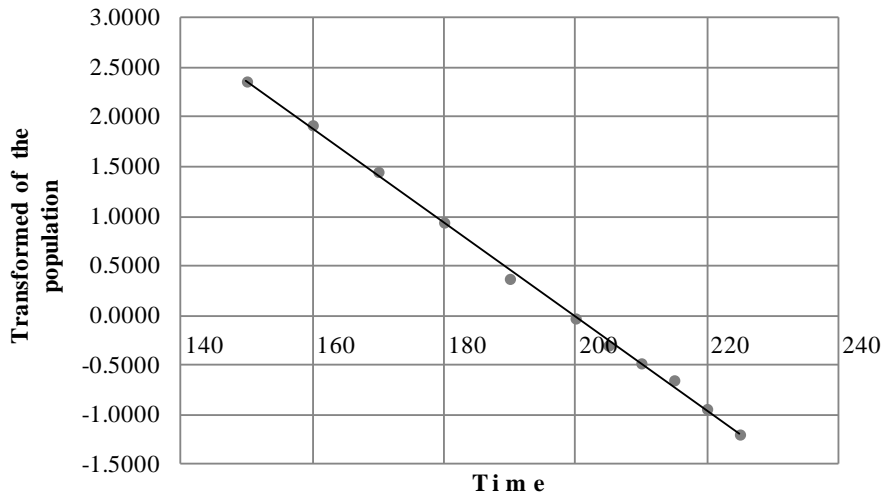
Source: Own calculations based on equation 11. The transformed of the years 1790, 1803, 1810, 1820, 1838 and 1842 were declared not defined because does not exist the natural logarithm of a negative number. The transformed of year 1850 was not considered because was an outlier.



Source: Table 4

Figure 3: The transformed of the population and time in Mexico, 1827-2015

As we can see in figure 3 the transformed of the population and time are related by a parabola, this is,  $\lambda(t) = At^2 + Bt + C$ . However, we can also observe a straight-line pattern after time 150, what would imply  $\lambda(t) = \alpha + \beta t$ . In figure 4 we can observe the relation. So, in order to compare the two patterns we adjusted both functions to the observed data.



Source: Table 4

Figure 4: Transformed of the population and time in Mexico, 1940-2015

But, due to the derivative of  $\lambda(t)$  has to be equal to  $h_2(t)$  which has to be negative, so, in the case of straight-line pattern the  $\beta$  parameter has to be negative, and in the case of parabola pattern the parameters  $A$  and  $B$  have to be negatives. If we use the straight-line we obtain a pattern called Logistic, but if we use the parabola we have a pattern called Extended Gaussian. The equations of these patterns are respectively,

$$P_t = k_1 + \frac{k_2}{1 + e^{\alpha + \beta t}} \tag{12}$$

$$P_t = k_1 + \frac{k_2}{1 + e^{At^2 + Bt + C}} \tag{13}$$

In the equation 12, due to  $\beta$  is negative when time is increased then is  $P$  is near to  $K_1 + K_2$ , and in equation 13, because  $A$  and  $B$  are negatives when time is increased  $P$  is near also to  $K_1 + K_2$ . That is, those parameters determine how quickly  $P$  approaches the maximum. Due to these characteristics the parameters  $\beta$ ,  $A$  and  $B$  are called the quickness parameters (González-Rosas, 2018).

In order to determining what pattern is adjusted better to observed data we estimated both the straight-line and the parabola. The following table presents the ordinary least squares estimation and the p-values of the straight-line and parabola.

Table 5: Parameters estimated of the equation 11 and p-values to proving its statistical significance

Parameter	Estimation	Standar Error	p-Value of t test	p-Value of F Test	R <sup>2</sup>
$\alpha$	9.4776	0.113421	0.000	0.0000	0.9986
$\beta$	-0.0474	0.00058	0.000		
A	-0.0001	0.000014	0.000	0.0000	0.9917
B	-0.0076	0.00374	0.056		
C	5.5019	0.2301	0.000		

Source: Own calculations based on table 4 and Stata/SE 11.1

As we can see in table 5 all parameters are significantly different of zero with a 5% significant level, except the B parameter which is significant at 6% level. We can also see the p-values of both F tests that indicate both equations are correct at 5% significant level. Finally, we have the determination coefficient which point out that straight line explain the 99.86 percent of the data variation of transformed population, while parabola explain 99.17 percent, this is, the straight - line explain data variation better. And so, estimated equations of the logistic and Gaussian patterns are respectively,

$$P_t = 7.1 + \frac{146.5}{1 + e^{9.4776 - 0.0474t}} \tag{14}$$

$$P_t = 7.1 + \frac{146.5}{1 + e^{-0.0001t^2 - 0.0076t + 5.5019}} \tag{15}$$

In figure 5, we have the graphics of both patterns. As we can see at glance both logistic pattern and Gaussian pattern fit very well to the observed data at all period, however, the Gaussian pattern seems to is adjusted better than Logistic pattern in 1983-1910 period. But by other hand, Logistic pattern seems to

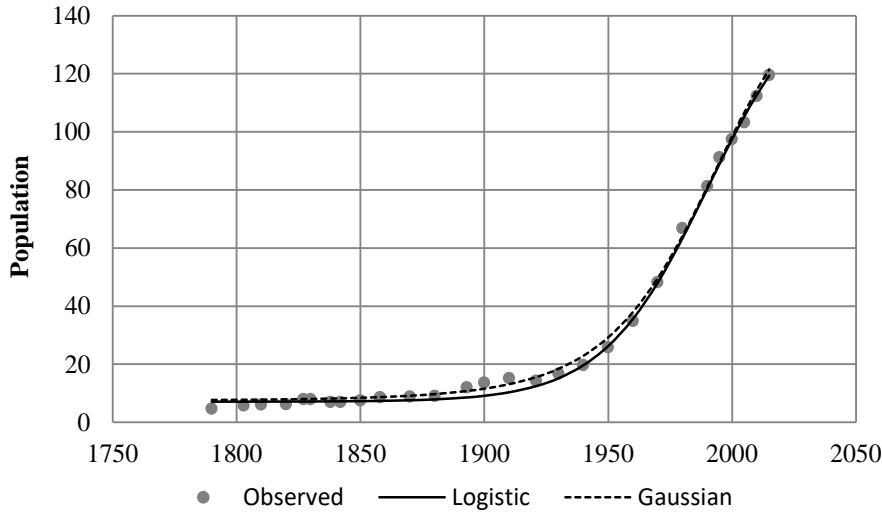


adjust better than the Gaussian one in 1921-1960 and 2005-2015 periods. However these criteria are very ambiguous, so, we had to define a Measure of the Adjust Error as it follow:

$$MAE = \sum_{t=1921}^{2015} (y_t - \hat{y}_t)^2 \tag{16}$$

Where,

*MAE* is the measure of the adjust error,  
 $y_t$  Denotes the observed population in year  $t$ , and  
 $\hat{y}_t$  is the estimated population in year  $t$ .



Source: Table 1 and own calculations based on 14 and 15

Figure 5: Observed data and logistic and Gaussian patterns in Mexico, 1790-2015

When we substituted data at equation 16 we found that the *MAE* for the logistic pattern was 98.73, while for the Gaussian pattern was 102.26. Based on these results we decided that Logistic pattern explain better the population evolution through time in Mexico.

#### IV. RESULTS

##### a) Punctual forecasts of the Population in Mexico

All the results above prove that behavior of the mean of the population through time in Mexico is governed by following mathematical equation:

$$P_t = 7.1 + \frac{146.5}{1 + e^{9.4776 - 0.0474t}} \tag{17}$$

Where,

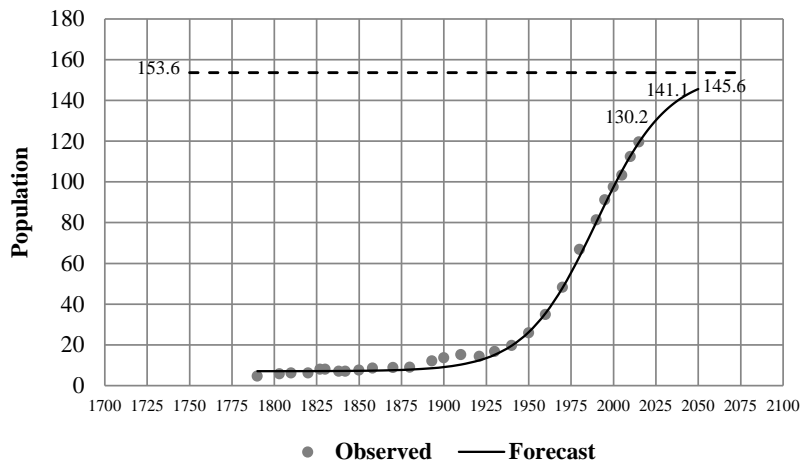
$P_t$ , Denotes the mean of the population in time  $t$ ,

The constant 7.1 is the minimum value of Mexico’s population,

The constant  $7.1 + 146.5 = 153.6$  denotes the maximum value of Mexico’s population, and

The constant  $-0.0474$  is the quickness parameter of Mexico’s population.

So that, when we gave values to time variable in equation 17 we obtained punctual forecasts of the mean of Mexico’s population for the 2016-2050 period (Annex 1). In figure 6, we can observe that the model is adjusted very well to the observed data.



Source: Table 1 and annex 1

Figure 6: Observed and forecasted population in Mexico, 1790-2050

According to the results of equation 17, we found that in 2025 the mean of Mexico’s population will be 130.2 million of people, in 2040 will be 141.1, and for 2050 the mean of Mexico’s population will reach 148 million of people. Still 8 million per under the population maximum that is of 153.6 people.

It is very important to clarify that what we are forecasting is the population mean not the observations, because, those are random and hence cannot be predictable, so that, in 2025 the real observation can be below or above to the 130.2 million, the same will happen in 2040 and 2050.

### V. DISCUSSION

If we consider that in each moment of time the population is a random phenomenon, then we can explain behavior irregular observed of the population in figure 1, however, this hypothesis brought as a consequence that we cannot forecast the population, since random phenomena cannot be predicted. So, the question arose, how can we predict what is not predictable?

The answer arrived us of the probability theory, since, according this theory if the population is a random phenomenon must to have a mean and a variance, so that, when we supposed that mean had a deterministic behavior given by a mathematical function that depends of time, then we accept that we would be able predict to least the mean of the population.

After that, according to trend of data, the function had to be growing, however population cannot grow, grow and grow, so that, was better suppose that must tend to the stabilizing or maybe to reach a maximum and after that, decrease. This situation brought us two questions more, firstly, what is the value, where the population is going to stabilize or reach the maximum in future? And secondly, what is the function we had to use to predict the population? This two questions we answered them using the Stable Bounded

Theory, which allowed us to prove existence of a stabilizer value and besides to calculate it. Also we find the function or pattern which allowed us to do the predictions of the population.

### VI. CONCLUSIONS

In Mexico, for the period 1790-2050, the behavior of mean of population through time is governed by a mathematical law that depends of time.

By first time, the scientific community has mathematics tests about subjects that we only watch at glance, that is, tests about the logistic pattern of the population growth.

In Mexico in order to explaining evolution of the population trough time, the demographers have used the logistic pattern, however, never they have given a mathematic test, this paper prove all the hypothesis used about it and substitute the empirical aspects.

Although this exercise was done with data from Mexico, it is important to make it clear that the Stable Bounded Theory can be applied to any country where data on the population are available. Also it can be used to forecasting mortality, fertility and net migration.

However, it is necessary to warn that the results of this paper are based on the assumption of the social, economic and political conditions of Mexico will continue without change. If this assumption it is not fulfill, the forecasts we are giving will not be true.

Also it is necessary to warn that the mathematical modeling of reality is based on assumptions, and that theoretical results are true only if the assumptions fulfill, so that, it is necessary to do a great effort to prove that the assumptions are true.

Finally, is clear that any exercise to predict the future is exposed a lot of error sources: wrong data, false assumptions, and wrong models, so on. Therefore, it is necessary to identify all possible error sources, and then utilize methodologies that minimize those errors. The Stable Bounded Theory is an example of that.

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ANNEX 1

Population Forecasts in Mexico, 2016-2050

Year	Time	Forecast	Year	Time	Forecast
1790	0	7.11	2020	230	125.18
1803	13	7.12	2021	231	126.25
1810	20	7.13	2022	232	127.29
1820	30	7.15	2023	233	128.30
1827	37	7.16	2024	234	129.28
1830	40	7.17	2025	235	130.22
1838	48	7.21	2026	236	131.14
1842	52	7.23	2027	237	132.03
1850	60	7.29	2028	238	132.88
1858	68	7.38	2029	239	133.71
1870	80	7.60	2030	240	134.51
1880	90	7.89	2031	241	135.29
1893	103	8.56	2032	242	136.03
1900	110	9.13	2033	243	136.75
1910	120	10.34	2034	244	137.45
1921	131	12.47	2035	245	138.11
1930	140	15.17	2036	246	138.76
1940	150	19.65	2037	247	139.38
1950	160	26.27	2038	248	139.98
1960	170	35.63	2039	249	140.55
1970	180	48.09	2040	250	141.10
1980	190	63.39	2041	251	141.63
1990	200	80.44	2042	252	142.15
1995	205	89.08	2043	253	142.64
2000	210	97.48	2044	254	143.11
2005	215	105.42	2045	255	143.56
2010	220	112.76	2046	256	143.99
2015	225	119.36	2047	257	144.41
2016	226	120.59	2048	258	144.81
2017	227	121.78	2049	259	145.19
2018	228	122.95	2050	260	145.56
2019	229	124.08			

Source: Own calculations based on equation 17





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## The Real Causes of the Turkish Crisis: From the Social - Democratic Consensus to Neoliberal Globalization - Will Turkey Fall to its Knees?

By Ylli Përmeti

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*GJMBR-G Classification: JEL Code: F49*



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**Abstract-** This article shows the real causes of the crisis of the Turkish economy. It argues that it is not the devaluation of the Turkish lira the cause of it or the concentration of power at the hands of Erdogan as mainstream analysts argue: but it is a systemic crisis in the sense that the Turkish economy has been integrated too much in the international market economy and as a result it lost its high degree of independence that it created during the social-democratic consensus and grew its dependence by the market forces of neoliberal globalization. In this sense, the devaluation of the Turkish lira and the concentration of power at the hands of Erdogan, is simply the result of the geopolitical confrontation between America and Turkey. As a result, it shows the vulnerability of the Turkish economy by market forces. So, the real (and ultimate) cause of the crisis is geopolitical. America, in order to realize its ends in the region, it has started to use sanctions at a higher level: it wants, not simply the release of the American pastor and other imprisoned Americans, but to achieve its geopolitical goals in the region: to keep them integrated (for all those countries that have been partially integrated like Turkey and others to start the process of integration) into new world order of neoliberal globalization. The geopolitical character of the crisis in Turkey has brought into the global stage a new characteristic of the financial crisis of all big emerging markets - a double crisis: both at government, corporate and banking level. It shows, furthermore, the ignorance of the intellectual community in Turkey about the effects of such integration into the international market economy and finance, in which, micro-economics has overlapped macro-economics. As a result, Turkey is at the crossroads and its future will be ominous.

## I. NGA SOCIAL-DEMOKRACIA NË GLOBALIZMIN NEOLIBERAL

Pas shqyrtimit të ndryshimeve kryesore strukturore shekullin e kaluar mirë do të ishte të shqyrtanim në vijim gjendjen ekonomike të Turqisë dhe efektet e politikave neoliberalë: sepse baza ekonomike përbën premisën kryesore përmes së cilës mund të parashikojmë të ardhmen e saj. Turqia nga viti 1923 deri në vitin 1983 ruajti një ekonomi me karakteristika statistike, si gjithë vendet e kohës-domethënë, plane strikte qeveritare mbi buxhetin, kufizime mbi përfshirjen e sektorit privat, mbi tregun e huaj, mbi rrjedhshmërinë e valutave të huaja, dhe mbi investimet direkte të huaja. Por pikërisht sepse ishte anëtare e institucioneve ndërkombëtare dhe ndryshimeve strukturore që adoptoi Perëndimi në përgjithësi, Turqia e Turgut Ozalit (1983)

dhe e partisë së tij politike e bazuar në klientelizëm dhe patronazhin e burimeve vendore filloi kalimin e saj nga statizmi drejt globalizmit neoliberal-domethënë, nga një sektor publik statist dhe kontrole strikte të kapitalit dhe investimeve-në një sektor më shumë privat dhe të bazuar në vlerat e tregut. Ozali filloi të krijonte një pushtet të dyfishtë: midis 'teknokratëve' (borde dhe agjenci ekonomike koordinimi etj.) dhe qeverisë.<sup>1</sup> Shteti modern turk që në fillimet e tij (1923) u themelua mbi klasën oligarke ose mbi klasën e 'kapitalizmit oligark' - në fjalë të tjera, siç citon Roy Karadag,<sup>2</sup> 'mbi fragmentarizmin e arenës politike, fundin e kontrollit social korporatist dhe themelimin e një elite të ngushtë politike tregëtare kartelesh, e cila kapi shtetin...të cilët janë komponentë vendimtarë që paraqesin dinamikat oligarke të cilët kanë minuar pushtetin e shtetit dhe besimin institucional'.<sup>3</sup> Me qëllim që të garantonte kalimin e butë drejt...siç e quan Karadag, "export-oriented industrialization" (EOI) ose drejt ekonomisë ekstrove, siç e quaj unë,<sup>4</sup> kryeministri Turgut Ozal, me Partinë e Mëmëdheut, u mbështet mbi nxitjet financiare kryesisht për ndërmarrjet eksportuese (për shembull, rabatë taksash, gjithashtu dhe hua preferenciale dhe kredi nga banka e re Eximbank). Bërthama e këtij procesi ristrukturimi, sidoqoftë, ishte promovimi i eksporteve industriale përmes të ashtuquajturave *ndërmarrje të tregëtisë së huaj*. Këto ndërmarrje, pjesa me e madhe e të cilave u përkiste ndërmarrjeve familjare, kishin siguruar me shumë stimulantë dhe subvencione me qëllim që të mbështesnin koston e kalimit intensiv në një rend ekonomik eksportues. Si rezultat, Turqia arriti të rriste ekportet nga 2.9 bilion dollarë (1980) në 12.9 bilion dollarë amerikanë (1989) brenda një dekade. Përqindja e mallrave industriale në lidhje me totalin e eksporteve u rrit nga 36.0 për qind në

<sup>1</sup> Market and Regulatory Reforms in the Turkish Case of Neoliberalism: Maladies of a Temporal Disjunction. University of Utrecht, Netherlands, 5-7 June 2008, Ümit Sönmez.

<sup>2</sup> Këtu nënkuptohet se analiza mbështetet mbi Pushtetin -sepse është pushteti që vë në lëvizje një shoqëri, sesa mbi luftën e klasave, siç është qasja Marksiste. Shih për më shumë, Miti i progresit dhe themelet e njohurisë.

<sup>3</sup> Neoliberal Restructuring in Turkey: From State to Oligarchic Capitalism, Roy Karadag, Paper 10/7, f. 6.

<sup>4</sup> Shih për më shumë, Ekonomia ekstroveve kapitulloi greqinë: shqipëria drejt të njëjtës greminë.

78.2 për qind përgjatë të njëjtës dekadë.<sup>5</sup> (Theksi në origjinal).

## II. BANKAT TURKE NË SHËRBIM TË TREGUT TË HUAJ DHE KASTËT POLITIKE

Në nivelin bankar dhe duke patur parasysh remitancat që kanë qenë në rritje që nga viti 1960,<sup>6</sup> përgjatë të njëjtës dekadë, partitë politike, siç tregon një studim,<sup>7</sup> politizuan rregullimin e bankave me ndërhyrje politike të rënda duke kërkuar rentë në liçensime, rregullime dhe mbikqyrje-të cilat gjeneruan një gjëndje të dobët në sektorin bankar-me rezultat, gjashtë banka që ishin liçensuar në vitin 1991, në vitin 1999, kapitulluan duke u shpëtuar nga një fond tjetër...me kursimet publike! Kjo ishte periudha kur politika turke mbikqyrësh nga një marrëveshje që kishte bërë me Uashingtonin zyrtar ("Washington Consensus"). Pas kësaj krize, FMN-ja u përfshi në ristrukturimin e bankave dhe influenca e saj ishte shumë më e madhe pas vitit 2001. Qasja e FMN-së ishte përqendrimi te rregullimet "prudenciale" të sektorit bankar-rregullime që kanë lidhje kryesisht me sasinë e rezervave që mbajnë bankat dhe me mënyrën e shpëtimit në rast kapitullimi. Kjo qasje u quajt "Program Dezinflacionar" ("Disinflation Programme") dhe lidhet kryesisht me katër pika: (1) rehabilitimin e bankave të kapitulluara [elitë e quajnë këtë situatë eufemisht "insolvente"!], përmes parave publike dhe transferimin e tyre te lojtarët privatë; (2) shpalljen e një ligji të ri bankar për të lehtësuar adaptim e ligjit Basel II, Principet Themeltare Bankare dhe normat bankare të BE-së; (3) themelimin e një agjencie rregullatore të re formalisht të pavarur; dhe (4) dhënia e pavarësisë ligjore të Bankës Qëndrore.<sup>8</sup> Këto masa, në thelb, synonin depolitizimin e gjendjes meqëse, sipas FMN-së, ishte "politizimi partiak" që shkaktonte kriza financiare në treg! Por kriza nuk vonoi dhe inflacioni shpërtheu në shifra rekord dhe nga gjashtë banka të kapitulluara në vitin 1999, u bënë 22 në vitin 2003! Si rezultat, të gjitha bankat u rikapitalizuan dhe u shtetëzuan. Kostua e përgjithshme nga paratë publike ishte 47.2 bilion dollarë amerikanë. Ata që fituan më shumë nga ky "ristrukturim" ishin bankat e huaja sepse katër banka ndërkombëtare (1) kishin akses në 2.9 bilionë dollarë që ofronte Banka Qëndrore; (2) kishin garanci të plotë nga Thesari që ishte kushtëzim paraprak i FMN-së; dhe (3) ato morrën pjesën e luanit duke blerë bankat vendore tërthorazi apo/ose drejtpërdrejt-që ishin shpëtuar me pará publike!

Kështu përqendrimi i pushtetit financiar u bë më imadhe dhe shkoi kryesisht te të huajt. Si rezultat, midis

vitit 2001 dhe 2008, BE-ja përcakttoi deficitin e përgjithshëm qeveritar (d.m.th. 3 për qind të PPB-së) dhe borxhi bruto i sektorit publik (d.m.th. 60 për qind kundrejt PPB-së), u ul nga 10.2 për qind në 2.2 për qind dhe nga 73.7 për qind në 39.5 për qind, respektivisht. Borxhet në sektorin publik u reduktuan nga 10 për qind në 0.1 për qind. Përgjatë periudhës 1985-2003, privatizimi i pasurive publike përllogaritet në vetëm 8.2 bilionë dollarë, ndërsa ai arriti në 36.4 bilionë dollarë përgjatë periudhës 2004-2009.<sup>9</sup> Si pasojë, pasuritë publike në Turqi shkojnë për herë dhe më shumë në pak duar. Sidoqoftë, reformat e periudhës së parë u shoqëruan me borxhe të huaj dhe shumë shpejt Turqia u gjend në amulli dhe kriza financiare (1994, 1999, 2001). Rritja mesatare e ekonomisë nga viti 1981 deri në vitin 2003 ishte rreth 4%. Pas vitit 2001 Ministri i Financave, Qemal Dervishi, me një karrierë 22 vjeçare në Bankën Botërore - që u emërua nga elita mbikombëtare dhe nuk u zgjodh demokratikisht - filloi të ndërmernte një sërë reformash, siç ishte borxhi gjigand prej 20 bilionë dollarësh që mori nga FMN-ja dhe Banka Botërore - dhe që nga ajo kohë inflacioni ra në një shifër dhe besimi i investitorëve u rrit. Sidoqoftë, Ministri i Financave kontribuoi kryesisht te forcimi i pavarësisë së bankës qëndrore dhe te procesi buxhetor sesa te ndonjë sintezë të qëndrueshme.

Kështu, nga një rritje ekonomike prej 6.8% midis vitit 2002 dhe 2007 ajo u tkurr 0.6% në 2008, dhe u rrit 6% në 2009 - d.m.th., ajo shkoi thujse 0%. Por në vitin 2010 ekonomia u rrit sërish 9.2% dhe në 2011 në 8.5%! Kriza 2008-2009 ishte aq e keqe sa kriza e vitit 1994 ku(r) rënia ekonomike ishte 6.3% dhe në 2001 ishte 7.1%. Por me një ndryshim: kriza e parë ishte edhe e natyrës financiare meqëse Lira turke u zhvlerësua masivisht (respektivisht 23.9%) edhe e natyrës strukturore - d.m.th. kalimi nga statizmi në strukturat dhe politikat e globalizmin neoliberal, ndërsa kriza e dytë ishte kryesisht e natyrës eksport-import - d.m.th., e një ekonomie ekstroverte që varësh nga barrierat doganore. Midis krizës së parë dhe të dytë, Turqia zbatoi politika "anti-dumping" - domethënë, shitje nën koston e prodhimit. Në këtë politikë Kina u përfshi në 43% të rasteve<sup>10</sup> - domethënë, Kina u përfshi në 43 artikuj ose thujse mbi gjysmën e prodhimit të brendshëm. Por në nivel vendor qeveria turke nxiti më shumë konsumin në sektorin e ndërtimit ose banesave se sa në krijimin e kushteve për ndërmarrje të reja dhe rrjedhimisht, rritjen e prodhimit. Për shembull, midis vitit 2002 dhe 2007, përqindja e përbërë vjetore e rritjes për borxhet familjare ishte 50 përqind, ndërsa rritja reale në familje ishte rreth

<sup>5</sup> Karadag, po aty.

<sup>6</sup> Determinants of Workers Remittances: The Case of Turkey, Bilkent University, Ankara, Turkey.

<sup>7</sup> The Regulatory State and Turkish Banking Reforms in the Age of Post-Washington Consensus, Caner Bakir and Ziya Önis, International Institute of Social Studies 2010.

<sup>8</sup> Po aty, f, 84.

<sup>9</sup> The Political Economy of Regulation in Turkey, Tamer Çetin, Fuat OAuuz, Fuat Oğuz, f, 7.

<sup>10</sup> Turkey's resistance to trade liberalisation with the EU through temporary trade barriers, Vox, Baybars Karacaovali, 4 September 2011.

8.5 për qind!<sup>11</sup> Kjo politikë bëri që ekonomia të rritësh në vitin 2010 në 10%. Turqia, në fjalë të tjera, pas vitit 1989 përdori politika "anti-dumping" dhe pas vitit 2005, adoptoi masa sigurie globale, ndërsa nxiste konsumin e brendshëm (borxhe për konsum etj.) sesa zhvillimin e ndërmarrjeve të reja. Ishte viti 1996 kur Turqia filloi liberalizimin e plotë të tregut meqëse ajo krijoi bashkimin doganor (customs union) me BE-në. Si rezultat, Turqia hoqi të gjitha barrirat tregëtare në sektorin e manifakturës, vis-à-vis BE-në, dhe ka ulur në një shkallë të konsiderueshme barrirat me vende të palës së tretë duke adoptuar tarifën e jashtme të përbashkët me BE-në. Por në raport me tregun amerikan tregëtarët turq janë në disavantazh: sepse ndërsa tregëtarët amerikanë nuk paguajnë tarifa doganore kur tregëtojnë në Turqi, falë marrëveshjes së "TTIP" me BE-në, domethënë, tërthorazi...homologët turq paguajnë kur tregëtojnë në Amerikë!<sup>12</sup> Turqia ka marrë gjithashtu një sërë masash në marrëdhëniet tregëtare preferenciale me BE-në, siç është ortakëria euro-Mesdhetare dhe Sistemi i Përgjithshëm e Preferencave dhe formoi zona tregëtare të lira me Shoqatën Europiane të Tregut të Lirë në 1992 dhe pastaj, me perspektivën e një kandidati për në BE, ajo u përfshi në bashkimin doganor. Turqia, në fjalë të tjera, zbatoi, si gjithë vendet e integruar në globalizmin neoliberal, lirinë e mallrave mbi thuajse të gjithë mallrat, në kohën kur kishte zhvlerësuar në nivel të konsiderueshëm Lirën, fakt që bënte koston e prodhimit më të ulët dhe rriste eksportet dhe për pasojë rriti mundësinë e investimeve të huaja.

Kështu, pavarësisht faktit se Turqia u prek seriozisht nga kriza e 2008-09, në vitin 2010-11 u rrit sërish me rreth 8.5 për qind, për një arsye të thjeshtë: sepse Turqia, ndërsa rriste koston e prodhimit gradualisht, për shkak të politikave inflacioniste dhe konkurrencës më të madhe në kuadër të globalizmit neoliberal, rriste gjithashtu shkëmbimet tregëtare me Kinën por edhe kompensonte koston e prodhimit vendas me koston e prodhimit kinez. Që nga viti 1990, Turqia, përveç lirisë së mallrave zbaton edhe lirinë e kapitalit - gjithashtu dhe lirinë e huave nga rezidentët në tregun ndërkombëtar të marketingut duke pranuar Artikullin VIII të FMN-së. Në të vërtetë, Turqia kishte kompletuar liberalizimin e tregut herët që në vitin 1989-të. Por ajo vuante nga një deficit i lartë publik dhe interesa të larta në huat e sektorit bankar. Me liberalizimin e kapitalit, siç citon *Melike Altinkemer*, në një studim, aftësia e bankave për të tërhequr kredi të huaja me afat të shkurtër ndihmoi të vononte përshtatjen fiskale, duke rritur deficitin buxhetor dhe bonove të brendshëm qoftë edhe më shumë, ndërsa shkurtonte

maturimin e tyre, i cili krijoi dyshime lidhur me qëndrueshmërinë e deficitit buxhetor. Këto zhvillime më në fund kulmuan në krizën e vitit 1994 me zhvlerësimin e Lirës turke: 23.9% dhe inflacioni u rrit në tre shifra: 132.1% dhe interesat bankare u rritën mesatarisht në 158.1%.<sup>13</sup> Nuk do të ishte e çuditshme që përgjatë dekadës së fundit, pabarazia në të ardhura është rritur më shumë se në çdo vend të BE-së.<sup>14</sup> Punësimi në agrikulturë ka rënë (meshkujt nga 33% në vitin 1990 në 18% në 2010 dhe femrat, nga 72% në 39%), ndërkohë industria është rritur (meshkujt nga 26% në 30% dhe femrat nga 11% në 16%) dhe shërbimet financiare janë rritur (meshkujt nga 41% në 52% dhe femrat nga 17% në 45%).<sup>15</sup> Ndërsa papunësia është rritur: nga 8.5% në vitin 1992 në 11.9% në vitin 2010.<sup>16</sup> Dhe varfëria është në nivele shumë të larta: në 17% në 2008.<sup>17</sup>

Sipas një studimi të *Forbs*, Stambolli, kryeqyteti financiar i Turqisë, ka një total prej 28 bilionerësh, sa i përket marsit të vitit 2010 (nga 34 që kishte në vitin 2008), duke u radhitur i katërti pas Nju Jorkut (me 60 bilionerë), Moskës (me 50 bilionerë), dhe Londrës (me 32 bilionerë).<sup>18</sup> Në vitin 2009-të, qeveria Turke, me qëllim që të reduktonte ndikimin e krizës globale financiare 2007-2012-të, ndërmorri disa masa, siç ishin shkurtime të përkohshme taksash mbi automjetet, aksesoreve dhe ekonomisë shtëpiake. Si rezultat, prodhimi i mallrave të rezistueshëm u rrit në 7.2%, pavarësisht rënies së prodhimit të automobilëve.<sup>19</sup> Por importet krahasur me eksportet ishin thuajse dyfish: 225.60 bilionë dhe 154.20 bilionë dollarë respektivisht. Të ardhurat dhe shpenzimet qeveritare janë gjithashtu në disbalancë: 209 bilionë dhe 228.3 bilionë dollarë respektivisht. Ndërsa qeveria krijonte mbiklasën, klasën e mesme dhe nënklasën dhe deficitin buxhetor, nxiste konsumin, ruante disi prodhimin e brendshëm, por importonte thuajse dyfish, me pasojë, rritjen e koston e prodhimit. Nëse në dekadën e parë tranzitore (1980-90) drejt globalizmit neoliberal pushteti përqendrohesh kryesisht tek elita politike, ekonomike dhe ushtarake (burokracia kryesore), në dekadën e dytë, ndërsa pushteti ushtarak brenda vendit reduktohet dhe rëndësia e islamizmit merr vendin e tij, ai rritet jashtë vendit, kryesisht në ushtrinë e Aleancës (NATO). Siç konkludon *Karadag*: 'si në çdo konfigurim tjetër politik-ekonomik eksperimenti Islamik neoliberal përballet me kontradiktat e tij rezultati i të cilit do të varet nga beteja e pjekur e pushtetit prezent me grupet e mbetur Qemalist brenda forcave Turke dhe gjykatat'. Në fakt, Ozali nuk kishte një strategji të plotë industriale siç kishin përgjithësisht vendet e perëndimit.

<sup>13</sup> Recent Experiences with Capital Controls: is there a Lesson for Turkey? Melike Altinkemer, Ankara, June, 2003 f, 21, pdf.

<sup>14</sup> Income inequality in Turkey, Today's Zaman, 12 November 2012.

<sup>15</sup> World development indicators 2012. Table 2.3.

<sup>16</sup> Po aty, Table 2.5.

<sup>17</sup> Po aty, Table 2.7.

<sup>18</sup> Cost Of Living Large, Forbs, 3/11/2010.

<sup>19</sup> Turkish recovery needs more time, Central Asia, Aug 25, 2009.

<sup>11</sup> The Regulatory State and Turkish Banking Reforms in the Age of Post-Washington Consensus, Caner Bakir and Ziya Önis, International Institute of Social Studies 2010, f, 99.

<sup>12</sup> BE-Turqi – dy partnerë të pabarabartë tregëtarë, DW, 25. 07. 2016.



Kjo është arsyeja që ai ndihmoi ndërmarrjet familjare me rabatë etj. Kështu, në vend të zhvillonte industrinë vendore për të konkurruar në tregun ndërkombëtar të marketingut, meqëse vendet perëndimore kishin arritur në nivele konkurruese, pranoi investimet e huaja - d.m.th., ekspansionin e industrisë perëndimore...dhe kështu, sot një pjesë e mirë e korporatave dhe bankave në Turqi janë të huaja (shih në vijim). "Turqia është transformuar", siç citon një analizë në FT, "nga e shtrenjta e investitorëve [ose kapitalistëve] të huaj në krizë-kandidate në pak vjet".<sup>20</sup>

### III. KORPORATAT TURKE TË ZHYTURA NË BORXHE

Problemi kryesor që është krijuar në ekonominë turke të Erdoganit është borxhi korporativ: përgjatë dekadës së fundit korporatat turke kanë shtuar borxhin në devizë të huaj me një shpejtësi që qendron e dyta pas korporatave kineze: ato kanë shfrytëzuar kryesisht politikën monetare të FED-it në Amerikë e cila e mbajti përqindjen e dollarit të ulët për shumë vjet. Numri i korporatave me kapital ndërkombëtar është rritur nga 5,600 në vitin 2002 në 58,400 në vitin 2017-të. Sipas bankës qendrore turke ndërmarrjet turke kishin borxhe në devizë të huaj rreth 210 miliard dollarë në fund të shtatorit 2016. Por në ditët e krizës së lirës borxhi shkoi 293 miliard dollarë dhe 85 për qind e tij zotërohet nga 2.300 ndërmarrje. Përqindja e pagesave të vonuara ("rollover ratio") e sektorit korporativ është 160 për qind. Domethënë, për çdo 100 dollarë të detyruar ndërmarrjet kanë marrë prapë 100 dollarë borxh dhe kanë shtuar dhe 60 të tjerë. Dhe nëse s'marrin borxh, falimentojnë. Kur ato marrin borxh në devizë të huaj, zhlerësojnë devizën turke. Dhe sa më shumë të marrin aq më shumë ekspozohen kundrejt kreditorëve të huaj. Ndërmarrjet e ndërtimit, pasurive të paluajtshme dhe energjisë ndjenë menjëherë dhimbjen nga lira e dobët bashkë me bankat që i financojnë ato. Rrënimi i vlerës së lirës e bënë më të vështirë procesin tregëtar si për mbulimin e borxhit të huaj (servicing foreign-exchange debts) dhe mallrat e importuara ashtu dhe për huatë e bankave kryesore: parashikohet se huatë e pazbatueshme (non-performing loans) mund të shkojnë nga 3.5 për qind aktualisht në 25 për qind në nivel me krizat pararendëse të tregjeve në zhvillim dhe pak më lartë se kriza bankare e Turqisë në fillim të shekullit.<sup>21</sup> Për vite me radhë rritja ekonomike është nxitur nga kredija e lirë ndërkombëtare. Korporatat morën hua të mëdha në dollarë dhe euro dhe me paqendrueshmërinë e devizës turke kostua e mbulimit të borxhit shkoi në stratosferë. Borxhi korporativ tashmë është rreth 70 për qind e prodhimit të përgjithshëm bruto nga 33 për qind që ishte në vitin 2007-të. Ky borxh mund të krahasohet

me borxhin grek përpara krizës së vitit 2009-të. Më shumë se gjysma e tij është në devizë të huaj.<sup>22</sup> Përqindja borxh-depozitë (loan-to-deposit) e sistemit bankar është rritur në një shifër rekord prej 120 për qind ndërsa sektori financiar është mbështetur kryesisht në borxhe nga jashtë për të mbuluar veprimtarinë e tij. Borxhi i denominuar turk ishte 69.5 për qind i PPB-së vitin e kaluar (nga 39.2 për qind në vitin 2009), shumë më lartë se Polonia (53.5 për qind) dhe Argjentina (51 për qind) mes 18 vendeve në zhvillim. Borxhi i denominuar në devizë të huaj, kryesisht në dollarë, është 22.5 për qind i PPB-së, duke lënë pas vetëm Singaporin dhe Hongkongun. Por familjet turke nuk kanë borxhe në devizë të huaj për shkak se është ndaluar në vitin 2009-të.<sup>23</sup>

Krahas ekspozimit të korporatave, detyrimet e ndërmarrjeve jo-financiare në devizë të huaj tashmë kalojnë asetet e tyre në valutë të huaj me më shumë se 200 miliard dollarë. Në 12 muajt që vijnë institucionet private jo-financiare duhet të ripaguajnë 66 miliard borxh në valutë të huaj. Për bankat turke borxhi është 76 miliard dollarë. Vështirësia tjetër është gjenerimi i devizës së huaj brenda vendit. Tre janë mënyrat për të gjeneruar divizë të huaj: (1) si eksportues; (2) si anëtar i industrisë së turizmit; (3) dhe si pjesëmarrës në ekonominë vendore. Të gjithë këta sektorë duhet të mbledhin lirë të mjaftueshme për të blerë devizën e huaj për të cilën ata kanë nevojë. Të tre këta sektorë janë në stres: eksportet janë rrënuar; të ardhurat nga turizmi janë rrënuar; dhe rritja ekonomike e ndërmarrjeve të zhytura në borxhe ka rënë.<sup>24</sup> Pushteti ekonomik rrjedhimisht ka lëvizuar nga ndërmarrjet dhe bankat me origjinë turke tek ato me origjinë të huaj kur borxhi i marrë së bashku i 30 tregjeve të mëdhenj është rritur nga 163 për qind të PPB-së në fund të vitit 2011 në 211 për qind në çerekun e parë të këtij viti (Institute of International Finance). Tregjet në zhvillim u goditën dyfish nga rritja në vlerë e dollarit, për të cilin luajtën rol vendimtar sanksionet amerikane dhe politika monetare e Fed-it (rritja e përqindjes).

Erdogani përgjatë krizës së lirës dhe rënies ekonomike - i shpalli luftë guvernatorit të bankës qendrore: sepse, sipas tij, ajo duhet të ulë normën e interesit me qëllim që të nxisë investimet dhe rritjen ekonomike!<sup>25</sup> Lira turke pësoi një goditje tjetër kur Erdogan argumentoi se do të ushtrojë kontroll më të lartë në ekonomi (duke përfshirë dhe bankën qendrore) pas rizgjedhjes së tij. Sipas tij, kur kriza godet, qytetarët bëjnë përgjegjës të zgjedhurit dhe jo bankën. Paralel me

<sup>22</sup> Turkey's corporate debt burden sparks jitters on economy, FT, Apr 24 2018.

<sup>23</sup> Turkey's banks present hurdle for Erdogan recovery, FT, 10 May 2018.

<sup>24</sup> Turkish companies loaded with foreign debt fear rate rises, FT, November 29, 2017.

<sup>25</sup> Erdogan backs off in battle with Turkish central bank, FT, March 12, 2015.

<sup>20</sup> Turkey: the crisis candidate, FT, January 9, 2017.

<sup>21</sup> Turkish business feels the pain of currency crisis, FT, 14 August, 2018.

këtë deklaratë dhe pritshmërinë e rizgjedhjes së Erdoganit dhe mundësisë së vendosjes së kontrollit të kapitalit me qëllim që Erdoganit të zhvillojë ekonominë me interesa të ulëta, siç pretendoi, kapitalistët e huaj ngurrojnë të investojnë, sepse ky objektiv nënkupton së pari falimentimin e Turqisë! Lira turke u zhvlerësua më shumë se 15 për qind në raport me dollarin gjatë muajve të parë –deri në fillim të qershorit- të vitit 2018-të. Por deri në gusht të po të njëjtit vit zhlerësimi shkoi në 37 për qind. Për të stabilizuar gjendjen banka qendrore rriti përqindjen e interesit (“repo rate”). Ky veprim në vetë-vetë vështirëson huamarrjen dhe tkurr veprimtarinë ekonomike.

#### IV. CILËN “POLITIKË EKONOMIKE” DO TË ZBATOJË ERDOGANI?

Gjasat janë se Erdoganit do të përdorë kontrollin e kapitalit: sepse vetëm përmes kësaj mase ai mund të përdorë bankën qendrore për të ulur përqindjen e huadhënies dhe rritur veprimtarinë ekonomike...lëvizje që nënkupton se ekonomia turke do të tkurret edhe më shumë gjatë viteve të parë të kësaj politike. Kjo masë do të rrisë dhe sigurinë e Erdoganit në pushtet dhe do ta orientojë edhe më shumë drejt Azisë dhe Rusisë dhe do ta zhvendosë nga orientimi euro-atlantik. Manifestua parazgjedhore e partisë së Erdoganit përfshiu ndërtimin e megaprojekteve (spitale, porte, rrugë dhe tunele). Duhet thënë se sektori i ndërtimit ka qenë shtysa kryesore e rritjes ekonomike për Erdoganin (2003-2017). Dëshira e tij për të përdorur megaprojektet për rritje ekonomike do të ketë një efekt frenues në politikën e tij:

*Ambicjet e tij mund të mbahen në kontroll nga pushteti i tregjeve që nuk janë të qetë me administrimin e tij ekonomik. Erdoganit përballet me një mëdyshje të madhe: ai duhet të shpenzojë. Por nëse ai shpenzon investitorët ndërkombëtarë do të bojkotojnë tregjet turke...ose ai do të përpiqet të shkojë në metoda tërësisht të reja që do të trembë vërtet tregjet ose ai do të duhet të pranojë disa nga këto projekte. Skemat e mëdha infrastrukturore kanë qenë një tipar përcaktues i administrimit 16 vjeçar të Erdoganit. Ndërtimi ka udhëhequr për një kohë të gjatë rritjen konsistente të vendit, e cila shkoi 7.4 për qind vitin e kaluar. Ai e ndihmon atë për të fituar zgjedhjet sepse qytetarët kanë qasje në shërbime më të mira dhe transport...shumë ndërtohen përmes krahazimit publik-privat përdorimi i të cilit është rritur dekadën e fundit...kostua e ndërimit ndërtimore para-2023 është 325 miliard dollarë. FMN-ja nxiti Turqinë të sigurojë një “përzgjedhje të rreptë” të këtyre projekteve shumë prej të cilëve janë financuar nga qeveria dhe përfshijnë garanci shtetërore të të ardhurave minimale - zakonisht në dollarë dhe euro se sa në lirën e fishkur...zhvlerësimi i lirës dëmton korporatat e rënduara me borxh në devizë të huaj. Vendi ka nevojë të gjejë më shumë se 200 miliard*

*dollarë në vit nga financa e jashtme për të mbuluar deficitin aktual dhe borxhet e maturuar. Shumica e tyre vjen në formën e “parasë së nxehtë” që mund të ndryshojnë shpejtë drejtim nëse ndjesitë zhvendosen ose kushtet globale ndryshojnë... Erdoganit sado i fuqishëm nuk ka zgjidhje veç të pranojë realitetin ekonomik’.*<sup>26</sup>

Ndërsa zhytja e devizës turke ka ushtruar trysni mbi sektorin korporativ me borxh në devizë të huaj (bankat dhe ndërmarrjet vendore kanë rreth 70 bilion dollarë borxh për të paguar deri në maj 2019) dhe ka nxitur një cikël inflacionar aq sa banka qendrore turke rriti parashikimin e inflacionit nga 8.4 në 13.4 për qind, investimet e huaja të drejtëpërdrejta (FDI) kanë filluar të bien: në vitin 2007 ishin më shumë se 22 miliard dollarë ndërsa shkuan 13 miliard kur Erdoganit u rizgjodhë dhe veçanërisht pas sulmeve terroriste në vitin 2015-të dhe puçi në vitin 2016-të. Shumica e investimeve burojnë nga Evropa, Amerika veriore dhe vendet e golfit. Britania, Holanda, Amerika, Spanja, Gjermania dhe Austria përbëjnë mbi 52% të investimeve.<sup>27</sup> Nëse këta ngrijnë investimet Turqia rrënohet për pak orë.

<sup>26</sup> Erdogan’s megaprojects dreams face market backlash, FT, Jun 26, 2018.

<sup>27</sup> Invest in Turkey, FDI, Invest.gov.tr.

## Erdogan has been great for growth and investment, so far...

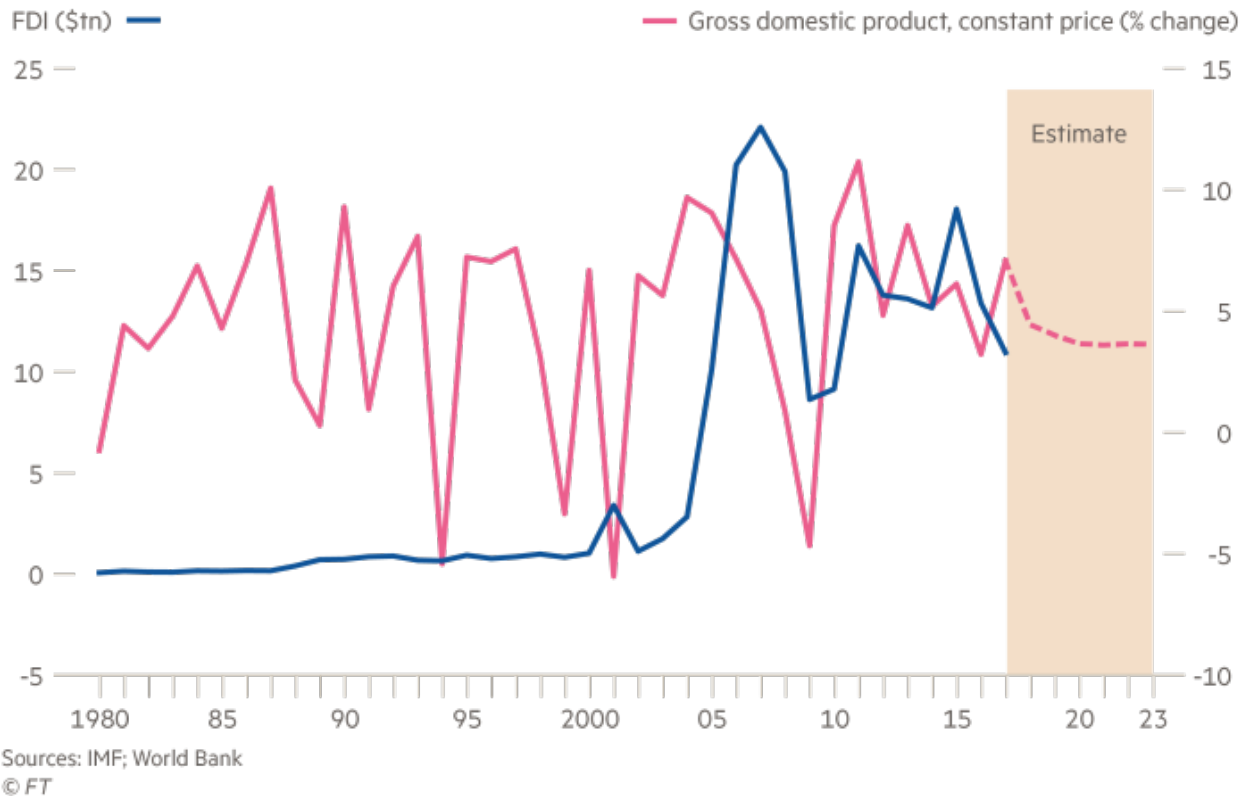


Figure 1

Në të vërtetë, investitorët e huaj (në këta përfshihen edhe ata që nuk shkelin kurrë në një vend) vazhduan të blinin aksione turke vitin e kaluar por ata tërhoqën 771 milion dollarë nga ndërmarrjet e listuara në bursë në treçerekun e parë të këtij viti. Si duket, kuptuan se gjendja do të përkeqësohet. Me luftën e sanksioneve mes Amerikës dhe Turqisë, kjo gjendje mund të përshkallëzojë dhe inflacioni të dalë jashtë kontrollit sidomos kur administrata e Trampit kërkon t'i përdorë sanksionet për të ndikuar fortë mbi vendet që ajo shënjestron me qëllim që t'i shmangët ngatërresave ushtarake. Ministria e financave amerikane vitin e kaluar shtoi 944 njerëz dhe entitete në listën e saj të sanksioneve dhe ka shtuar 1000 emra këtë vit. Krahas objektivit të shmangies së përfshirjes ushtarake administrata synon të shtyjë vendet të përdorin dollarin amerikan dhe jo devizat e tjera "rivale". Amerika i ka përdorur sanksionet në rritje që në vitin 1990 dhe veçanërisht pas 11 shtatorit të vitit 2001 me Xhorxh Bushin. Por Trampi i ka çuar në një nivel të ri.<sup>28</sup> Për të ndihmuar devizën turke Erdogani thirri bashkatdhetarët për të kontribuar me ar, euro dhe dollarë - domethënë, t'i konvertojnë ato në lirën turke me qëllim që të rrisin vlerën e saj - duke cituar se "Turqia ishte ballëpërballë me një luftë ekonomike...mos u friksoni, ne do të

fitojmë" ndërsa paraqiti një plan për 100 ditët e ardhshme të presidencës së tij duke emetuar një bond në renminbi (kur rendimenti (jildi) e bondeve turke është në rritje) për të marrë borxh nga Kina. Sipas planit, qeveria synon të përparojë me 400 projektet e rinj vlera e të cilëve shkon në 9 miliard dollarë ndërsa investitorët e huaj kërkojnë nga banka qendrore të rrisë interesat me qëllim që të ndalojë rrënimin e mëtejshëm të lirës kur vetë Erdogani kërkon të ulë përqindjen me qëllim nxitjen e rritjes ekonomike! Për të nxitur tregëtarët të shesin dhe përdorin devizën turke Erdogani, sepse pezulluan transaksionet –sepse deviza po zhytësh, u thërriti: "Çfarë do të thotë se ju nuk shisni prodhimet tuaja? Ju do t'i shisni ato, miqtë e mi. I mbani në magazina? Çfarë do të thotë kjo? Ti do të shesësh. Nëse ti nuk shet, ti do të paguash çmimin. Sepse unë e shoh këtë si tradhëti kundrejt kombit...Ti duhet të jeshë patriot. Nëse s'je patriot, ti do të paguashë çmimin"...duke i nxitur ndërmarrjet të mos blejnë në dollarë dhe euro: "Po u thërras biznesmenëve tanë: mos sulmoni bankat duke blerë devizë të huaj nga ata". Në rastin e shitjeve Erdogani detyron ndërmarrjet të shesin pavarësisht se fitojnë apo jo. Në rastin e dytë kërkon të forcojë devizën edhe me ndërmarrjet. Nga ana tjetër, investitorët dhe analistët mbrojnë skenarin që banka qendrore të rrisë interesat, të vendosë inflacionin nën kontroll dhe të kthejë besimin. Këtë skenar mbështet dhe FT:

<sup>28</sup> Trump takes deployment of sanctions to new level, FT, 11 Aug, 2018.

*Fakti që rritja ekonomike është e fuqishme dhe borxhi publik dhe familjar është i ulët - borxhi i qeverisë është 28.4 për qind të PPB-së ndërsa borxhi familjar është 17.4 për qind - [skenari i mësipërm] do të sillte një zgjidhje të shpejtë në krizën ekonomike turke. Ekonomia do të ngadalësonte [ritmin e saj] por në ditën në të cilën disa investitorë qarkulluan nocionin se Turqia mund të zgjedhë në fund të imponojë kontroll kapitali ose t'i kthehet FMN-së, alternativat duken më të rrëmujshme. Një kërcim në çmimet e importit, falë rënies së lirës, të përkrahur nga kostot në rritje të huamarrjes ndërsa investitorët e huaj tërhiqen, do të thithte gjallërinë jashtë ekonomisë turke dhe do të rrezikonte dobësi të mëtejshme të lirës".<sup>29</sup>*

Në një shkrim tjetër FT shqyrton pesë variante për Turqinë - (1) rritjen e përqindjes së interesave, një variant që duket i pamundur sepse Erdogani beson se interesat e larta shkaktojnë inflacion dhe nuk e kurojnë atë; (2) të kërkojë ndihmë nga FMN-ja, një variant tjetër që duket i pamundur sepse Erdogani e konsideron bashkëpunimin me të cënim të sovranitetit ekonomik dhe se FMN-ja do të kërkojë politika shtrënguese në shkëmbim; (3) të realizojë marrëveshje me Amerikanët për pastorin, një variant që duket gjithashtu i pamundur sepse Erdogani po e përdor amerikanin për ta shkëmbyer me Gylenin; (4) të vendosë kontroll kapitali por ky variant duket i pamundur gjithashtu sepse ai operon më mirë kur shteti ka kontroll të lartë në sektorin financiar dhe objektivi është të ndalojë rezidentët të dërgojnë pará jashtë vendit, si Kina, kur shumica e daljeve turke janë huamarrje e huaj ose investime...në këto kushte kontrolli i kapitalit do të parandalonte vetëm huamarrjet e reja; dhe (5) pritjen sa të mbarojë gjendja e tensionuar.<sup>30</sup>

Nga këta pesë variante, në fakt, Erdogani do të zgjedhë kontrollin e kapitalit, jo vetëm sepse nuk mund të realizojë ndonjë marrëveshje me amerikanët por ai nuk ka rrugë tjetër veç të shkojë drejt lindjes nëse kërkon të shpëtojë nga ndonjë puç tjetër me gjithçka që nënkupton ky orientim (masa represive brenda vendit etj.). Qasja e "distanca të barabarta" ("arm's length") mes Lindjes dhe Perëndimit nuk mund të përdoret përsa kohë që ekzistenca e Erdoganit kërcënohet nga Perëndimi. Orientimin i tij Erdogani e qartësoi edhe në një artikull të publikuar në "Nju Jork Tajms" menjëherë pas dështimit të bisedimeve për çështjen e sanksioneve amerikane ku ndërsa kritikon qendrimet e establishmentit amerikan për njëanshmëri në veprime dhe nevojën për përmbyshjen e saj, paralajmëroi se Turqia ka alternativa: do të kërkojë miq të rinj.<sup>31</sup> Qartësisht, ai nënkupton aleancën e re me Rusinë dhe

Kinën, Iranin dhe Katarin. Por ky orientim do të jetë tejet i vështirë për Erdoganin: jo vetëm sepse do të minohet në proces nga perëndimorët por edhe sepse ekonomia turke është integruar shumë në globalizmin neoliberal - kuadrin e të cilit e administron elita mbikombëtare (G7) dhe veçanërisht Uashingtoni. Nëse kriza në Turqi thellohet, disa banka europiane ("BBVA" e Spanjës, "UniCredit" e Italisë dhe "BNP Paribas" i Francës) do të dëmtohen - sepse sipas statistikave të BIS, huadhënësit lokalë - duke përfshirë filialet të huaja - kanë pretendime në dollarë në vlerën 148 miliard nga 36 miliard në vitin 2006 dhe pretendimet në euro janë 110 miliard. Ato, në fakt, pësuan humbje të mëdha menjëherë pasi Trampi deklaroi sanksionet e reja. Bankat spanjolle kanë borxhe kundrejt huadhënësve turq 83.3 miliard dollarë; bankat franceze 38.4 miliard dhe 17 miliard në deviza të huaja dhe të vendore bankat italiane. BQE-ja shqetësohet sepse huamarrësit turq mund të mos mbrohen nga dobësia e lirës dhe të fillojnë të falimentojnë në huatë e devizave të huaja, të cilat përbëjnë 40 për qind të aseteve të sektorit bankar turk. Zhytja e lirës kundrejt dollarit i ka lënë bankat lokale të ekspozuara për shkak të shkallës së huave në divizë të huaj.<sup>32</sup>

Qartësisht, kriza turke shtrihet në gjithë sektorët dhe veçanërisht në sektorin financiar për të cilin nuk besoj se është në dijeni klasa politike apo qeveria atje: sepse nuk kam lexuar ndonjë studim serioz i cili të tregojë realitetin e plotë ekonomik të vendit. Pa përmendur ministrin i ri të financave - dhëndrin e Erdoganit - i cili nuk e ka dijen e nevojshme për t'u përballur me sfidat e ekonomisë. Dhe kur s'ka dije gjendja me siguri do të përkeqësohet. Në gjendjen e krijuar, korporatistët turq thirrën për herë të parë Erdoganin duke i kërkuar shtrëngimin e politikës monetare për të stabilizuar përqindjen e shkëmbimit, të imponojë masa kursimtare dhe urgjentisht të zgjidhë mosmarrveshjet me Amerikën në kohën kur banka qendrore nuk jepte hua në reperin e vendosur prej 17.5 për qind por në 19.25 për qind. Si kundërpërgjigje, Erdogani hapi një front të ri konfrontimi: Turqia do të bojkotojë prodhimet amerikane - prodhuesit e teknologjisë amerikane - ndërkohë që Ankaraja priste sanksionet e radhës nga Amerika veçanërisht kundrejt bankës shtetërore, Halkbank, për shkak të shmangies së sanksioneve ndaj Iranit. Dhe ndërsa banka qendrore verpoi të ndalonte rënien e lirë të lirës duke furnizuar sistemin bankar me likuiditet të freskët dhe duke shkaktuar një ringritje të devizës, Erdogani përshkallëzoi konfrontimin me amerikanët me rritjen e tarifave mbi automjetet, alkoolin dhe cigaret, kozmetikën, orizin dhe qymyrin amerikan. Por ndërsa Erdogani priti Emirin e Katarit, vendi i të cilit administron një fond astesh prej rreth 300 miliard dollarë, prej të cilit mori zotimin se do ta mbështeste me hua në vlerën 15 miliard dollarë për bankat turke, Trampi paralajmëroi sanksione të

<sup>29</sup> Turkey: how investors turned on Erdogan, FT, 8 August, 2018.

<sup>30</sup> Turkey's options to stop the lira's fall, FT, 10 August, 2018.

<sup>31</sup> Erdogan: How Turkey sees the crisis with the US, New York Times, Aug. 10, 2018.

<sup>32</sup> Turkish lira plunges as crisis mounts, FT, 10 Aug, 2018.

mëtejshme kundër Turqisë dhe Kinës duke goditur tregjet e divizave në Hong Kong, Kinë dhe Indi.

Artësisht, Erdogani po kërkon të mbrojë sistemin bankar me borxhe të rinj kur dihet (nga ata që dihet) se sa më shumë t'i përdorë sanksionet Amerika aq më shumë forcohet dollari - sepse investitorët shtyhen gjithnjë dhe më shumë të përdorin dollarin - dhe aq më shumë dobësohen devizat e kombeve. Përgjatë të njëjtës fazë, Erdogani filloi të lironte disa të burgosur (dy ushtarakë grekë dhe një europian) por jo amerikanët: sepse duhet thënë se Turqia ka arrestuar disa amerikanë por në qendër të vemendjes është pastori. Si duket, kërkon të normalizojë marrëdhëniet me fqinjët dhe t'i përkeqësojë me amerikanët. Sidoqoftë, qeveria e Erdoganit për të stabilizuar lirën njoftoi se do të përdorë masa fiskale - domethënë, do të fillojë politikën e kursimit nga ministritë duke kërkuar nga ato të shkurtojnë shpenzimet me 10-30 për qind duke zhgënjyer disa investitorë, të cilët kërkonin të përdorte "politika monetare" (rritjen e përqindjes së lirës). Qartësisht, lëvizjet politike të Erdoganit janë spontane - të karakterit hakmarrës - dhe nuk reflektojnë dije sistematike. Për të njëjtat arsye, ekonomia truke nuk do të përballet thjesht me amulli - në afatshkurtër - por me depresion afatgjatë. Rënia ekonomike (për mos të thënë "rrënimi") atje do të ketë efekte edhe në Shqipëri: sepse dihet se kapitali turk mbizotëron sistemin bankar me rreth 28% - nëse banka mëmë s'ka likuiditetet filialet do të vendosen në veprim -; importet do të shtohen meqëse zhvlerësimi i lirës i bën eksportet truke më të lira (në importe ajo është vendi i tretë pas Italisë dhe Greqisë, me 8.1%); dhe në investime (këto të fundit ishin në fund të tremujorit të parë të këtij viti 534 milionë euro duke qendruar pas Greqisë me 1.3 mld euro, Zvicrës me 1 mld euro, Hollandës me 948 mln euro, Kanadasë me 896 mln euro dhe Italisë me 656 milionë euro.

Në nivel social, Turqia është e ndarë në dy klasa kryesore: në njërin anë qëndrojnë të "zinjtë" dhe në tjetrën të "bardhët":

*Në Amerikë, ndarja kulturore që përcakton politikën është midis shteteve të kuq dhe blu. Në Turqi, ndarja është midis turqve të "zinj" dhe të "bardhë". Kjo nuk lidhet me ngjyrën e lëkurës por me sjelljen sociale dhe klasës. Turqit e "bardhë" zakonisht janë shekullaristë, relativisht të pasur dhe më shumë urbanistë. Turqit e "zinj" janë Muslimanë të përshtirshëm dhe janë më të varfër dhe më provincial. Mendo për përcëimin dhe mosbesimin e ndërsjellë midis të kuqve dhe blu në Amerikë - trefishoje atë - dhe ti do të kesh një ide të thellë për ndarjen që ndan dy kampet në luftën kulturore të Turqisë.<sup>33</sup>*

Në fjalë të tjera, atje është një klasë që lidhet kulturalisht me Perandorinë Otomane dhe vlerat që ajo

zhvilloi, dhe një klasë, statiste – shekullariste, që lidhet me vlerat e shekullit të fundit. Sidoqoftë, këto janë klasa të karakterit social: sepse klasat duhet të shikohen në lidhje me gjithë pushtet: politik, ekonomik, social dhe ekologjik.<sup>34</sup>

<sup>33</sup> The Diary: Gideon Rachman, FT, June 28, 2013.

<sup>34</sup> Shih, Klasat, Kushtetuta e globalizmit neoliberal dhe pavarësia e popujve.



## Analysis of ATM Service Performance by using ARENA Simulation: The Case of Commercial Bank of Ethiopia, Sabyan Branch

By Dinku Manaye & Amare Worku

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**Abstract-** ATMs are among the most important service facilities in the banking industry. The main objective of ATM for bank is to keep away the customers from coming to bank and make the process easy for them to avoid the basic procedure they have to do in the bank. But ATMs themselves have as a result become subjects of large service demands which directly translate to queues for services when these demands cannot be quickly satisfied specially during weekend periods and month endings (salary times) where the demand for cash is high. In this study Arena simulation model was developed for the ATM service found in the commercial bank of Ethiopia, Sabyan branch to analyse its service performance. In the ATM center the customer inter arrival time of the customers followed the exponential distribution with a mean of 29 seconds and the service time is a Poisson distribution with a mean of 44.3 seconds. From the Arena simulation run results, we can conclude that the service is not efficient in the ATM Centre as there is excessive waste of time in the ATM center (71.3 seconds) and higher number of customers waiting in the queue (4 customers). To improve the ATM service efficiency of the case company and to keep satisfaction of the customers, we recommend the company to follow the following ways. To improve the ATM service efficiency of the case company and to keep satisfaction of the customers, we recommend the company the following ways. One way can be increasing the ATM facility number from two to three and another way can be increasing the service time of the available ATM services by improving the speed of the system.

**Keywords:** arena simulation model, ATM service center, customers, queue, service performance.

**GJMBR-G Classification:** JEL Code: G29



*Strictly as per the compliance and regulations of:*



# Analysis of ATM Service Performance by using ARENA Simulation: The Case of Commercial Bank of Ethiopia, Sabyan Branch

Dinku Manaye<sup>α</sup> & Amare Worku<sup>ο</sup>

**Abstract-** ATMs are among the most important service facilities in the banking industry. The main objective of ATM for bank is to keep away the customers from coming to bank and make the process easy for them to avoid the basic procedure they have to do in the bank. But ATMs themselves have as a result become subjects of large service demands which directly translate to queues for services when these demands cannot be quickly satisfied specially during weekend periods and month endings (salary times) where the demand for cash is high. In this study Arena simulation model was developed for the ATM service found in the commercial bank of Ethiopia, Sabyan branch to analyse its service performance. In the ATM center the customer inter arrival time of the customers followed the exponential distribution with a mean of 29 seconds and the service time is a Poisson distribution with a mean of 44.3 seconds. From the Arena simulation run results, we can conclude that the service is not efficient in the ATM Centre as there is excessive waste of time in the ATM center (71.3 seconds) and higher number of customers waiting in the queue (4 customers). To improve the ATM service efficiency of the case company and to keep satisfaction of the customers, we recommend the company to follow the following ways. To improve the ATM service efficiency of the case company and to keep satisfaction of the customers, we recommend the company the following ways. One way can be increasing the ATM facility number from two to three and another way can be increasing the service time of the available ATM services by improving the speed of the system. Both ways can be taken as good options since the operating cost of the new mechanisms is minimal compared with cost of losing customers due to low quality of service.

**Keywords:** arena simulation model, ATM service center, customers, queue, service performance.

## I. INTRODUCTION

Improving the performance of service industries when arrival and service time are random and performed by human employee is a complex decision environment [1, 2]. This scenario was best expressed in the banking industry. The development of information technology in bank sectors is Automatic Teller Machine (ATM). ATMs are among the most important service facilities in the banking industry [3]. The main objective of ATM for bank is to keep away the customers from coming to bank and make the process easy for them to avoid the basic procedure they have to do in the bank. ATMs

themselves have as a result become subjects of large service demands which directly translate to queues for services when these demands cannot be quickly satisfied. This situation becomes more evident during weekend periods and month endings (salary times) where the demand for cash is high. Simulation has become one of the most widely used tool in such system analysis due to availability of the many software's having large computing capabilities [2]. The simulation model is developed and run with particular inputs and model characteristics. In this study, two ATM services found in the commercial bank of Ethiopia, Sabyan branch has been considered. Simulation software ARENA is used to develop a simulation model and Performance analysis will be carried out.

## II. LITERATURE REVIEW

Simulation modeling is fast becoming an important aid in achieving higher levels of efficiency and productivity. Historically, the most frequent uses of simulation modeling have been directed to the improvement of manufacturing operations. More recently, simulation has come into its own as a powerful tool for improvement of operations within the services sector [4]. Simulation is one of the most powerful tools available to decision-makers responsible for the design and operation of complex processes and systems. It makes possible the study, analysis and evaluation of situations that would not be otherwise possible. In an increasingly competitive world, simulation has become an indispensable problem solving methodology for engineers, designers and managers [5].

Simulation can be defined as "the imitation of the operation of a real-world process or system over time" [6]. The process of interest is usually called a system. When building a simulation model of a real-life system under investigation, one does not simulate the whole system. Rather, one simulates those sub-systems which are related to the problems at hand. This involves modeling parts of the system at various levels of detail. In order to study the system, we make a set of assumptions about it. These assumptions constitute a model. Assumptions are expressed in mathematical or logical relationship. If the model is simple enough, it may be solved by mathematical methods such as calculus, algebra or probability theory. However, many

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real world problems are too complex. Models of these systems are almost impossible to solve analytically. In a simulation, we use a computer to evaluate a model numerically and data are gathered in order to estimate the desired characteristics of the model [7].

A simulation model is a representation that incorporates time and the changes that occur over time. Simulation models can be classified by many ways, but one useful way is along these dimensions [8]:

- (1) *Continuous vs. Discrete*: It is convenient to distinguish between continuous and discrete simulations. In a continuous simulation the underlying space-time structure as well as the set of possible states of the system is assumed to be continuous [7], thus the state of the system can change continuously over time; an example would be the level of water flows in a tank. In discrete simulations, changes can occur only at separated points in time such as customer arrivals to a bank.
- (2) *Static vs. Dynamic*: Simulation models can be classified as static or dynamic. A static simulation model is a representation of a system at a particular point in time. Static simulation is usually referred as a Monte Carlo simulation. A dynamic simulation model is a representation of a system as it evolves over time.
- (3) *Deterministic vs. Stochastic*: A deterministic simulation model is one that contains no random inputs; a stochastic simulation model contains one or more random input variables like a bank with randomly arriving customers requiring varying service times. A model can have both deterministic and random inputs in different components. It is often a must to allow for random inputs in order to make the model a valid representation of reality. Random inputs can be generated through specifying probability distributions from which observations are sampled.

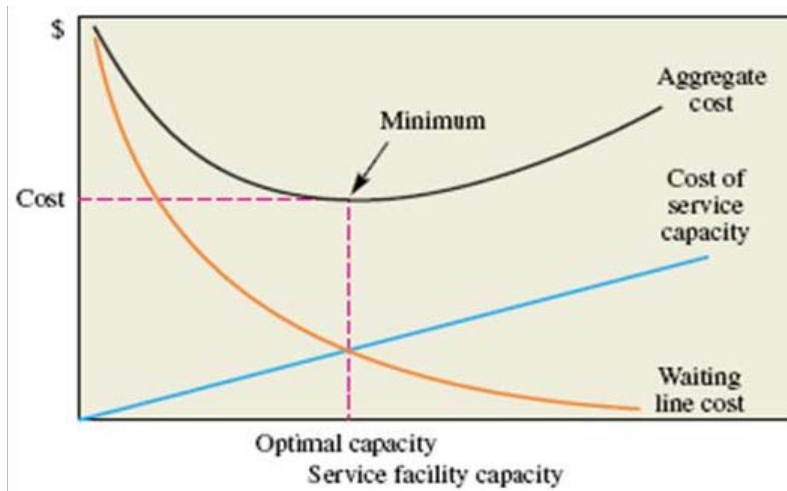
Simulation has a number of advantages that allow the identification of problems, bottlenecks and design shortfalls before building or modifying a system. It allows comparison of many alternative designs [9] and let us experiment with new and unfamiliar situations as to answer "what if" questions [5]. Evaluation and comparisons can take place before committing resources and investment to a project. Simulation allows study of the dynamics of a system, how it changes over time and how subsystems and components interact [9]. On the other hand, often simulations are time consuming, data is not available or costly to obtain, and the time available before decisions must be made is not sufficient for a reliable study [9].

Simulation modeling is an art that requires specialized training and therefore high skills of the modelers [5]. If two models of the same system are constructed by two competent individuals, they may

have similarities, but it is highly unlikely that they will be the same. Despite its tremendous benefits, simulation is not a perfect technology. It is a decision support tool that may help in simplifying the decision making process. As such, simulation output must be carefully analyzed. Most simulation models have random inputs such as equipment reliability, variable demand or loss, which cause the simulation output to be random too [8]. Therefore, running a simulation once is like performing a random physical experiment once and the results will probably be different each time. So it is highly recommended to run simulation models many times before concluding results. Simulation modeling is used in a multitude of applications. Many researchers attempted to classify and categorize the simulation applications. Simulation modeling is often used for modeling and designing many applications including hospitals, military operations, traffic, airports, services industries, computer systems, telecommunication networks and manufacturing systems like factories, flexible manufacturing systems, assembly lines, warehouses, and supply chains [8].

Service industry has been developing rapidly and receiving more attention in the recent years by system modelers. Customer satisfaction is a growing concern in service industry settings such as banks, hospitals, and call centers. High variability in demand is prevalent in the service industry, and customers still expect to be served promptly when they arrive [10]. Therefore, there is a need for efficient staff utilization with minimal possible cost, taking into account varying demand levels for the day of the week, or even for the time of the day. Improving customer satisfaction and service levels usually requires extra investments. To decide whether or not to invest, it is important to know the effect of the investment on the waiting time, and service cost. Usually managers and decision makers seek to balance between the service and waiting time cost to offer the best service with minimal cost [11]. Figure (1) shows the relation between these costs and how to obtain the minimum aggregate cost and optimal capacity.





Source: (Chase, 2007)

Figure 1: Waiting line versus service capacity level trade-off

The service system is characterized by the number of waiting lines, the number of servers, the arrangement of the servers, the arrival and service patterns, and the service priority rules [12]. Some waiting line and service problems that seem simple on first impression turn out to be extremely difficult or maybe impossible to solve. Waiting lines that occur in series and parallel (such as in assembly lines and job shops) usually cannot be solved mathematically [9]. Therefore, simulation modeling is necessary to explore and analyze alternative designs to obtain the optimal solution.

Commercial simulation modeling packages enable modelers to develop simulation models and also provide facilities to carry out simulation optimization as to help modelers optimize performance parameters that are of critical importance in the design of the systems under study. Most simulation modeling packages provide statistical reports (mean, minimum value, maximum value) to simplify analysis for performance measures (e.g., wait times, inventory on hand, utilization ... etc.). There are many different simulation modeling packages in the market and each has its strengths and weaknesses. The best packages allow the user to combine easy-to-use constructs with more flexibility [13]. Some of the most popular simulation modeling packages include Arena, Auto Mod, Pro Model, Simul8, and Witness.

Arena is a simulation software developed by Rockwell Automation. It uses the SIMAN simulation language. Arena is extensively used to simulate a company's process or system to analyze its current performance as well as possible changes that could be made. By accurately simulating a process or system, a company can see the outcomes of changes without implementing them in real-time, thus saving valuable time and resources.

In Arena, the user builds an experiment model by placing modules (boxes of different shapes) that

represent processes or logic. Connector lines are used to join these modules together and specify the flow of entities. While modules have specific actions relative to entities, flow, and timing, the precise representation of each module and entity relative to real-life objects is subject to the modeler. When planning a new system or making significant changes to an existing one, simulation modeling is a key tool for predicting and validating system performance. Simulation modeling is not a perfect technology. It is a decision support tool that aids in decision making process and it is not a decision-maker. Simulation software tools like Arena are used to describe and analyze the behavior of a system, answer questions about proposed changes to the system, and help designing new systems. Statistical data, such as waiting time and resource utilization, can be recorded and outputted to reports as to simplify analysis. So in this study we have used the Arena simulation software to model and analyze the performance of the ATM service system.

### III. METHODOLOGY

Various scholars have studied ATM service performance by using queuing theory [14, 15, 16]. But in this study we want to use computer simulation of ARENA instead of queuing theory to study the case ATM service system with ease. So different materials and methods are used to achieve the goal of this study as shown below in detail.

#### a) Research Design

Depending on research questions and orientation of the researcher, a choice is made in setting out the research plan. There is experimental design, longitudinal design, cross-sectional design and case study design. These designs are divided into fixed and flexible research designs [17]. Others have referred to this distinction as quantitative research designs and qualitative research designs respectively.

The case study design is applied appropriately in this paper. Case study as an empirical inquiry is chosen because it allows focus to be placed on the queue phenomenon within its real-life context. A case study design was chosen also because the topical issue was customer queuing at ATMs; this could not be considered more perceptively without the context, the banking environment and more specifically the settings created by the ATM-customer interaction. It was in these settings that data was gathered and utilized. Moreover, it allowed us to cover contextual conditions relevant to the phenomenon under study. The design here is particularly a single case where we considered the two ATMs of the commercial bank of Ethiopia, Sabyan branch. This appropriately provides us the needed environment to collect required data for analysis.

The researchers have provided the example of the application of discrete event simulation in evaluating performance of service line in the case company. A simulation model provides a visual animation of the service delivery process. The data was collected from the two ATM facilities of the commercial bank of Ethiopia, Sabyan branch so that modeling and simulation will be done by using arena software. An ARENA® simulation model was developed, verified, and validated to determine the performance of the ATM services.

#### b) *Data collection, sampling procedure and data analysis*

##### i. *Data Collection*

In this paper, two types of data were collected and used. These are primary data and secondary data. Secondary data was obtained through an intensive review of relevant literature on the ARENA simulation from journal articles, textbooks and many usable electronic sources and review of the ATMs transaction history. Primary data was collected in two weeks period via observation which involves recording of the three key required quantities (customer arrival time, customer service start time and customer service end time) as customers reach at and leave the ATM terminal.

##### ii. *Sampling Procedure and Population*

Participants for the time studies were ATM users who arrived at the ATM terminal between the hours of 7:00 AM and 7:00 PM. In each of the study period several repeat customers might have been captured in the time studies, but we didn't believe this will affect the analysis.

To simplify the study, the study period was divided into two groups that means peak hours of a day where there are more customers coming to the ATM terminal and normal hours of a day where there are less customers coming to the ATM terminal. Peak hours of a day includes early morning (7:00 AM to 9:30 AM) and late afternoon (4:30 PM to 7:00 PM) whereas the normal hours includes the hours which are not included in the

peak hours of the day. But in the normal hours there are minimum number of customers coming to the ATM service. So we can represent a particular day customer arrival rate and service rate by the peak hour range. Then by taking a one hour interval observation we can obtain customer arrival rate and service rate.

##### iii. *Data Analysis*

The collected data through direct observation was analyzed. Fitting input distribution through the input analyzer of Arena is used to identify fitted statistical distribution. It is used to evaluate the distribution's parameter and calculates a number of measures of the data. To select which type of distribution to use, we have compared the square error of each distribution. Larger square error value means the further away of the fitted distribution is from the actual data [18]. So we have selected the distribution with the smallest square error value. The data was analyzed by using real recorded time from the case ATM system. These data supported the analysis of validation of the model [19].

The other thing we will analyze was the customer waiting time. There are two types of customer waiting times; the time a customer spends in the queue and the total time a customer spends in the system. Since we are dealing with human beings, we are specifically concerned with customer waiting time in queue. It is waiting in queue that is dissatisfactory to customers and affects greatly their service experience. The following performance measures of the system would be generated from the simulation model:

- $\rho$ : Utilization; the probability that the ATMs are busy at random time (t) within the interval.
- $Wq$ : Average customer waiting time in the queue, in second.
- $W$ : Average time spent at the ATM service, including the waiting time in queue, in second.
- Number in: of customers arrived per day
- Number out: of customers served per day
- $Lq$ : Average number of customer in the queue per time period.

Based on the values of this measures, we can give the analysis of the performance of the case ATM service system.

#### c) *Model Development*

The conceptual model for the ATM service can be represented as shown below. Customers arrive at the service system at random points in time to seek service also in a random manner. The service system operates in such a manner that for each arrival, if both ATMs are busy then the customer enters a queue; else the arriving customer immediately enters service. As customers depart, one or both ATMs becomes idle, else a customer is selected from the queue to enter service. This will be modelled by using computer simulation of Arena.

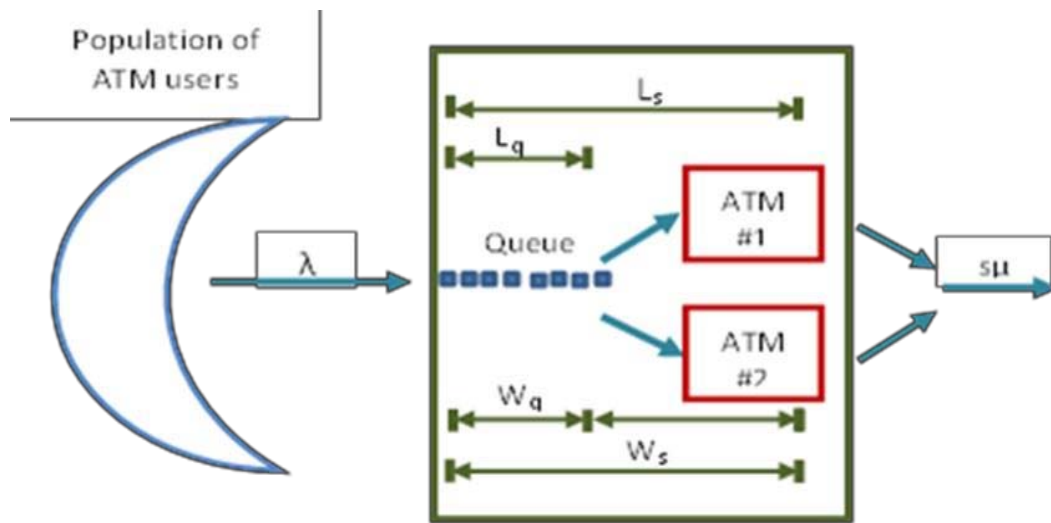


Figure 2: A Conceptual Model of the Case ATM queuing system

i. Model Assumptions

The model above is implemented with the following assumption implemented.

- Identical service facilities (since same kind of transactions are performed on both ATM).
- No customer leaved the queue without being served.
- A queue with unlimited waiting space that feeds into s identical servers.
- Customers are served on FCFS (First Come, First Serve) basis.
- Customers arrive randomly and the service time i.e. the time customer takes to do transaction in ATM, is also random.

ii. Model Verification and Validation

To verify the model, the Arena developed model should run in different running conditions to know whether the outputs are logical or not.

Validation activities are necessary to the construction of reliable models. Validation means to check whether the real world model and model made in simulated world is the same. The standard approach is to collect data (parameter values, performance metrics,

etc.) from the system under study, and compare them to their model counter parts. These parameters will prove the validity of the data and simulation.

d) Number of Replication Estimation

In particular, minimizing the number of replications and their length is necessary to obtain reliable statistics. In order to decide the number of replication the model must run some initial set of replication so that sample average, standard deviation and confidence interval are computed.

#### IV. RESULT AND DISCUSSION

Based on recorded arrival times, the inter arrival time and service time are found out. Using the input analyzer module of the software, the probability distribution for inter-arrival time and service time are found out. The inter arrival time of the customers followed the exponentially distribution (Square Error: 0.009100 and corresponding p-value = 0.329) with a mean of 29 seconds. The service time is a Poisson distribution (Square Error: 0.049503 and corresponding p-value = 0.263) with a mean of 44.3 seconds.

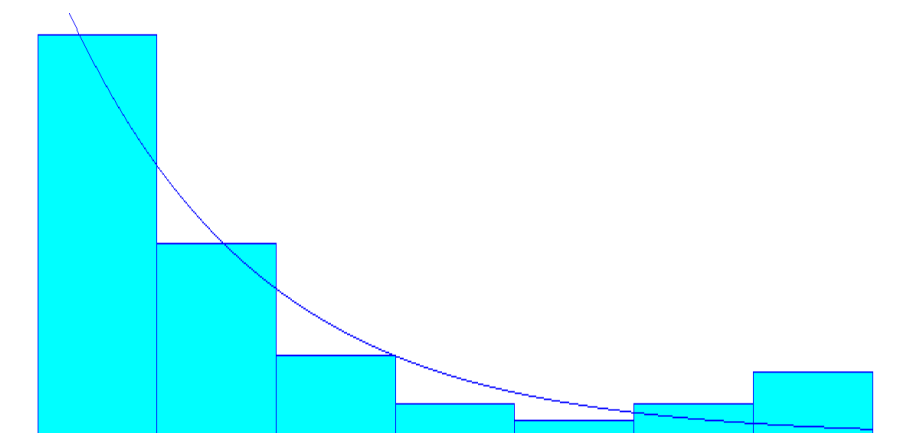


Figure 3: Customer inter arrival time distribution histogram

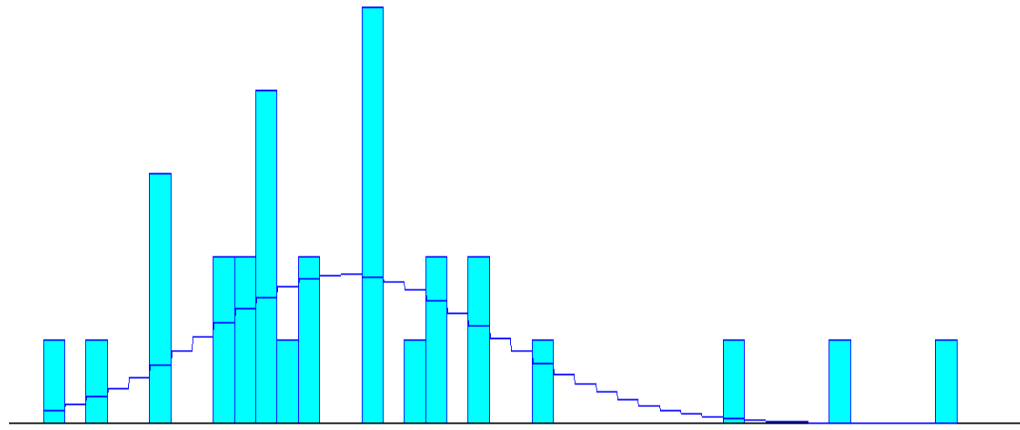


Figure 4: ATM service time distribution histogram

In the Arena simulation model, one create module, one assign module, one decide module, two process modules and one dispose module were used.

Figure 3 is the snapshot of the simulation model in Arena.

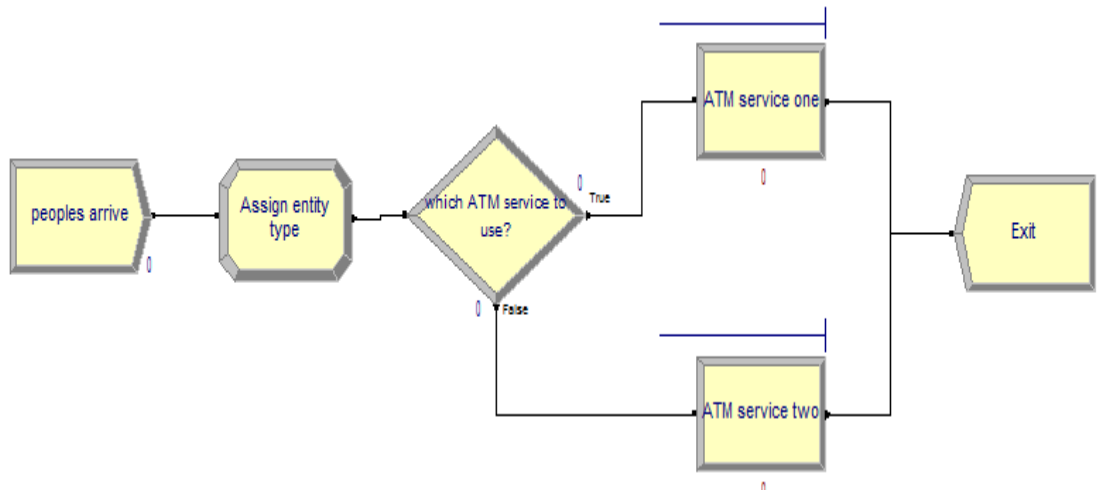


Figure 5: Arena simulation model of the ATM service

In order to decide the number of replication the model must run some initial set of replication so that sample average, standard deviation and confidence interval are computed. Through this mechanism the model replication number was set 30 with replication length of 8 hours (considering 8 hours of working in a day).

To verify the model, the Arena developed model was tested in different running conditions to know

whether the outputs are logical and consistent or not. Through this mechanism the model was verified.

Validation of the model was performed by comparing the actual customers being served by the ATM service in a day which is 1000 in average (found from the bank personnel's data) and the Arena simulation run result (number out) which is 986. The data comparison shows that the difference is minimal which shows the developed model is valid.

Table 1: Arena simulation run results

Parameter	LqW	Wq	$\rho$		Number	Number
			ATM service1	ATM services 2	in	out
Value	4115.55	71.2996	0.7553	0.7616	990	986

The above Arena simulation model run results indicate that:

- The average utilization of ATM service one and ATM service two was found 75.53% and 76.16% respectively.

- The average number of customers coming to the ATM service were 990 and out of which 986 were served.
- The average number of customers waiting in the queue was 4.

- The average waiting time for a customer in the queue was whereas the service time was 44.3 seconds.
- The total waiting time for a customer in the ATM service was 115.6 seconds.

From these it was clear that the waiting time of a customer in the queue (71.3 seconds) is higher amount even as we can compare it with the service time (44.3 seconds) and higher number of customers waiting in the queue (4 customers) which indicates inefficient system.

## V. CONCLUSION AND RECOMMENDATION

The main purpose of this study is analysis of the performance of the ATM service found in the commercial bank of Ethiopia, Sabyan branch by developing Arena simulation model for the ATM service center. That means the simulation run was used to collect the service performance measures like the number of customers waiting in the queue and the waiting time in the queue. With all the above results, we can conclude that the service is not efficient in the ATM Centre as there is excessive waste of time in the ATM center (71.3 seconds) and higher number of customers waiting in the queue (4 customers). So efforts has to be taken to reduce the waiting line even though it cannot be totally eliminated as going for total elimination would lead to excessive service cost.

To improve the ATM service efficiency of the case company and to keep satisfaction of the customers, we recommend the company the following ways. One way can be increasing the ATM facility number from two to three (it can be increased further up to optimum service cost). Another way can be increasing the service time of the available ATM services by improving the speed of the system (for example by increasing the internet speed and removing fluctuation of electric power). Both ways can be taken as good options since the operating cost of the new mechanisms is minimal compared with cost of losing customers due to low quality of service.

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# A Study on the Impact of Plastic Money on Consumer Spending Pattern

By Dr. Jaishu Antony

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**Abstract-** The paper examines the perceptions of consumers regarding the impact of plastic money on their spending pattern. This study was conducted among the bank customers in UAE. A sample of 250 customers has been taken from UAE. According to the central bank of UAE, 23 local banks are functioning in the UAE. Out of these 23 banks, five banks were selected randomly for this study, and 50 respondents from each bank were picked randomly for this study. Chi-square test and the Proportional test have been used to analyze the data. The analysis reveals that majority of the customers have the opinion that using of plastic money has a high impact on their spending pattern and are struggling to manage their money irrespective of their age, sex and income. The analysis was done to find out why consumers prefer plastic money even though they struggle to control their money while using plastic cards and the main reasons for which plastic money has a high impact on consumer spending pattern. Plastic money made a revolution in the banking industry across the world. Plastic money has many advantages when compared to paper money, but the convenience of plastic money makes it easy to spend beyond means. Plastic money is a good system but if you are not managing your plastic cards in a proper way that will lead to overspending, financial burdens, and financial stress.

**Keywords:** *plastic money, plastic money users, paper money, overspending.*

**GJMBR-G Classification:** *JEL Code: D18 , D11*



*Strictly as per the compliance and regulations of:*



# A Study on the Impact of Plastic Money on Consumer Spending Pattern

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**Keywords:** plastic money, plastic money users, paper money, overspending.

## I. INTRODUCTION

Plastic Money or Polymer Money, made out of plastic, is a new and better way of paying for goods and services and is used every day in place of actual bank notes. According to Business Dictionary, plastic money is a generic term for all types of bank cards, credit cards, debit cards, smart cards, Automated Teller Machine cards and charge cards. In recent years, there has been a dramatic growth in the usage of plastic money among the people.

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Twenty-two years since plastic money business got introduced to the UAE; the country has emerged as one of the fastest growing markets for credit cards and debit cards regarding of market penetration and per capita spending in the Middle East. As part of the plastic money boom, the UAE today has more than 3.5 million credit and debit cards in circulation. Merchant adoption rates for plastic money are very high in the UAE compared to many other countries in the region. With the role of electronic payments evolving in the UAE, Card companies are encouraging cardholders to use their plastic for everyday life, rather than just for high-value purchases or travel and entertainment. Card companies argue that Card-based payments support larger purchase and thus are more beneficial to merchants. Consumers often spend more on cards than they do with cash.

### a) Plastic money and spending pattern

Plastic Money is the alternative to the paper money or the standard Money. The psychological impetus behind impulse spending via credit or debit cards is one of the main reasons people tend to overspend. Carey Kirk, counselling psychologist at Light House Arabia said, "Due to the absence of payment pain; people are less likely to thoroughly evaluate an item and their need for it before they purchase it, making it more likely for them to indulge in impulse buys. When we buy more impulsively, we are paying less attention to our spending and are more likely to lose track of how much money we have spent. When we spend cash, there is emotional pain associated with handing over our money and concretely knowing we now have less in our wallets. With cash, the exchange of physical money for goods is visible, tangible, and immediate".

In addition to money leaving our wallets, when using credit cards, balance payments are not due immediately is another reason for overspending. The lag between purchasing an item and having to settle the credit card bill further distances our association between using a credit card and spending money. Robert (2001) in his study, 'Money Attitudes and Intentions towards Credit Card Use and Compulsive Buying among American College Students, used a simple modelling approach to investigate the role of money attitudes and credit card use in the campus buying within a sample of American college students. It was found in the study that the money attitudes, power, prestige, distrust, and anxiety are much related



to compulsive buying and that Credit card often moderates these relationships.

C. Prakash (2003), in his study "Impact of Credit Cards on Spending Patterns" had focused on the impact of credit cards on spending pattern to study the conceptual aspects and the evolution of credit cards in India. An interview schedule was given to three hundred credit card holders. Simple Percentage, F test, ANOVA and Chi-square test were used to analyze the collected data. It was found out that almost all the respondents irrespective of their income levels had agreed that their purchasing power had increased after they had begun to use their credit cards. The accessibility of the credit cards is limited to relatively small institutions like airlines, jewellers shop, and restaurants.

#### b) Objectives of the Study

The fact that consumers do not feel physical cash leaving their hands also plays into the tendency of some to use plastic more often. Those who are using the plastic cards many times tend to buy more than those who are using the currency note and inevitably end up buying more than they thought they would. When they leave the shopping mall they realize the fact that their card has been swiped a number of times, but they are not worried just yet, but by the end of the month when they receive their credit card bill or bank statement they will realize the fact that they have spent more than they could afford. So increased use of plastic money among the people has generated the concern that the convenience of the plastic money may tempt the users to live beyond their means that eventually leads to ineffective cash management and overspending and push the people into severe indebtedness. Inexperience with plastic cards and a lack of personal financial knowledge are likely to place some users at greater financial risk of having large, and perhaps unmanageable, debts burdens.

From the above theoretical perspective, the following research objectives have been developed for this study.

1. To understand the impact of plastic money on consumer spending pattern.
2. To know the preferences behind using the plastic money.
3. To find out the factors for which/why plastic money has a high impact on consumer spending pattern.
4. To offer suggestions from the findings and conclusions of the study, so that deficiencies and shortcomings can be rectified.

#### c) Hypothesis

The following hypotheses are maintained for the study.

*Hypotheses 1:* Plastic money has no impact on the consumer spending pattern.

- 1(a) No relationship exists between the age of the plastic money users and their perception towards

the impact of plastic money on their spending pattern.

- 1(b) No relationship exists between the sex of the plastic money users and their perception towards the impact of plastic money on their spending pattern.

- 1(c) No relationship exists between the income of the money users and their perception towards the impact of plastic money on their spending pattern.

## II. METHODOLOGY

#### a) Data Collection

Data has been collected from both primary and secondary sources. Primary data has been collected from the respondents through a field survey. The researchers adopted a face-to-face distribution of the questionnaire to the respondents of this study in the scrutiny of obtaining higher response rate.

The data for this study were collected using survey questionnaires. All questionnaires were accompanied with a covering letter stating the purpose of this study. It also guaranteed anonymity of respondents. Right before collecting data from the final respondents, the instrument was reviewed by an expert in the area to justify for the content validity.

Using a convenient sampling methodology, the researchers gathered 250 responses for this study. Data has been collected from both primary and secondary sources. Primary data has been gathered from the respondents through a field survey. The secondary data for the study was collected from the published journals, magazines and other periodicals, books on research works, etc. Internet services were also used to gain the latest information through various websites

#### b) Sampling Design

The sampling frame of this study comprises credit card customers of major local banks in UAE. Convenient sampling technique has been adopted for this study. According to the central bank of UAE, 23 local banks are functioning in UAE. Out of these 23 banks, five banks were selected randomly for this study. The data for this study were gathered using survey questionnaires. Primary data has been collected from 250 respondent's i.e. 50 respondents from each bank with the help of a structured questionnaire. While selecting a respondent, due importance was given to various factors such as age, sex, and income, etc.

#### c) Techniques for Data Analysis

In this study, we mainly use the chi-square test to test whether the hypothesis that attributes are associated or not. And the Proportional test to assess whether the proportion (ratio of number of responded in favour to total number of respondent) is more than 0 p (50% in our case) or not, We use the statistics where x is the number respondent in favor and n is the total number and  $q_0 = 1 - p$ .

### III. FINDINGS

The demographic profile of the sample

*Table 1: Respondent's Profile*

Sl. No.	Variables	Frequency	Percentage
1.	Age		
	Below 25	7	2.8
	26-35	24	9.6
	36-45	94	37.6
	Above 45	125	50
	Total	250	100
2.	Sex		
	Male	216	86.8
	Female	34	13.2
	Total	250	100
3.	Income		
	Below 10,000	187	74.8
	10,000 - 20,000	43	17.2
	More than 20,000	20	8
	Total	250	100

Source: Field Survey

*Table 2: Perception of plastic money users towards the impact of plastic money on their spending pattern*

Rate the impact of plastic money on your spending pattern	Frequency	Percentage
High impact	156	62
Some impact	70	28
No impact	24	10
Total	250	100

Source: Field Survey

Table 2 presents the perception of the plastic money users towards the impact of its use on their spending pattern. Out of 250 respondents, 62 percent have the opinion that uses of plastic money have a high influence on their spending pattern. 28 percent of the respondents have the notion that uses of plastic money have some relation on their spending pattern, and 10 percent of the total respondents have the idea that uses of plastic money have no effect on their spending pattern. In this context, the following hypothesis is constructed and put to the test, such that H<sub>1</sub>, Plastic money has no connection on the consumer spending pattern. To verify this, we conducted the proportional trials which gives Calculated value (Z) = 3.7947 and is significant at 5% level (Tabled value= 1.645).

Since calculated value is more than the tabled value, we reject H<sub>1</sub>. Hence we can conclude that the Plastic money has a high impact on the consumer spending pattern.

For this study Plastic money users are separately studied by their age, sex, and income.

a) *The Relation existing between the age of the plastic money users and their perception towards the impact of plastic money on their spending pattern*

In order to prove that relationship exists between the age of the plastic money users and their perception towards the impact of plastic money on their spending pattern, the following hypothesis is constructed and put to the test, such as H<sub>0</sub>, there is no relationship existing between the age of the plastic money users and their perception towards impact of plastic money on their spending pattern. Chi-Square test for independence is applied to test whether H<sub>0</sub>, is true or not.

Table 3: Impact of plastic money on spending pattern based on age of the plastic money users

Cross Tab							
			Age				
			Below 25	25-35	35-45	45 and Above	Total
Impact of plastic money on spending pattern	Some Impact	Count	2	10	26	32	70
		% within Age	28.6%	41.7%	27.7%	25.6%	28.0%
	High Impact	Count	3	10	59	84	156
		% within Age	42.9%	41.7%	62.8%	67.2%	62.4%
	No Impact	Count	2	4	9	9	24
		% within Age	28.6%	16.7%	9.6%	7.2%	9.6%
Total		Count	7	24	94	125	250
		% within Age	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests				
	Value	df	Tabled Value	Sig.
Pearson Chi-Square	7.898	4	9.488	0.095
Not Significant				

Source: Field Survey

The result of the Chi-square test to prove the relation between the age of the plastic money users and their perception towards the impact of plastic money on their spending pattern is as follows.

The calculated value of  $\chi^2$  is = 7.898

Tabled value = 9.488

Since the calculated value is less than table value, the Hypothesis (H0) is accepted. Hence it is proved that there is no close association between age of the plastic money users and their perception towards the impact of plastic money on their spending pattern.

b) Relation between the sex of the plastic money users and their perception towards the impact of plastic money on their spending pattern

In order to prove that relationship exists between the sex of the plastic money users and their perception towards the impact of plastic money on their spending pattern, the following hypothesis is constructed and put to test, such as H0, there is no relationship existing between the sex of the plastic money users and their perception towards impact of plastic money on their spending pattern. Chi-square test for independence is applied to test whether H0, is true or not

Table 4: Impact of plastic money on spending pattern based on the sex of the plastic money users

Cross Tab					
			Age		
			Male	Female	Total
Impact of plastic money on spending pattern	Some Impact	Count	57	13	70
		% within SEX	26.4%	38.2%	28.0%
	High Impact	Count	136	20	156
		% within SEX	63.0%	58.8%	62.4%
	No Impact	Count	23	1	24
		% within SEX	10.6%	2.9%	9.6%
Total		Count	216	34	250
		% within SEX	100.0%	100.0%	100.0%

Chi-Square Tests				
	Value	df	Tabled Value	Sig.
Pearson Chi-Square	0.215	1	3.841	0.643
Not Significant				

Source: Field Survey

The result of the Chi-square test to prove the relationship between the sex of the plastic money users and their perception towards the impact of plastic money on their spending pattern is as follows.

The Calculated Value of  $\chi^2$  is = 0.215

Tabled Value = 3.841

Since the calculated value is less than the table value, the Hypothesis H0 is accepted. Hence it can be concluded that there is no close association between sex of the plastic money users and their perception towards the impact of plastic money on their spending pattern.

c) *Relation between the income of the plastic money users and their perception towards the impact of plastic money on their spending pattern*

In order to prove that relationship exists between the income of the plastic money users and their

perception towards the impact of plastic money on their spending pattern, the following hypothesis is constructed and put to test, such as H0, there is no relationship existing between the income of the plastic money users and their perception towards impact of plastic money on their spending pattern. Chi-square test for independence is applied to test whether H0, is true or not.

Table 5: Impact of plastic money on spending pattern based on income of the plastic money users

Cross Tab						
			Income			
			More than 20,000	10,000 to 20,000	Below 10,000	Total
Impact of plastic money on spending pattern	Some Impact	Count	6	9	55	70
		% within income	30.0%	20.9%	29.4%	28.0%
	High Impact	Count	12	27	117	156
		% within income	60.0%	62.8%	62.6%	62.4%
	No Impact	Count	2	7	15	24
		% within income	10.0%	16.3%	8.0%	9.6%
Total		Count	20	43	187	250
		% within income	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests				
	Value	df	Tabled Value	Sig.
Pearson Chi-Square	2.458	2	5.991	0.293
Not Significant				

Source: Field Survey

The result of the Chi-square test to prove the relationship between the income of the plastic money users and their perception towards the impact of plastic money on their spending pattern is as follows.

The calculated value of  $\chi^2$  is = 2.458

Tabled value = 5.991

Since the calculated value is less than the table value, the Hypothesis H0 is accepted. Hence it can be concluded that there is no close association between the income of the plastic money users and their perception towards the impact of plastic money on their spending pattern.

To find out why customers prefer plastic money to paper money, further analyses have been conducted among the customers.

Table 6: Which mode of money you use more

Which mode of money you use more	Total Respondents	Percentage
Plastic Money	216	86.4
Cash	34	13.6
Total	250	100

Source: Field Survey

The above analysis reveals the facts that out of a total of 250 customers 216 customers, i.e., 86.4 percent prefer and use the plastic money only 13.6 percent i.e., 34 customers are using or preferring paper money.

To find out which plastic money customers use more, further analyses have been conducted among the customers who prefer plastic money.

Table 7: Type of plastic money you use more

Type of plastic money used	Total Respondents	Percentage
Credit Card	104	48.15
Debit Card	96	44.44
Specific Outlet card	16	7.41
Total	216	100

Source: Field Survey

An analysis of respondents, who prefer plastic money to paper money, states that 48.15 percent, majority of the customers use credit cards and 44.44 percent of the customers use debit cards. Only 7.14 percent of the customers use specific outlet cards.

To find out the pivotal reasons for which/why customers prefer plastic money, further analyses have been conducted among the customers who prefer plastic money.

Table 8: Preference behind uses of plastic Money

Preference behind uses of plastic Money	Total Respondents	Percentage
Security in respect to paper money	43	19.91
Convenient to carry and use	55	25.46
Less risky to carry as compared to paper money	33	15.28
Suits personality	36	16.67
More credit options	49	22.68
Total	216	100

Source: Field Survey

Among the customers who prefer plastic money, 25.46 percent expressed the reason for preference as convenient to handle and use 22.68 percent of the respondents prefer plastic money because it gives them more credit options. 19.91 percent have the opinion that they prefer plastic money because of security reasons. 16.67 percent pointed out the facts that using plastic money suits their

personalities. 15.28 percent have the answer that they prefer plastic money because it is less risky to carry as compared to paper money.

To find out the many reasons for which plastic money have a high impact on consumer spending pattern, further analyses have been conducted among the customers who prefer plastic money.

Table 9: Why plastic money leads to overspending?

Why plastic Money leads to overspending?	Total Respondents	Percentage
While using the plastic money, we don't feel physical cash leaving our hands	32	14.81
The Convenience of the plastic money may tempt the users to live beyond their means	85	39.35
The Psychological impetus behind impulse spending say spending via credit or debit cards etc	43	19.91
The time lag between purchasing an item and having to settle our credit card bill further distances our association between using a credit card and spending money	56	25.93
Total	216	100

Source: Field Survey

The above table consolidates a detailed analysis of the main reasons for which/why plastic money has a high impact on the consumer spending pattern 39.35 percent of the respondents have the opinion that the usage of plastic money leads to overspending mainly because of the reason that the convenience of the plastic money may tempt the users to live beyond their means. 25.93 percent expressed the reason for overspending as the time lag between purchasing an item and having to settle the credit card bill further distances the association between using a credit card and spending money. 19.91 percent of the respondents have the view that psychological impetus behind impulse spending via credit or debit cards etc, many times leads to overspending. 14.81 percent pointed out the reason as while using plastic the money they don't feel physical cash leaving their hands many times, hence, leads to overspending.

d) Findings

1. Majority of the plastic money users have the opinion that plastic money has a high impact on their spending pattern.

2. There is no close association between age of the plastic money users and their perception regarding the impact of plastic money on their spending pattern.
3. Majority of the respondents who are above 35 years of age expressed the strong agreement to the view that uses of plastic money have a high impact on their spending pattern.
4. There is no close association between sex of the plastic money users and their perception regarding the impact of plastic money on their spending pattern.
5. There is a close association between the income of the plastic money users and their perception regarding the impact of plastic money on their spending pattern.
6. Majority of the respondents who belong to the income range of 10,000 to 20,000 expressed the strong agreement to the view that the uses of plastic money have a high impact on their spending pattern.

7. The above analysis reveals the fact that the majority of the customers use plastic money than paper money.
8. Analyses of respondents, who prefer plastic money to paper money, among the different plastic cards, the credit card is the plastic money that the majority use more.
9. Analysis proves the fact that customers prefer plastic money because it is secure, convenient to carry and use and it gives them more credit options.
10. A detailed analysis to find out why plastic money leads to overspending, majority of the respondents expressed strong agreement to the view that convenience of the plastic money may tempt the users to live beyond their means. Hence, the time lag between purchasing an item and having to settle their credit card bill further distances there association between using a credit card and spending money.

e) *Suggestions*

Based on the findings following suggestions seem feasible for managing the credit card debt.

1. Plastic money has many advantages over paper money but, it does not mean that paper money is obsolete. It is always recommendable to reduce the use of plastic money because consumers don't feel physical cash leaving their hands also plays into the tendency of some to use plastic more often.
2. Those who are using the plastic many times tend to buy more than those who are using the currency note and inevitably end up buying more than they thought they would and have more chances of getting deeper in debt.
3. Impulse spending via credit or debit cards is one of the main reasons people tend to overspend. Due to the absence of payment pain, people are less likely to thoroughly evaluate an item and their need for it before they purchase it, making it more likely for them to .indulge in impulse buys.
4. Rampant usage of credit cards should be avoided since it leads to an endless cycle where the users maximize their credit card and get another one because they are unable to pay for the previous one, and they finally fall into debt.
5. Sharing the credit cards with others may lead to over-spending, misuse of the card and related disputes. It may also disturb the personal budget of the card bearer.
6. It is always better to use paper money because of the availability of money itself-work as a managing system. When we use paper money, there is emotional pain associated with handing over our money and concretely knowing we now have less in our wallets. With cash, the exchange of physical money for goods is visible, tangible, and immediate.

7. Too much usage of debit card, also may lead to effective cash management because there's immediate loss when cash is handed over, but when a plastic card is swiped, it doesn't give any immediate feeling of loss. Even when a message is communicated to the person, by the time they comprehend that the money is gone, the damage has already been done and cannot be reversed.
8. While using the card there is a time lag between purchasing an item and settling the bill in future. This lag between purchasing an item and having to settle our credit card bill further distances our association between using a credit card and spending money. Small expenses do not get visualised when using a card. When it is the end of the month people realize that their card expenses are not payable and, once this takes place, it is too late to avoid late payment fee.
9. When carrying cash, people know how much they can spend, but when they carry card, they feel that as long as there is money, they can still spend. This may be good for the retailers and bank but not good for people especially in managing their money in an effective way.

#### IV. CONCLUSION

Plastic money made a revolution in the banking industry across the world. It has many advantages compared to paper money, but the convenience of plastic money makes it easy to spend beyond means. Plastic money is a good system but if you do not manage your plastic cards in a proper way that will lead to overspending, financial burdens, and financial stress. Plastic money is convenient, less risky, and safer than paper money, but it's important to remember that it is not compulsory that you should use plastic money especially if you are not able to manage your money while using the plastic cards. When we spend cash, there is emotional pain associated with handing over our money and concretely knowing we now have less in our wallets. With cash, the exchange of physical money for goods is visible, tangible, and immediate, but when a plastic card is swiped, it doesn't give any immediate feeling of loss. Even when a message is communicated to the person, by the time they comprehend that the money is gone, the damage has already been done and cannot be reversed. So the selection of the mode of money should depend on which mode helps you more to have a better control over your hard earned money.

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# Adopting Bioinformatics and Neural Network Deductions to Extrapolate the Structure and Evolutionary Dynamics of Helix Partnerships

By Hong Xing Yao & Evans Takyi Ankomah-Asare

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**Keywords:** *innovation, network, triple helix, dna, neural networks, university.*

**GJMBR-G Classification:** *JEL Code: 370199p*



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## Preamble

Current research in science has become innovative and thought-provoking given the ability to adopt principles from one seemingly delinked field into another. In this paper, we assume an approach that models institutional relations between University, Government and Industry, by harnessing prior deductions in bioinformatics that helped to mathematically showcase the structure of Deoxyribonucleic acid (DNA). Thus the internal member network of individual organizations is expected to be of a small world nature and attains regularity as a probability of connectivity between nodes in that network approaches 1 (Liu, Madler, & Bush, 2015; Watts & Strogatz, 1998a, 1998b). When the bonds have no fragility (fragility = 0) then we expect the dynamism of institution to institution connections to characteristically mimic a trefoil knot. However as this will be an ideal and never the general case, the trefoil knot will never form an unending loop but will be characteristically dense as it approaches fragility of zero. The density of the bonds between the partnerships and subsequent entries and breaks in the network will reflect the twists and writhes as seen in a

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DNA system. We hold the performance of University as the energy that feeds the system and resulting innovation generated as the bond that sustains the dynamic network from breaking up.

## I. INTRODUCTION

Triple Helix theories building on the deductions from Lowe (1982) and Etzkowitz (1993), to proceeding works (Etzkowitz, 1993; Etzkowitz & Leydesdorff, 1995; Etzkowitz & Ranga, 2012), marked the beginning of the appreciation of the role and synergies between knowledge generation, government and industry and how this impacts on innovation generation, and, in an extended analysis; national and regional development. The proposed models hinged on mathematical models of networks structures (Boland, Phillips, Ryan, & McPhee-Knowles, 2012; Fitjar, Gjelsvik, & Rodríguez-Pose, 2014; Khan & Park, 2013; Nakwa, Zawdie, & Intarakumnerd, 2012; Purnomo, Pujianto, & Efendi, 2015) and projected benefits (Egorov, Babkin, Kovrov, & Muraveva, 2015; Guerrero & Urbano, 2017; Heitor, 2015; Herliana, 2015; Horaguchi, 2016; Ivanova & Leydesdorff, 2015; Jiao, Zhou, Gao, & Liu, 2016; Kinnunen, Rinkinen, Majava, & Gillette, 2016; Petersen, Rotolo, & Leydesdorff, 2016; Villarreal & Calvo, 2015; Wonglimpiyarat, 2016a, 2016b) as motivation for partnerships as well as the possible evolutionary dynamics of this system (Baas & Hjelm, 2015; Cai, 2014; Ehrenfeld & Gertler, 1997; Etzkowitz, de Mello, & Almeida, 2005; Etzkowitz & Leydesdorff, 2000; Etzkowitz, Webster, Gebhardt, & Terra, 2000; Eun, Lee, & Wu, 2006; Fazlollahi, Mandel, Becker, & Maréchal, 2012; Gallego-Bono & Chaves-Avila, 2016; Gorddard, Colloff, Wise, Ware, & Dunlop, 2016; Le Lann, Negny, & Bryon-Porte, 2016; Rammel, Stagl, & Wilfing, 2007; Sabau, 2010; Wang, Sutherland, Ning, & Pan, 2015) has given rise to several publications and studies mostly focused on developed countries.

Abstracting concepts from diverse fields into social and organizational studies has helped in explaining, sometimes complex systems, as simple as possible by reducing the interaction to mathematical deductions infused with dynamic logic of decision making and conclusions. Our approach is to consider organizational partnerships, development, and growth in

innovation as having the structure, characteristics and dynamics of a simplified DNA; where Universities are at the core of the system and Government and Industry

serve as backbones of the partnership. The assumed approach presented thus far is graphically expressed in Figure 1 below.

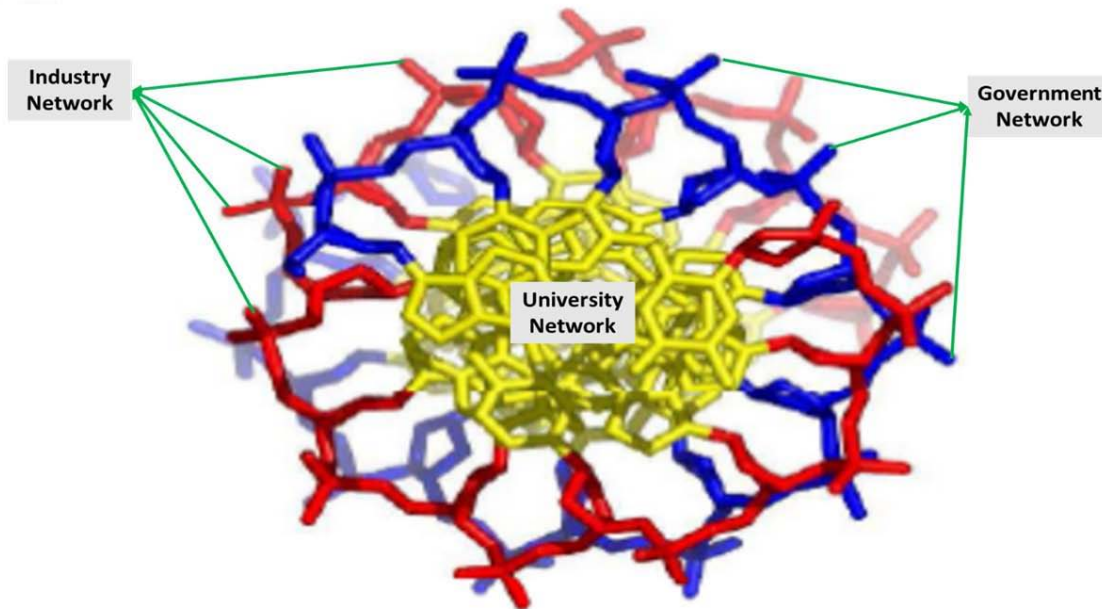


Figure 1: DNA Extrapolation of a Triple Helix with University networks as the base and Government (Blue) and Industry (Red) networks as the backbones of the partnership. source Swigon (2009)

In Figure 1, the endpoints and intersections of the individual DNA strands are considered to be nodes and edges of the three different networks forming the helix. This is consistent with network theories (Dorogovtsev & Mendes, 2003; Estrada, 2011; Newman, 2010). Like a typical DNA structure, a triple helix relation results in innovation (Cai, 2014; de O. e Silva, de Freitas, Paranhos, & Hasenclever, 2012; Fitjar & Rodríguez-Pose, 2015; Kruss, McGrath, Petersen, & Gastrow, 2015; Martin, 2012; Ozkan-Canbolat & Beraha, 2016; Quitzow, 2015; Rogers, 2015; Scupola & Zanfei, 2016; Velu, 2016; Zitrou, Bedford, & Walls, 2016) and this innovation has the tendency to visibly showcase products rather than the knowledge that created them. Invariably, the trials and tribulations of professors, universities and research institutions in generating novelty, developing patent concepts and the diffusion mechanisms that result in the final product are minimally showcased in the marketing strategies of the product development network. The paper, based on this minimal presence of research work in product development and marketing strategies, therefore considers the backbone of the helix to be Government and Industry; as showcasing systems, with the strength of helix partnerships being hinged University partners' ability to generate innovation. In tandem then, the appreciation of a Triple Helix relation as a DNA structured network of relations builds from the mechanical properties that influence the processes of innovation generation, diffusion, transmission, replication and feedback as a

driving force for innovation and sustainability within the helix.

We first conduct a topological analysis of triple helix systems about the DNA structure of a living organism, we then continue to present the flexibility of partnerships that result from triple helix systems, as the strength and conditional influenced dynamics of such interactions. Building on these initial deductions, we propose the dynamic structure of helix partnerships and how they can be resolved using neural network approaches. We conclude by relating this to policy development and sustainability.

## II. TOPOLOGY

Building on the topology of DNA's, a triple helix system, can then be viewed as a collection of three continuous curves - graphical plots of internally interacting nodes in each partnered network.

Thus the axial curve of the backbone systems can be considered as curves passing through the focal individuals (centroids) of the base curve. In such a case, three curves  $C_1$ ,  $C_2$  and  $C_3$  helps define coefficients of linkage ( $L_k$ ) that characterize the curves as they interweave with one another. Linkages should be seen as signals of a partnership established point or interactions between focal nodes across the three networks. Further, assume that the generic projection of the three curves on a plane, where the crossing of one curve with the others, is transversal.

We begin by providing orientation as well as crossing signs to our networks as provided for in Figure 2 (a & b). The coefficient of linkages is then taken to be one half the sum of all signed crossings. In conformity to

DNA modeling, we assign  $C_1$  to the axial curve of Universities and  $C_2$  and  $C_3$  to the backbone chains of Government and Industry.

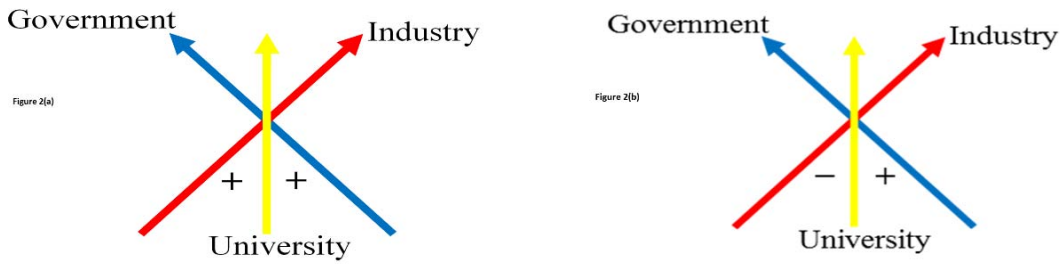


Figure 2: Oriented Triple Helix Partnerships

Figure 2(a) +ve and +ve = triple helix Figure 2(b) -ve and +ve = dual helix. Using Gaussian principles

the formula of the differential curves can be considered as a triple integral and written as

$$L_k(C_1, C_2, C_3) = \frac{1}{4\pi} \oint_{C_1} \oint_{C_2} \oint_{C_3} \frac{(t_1(s_1) \times t_2(s_2) \times t_3(s_3)) \cdot [(X_1(s_1) - X_2(s_2)) + (X_1(s_1) - X_3(s_3))]}{|(X_1(s_1) - X_2(s_2)) + (X_1(s_1) - X_3(s_3))|^3} ds_3 ds_2 ds_1 \quad [1]$$

Where  $C_i$  is defined by giving its position  $X_i(S)$  in space as a function of the arc-length  $S$ , and  $t_i(S) = X'_i(S) = dX_i(S)/dS$ .

we beginning by assigning to each curve orientation; as shown in Figure 1, and subsequently computing the sum of signed crossings in a planar projection along every possible direction.  $Wr$  then becomes the average sum of all projections. Thus for a differential curve  $C$ , a formula for  $Wr$  analogous to the deduced Gaussian integral can be considered as

Cognizant of two critical properties of curves that are related to a linkage, we proceed by deducing the *writhe* and *twist* of the individual networks in a triple helix interaction.

*Writhe (Wr)*: This characterizes the amount of chiral within a single curve in a helix. To help define the  $Wr$ ,

$$Wr(C) = \frac{1}{4\pi} \oint_C \oint_C \oint_C \frac{(t(s_1) \times t(s_2) \times t(s_3)) \cdot [(X(s_1) - X(s_2)) + (X(s_1) - X(s_3))]}{|(X(s_1) - X(s_2)) + (X(s_1) - X(s_3))|^3} ds_3 ds_2 ds_1 \quad [2]$$

*Twist (Tw)*: Measures the winding of one curve in space, typically around an assumed constant. In the case of a triple helix, we consider that the individual networks of the three players are in a dance of partnership. Thus the twist is deduced as the three networks being in a state of winding around each other in a given space. The twist analogy requires that the curves under consideration be differentiable, spatially close to each other and in the case of partnership occurrence; tangential. By considering that our three

networks are in a Euclidean space of  $\mathbb{R}^3$ , we can deduce the distance ( $d$ ) between them as  $d = |x - y| = \sqrt{\sum_{i=1}^3 |x_i - y_i|^2}$ . Where one has to plot about actual distances of institutions in a triple helix, geographical proximity deductions could also provide similar results.

We continue, the twist of  $C_3$ ,  $C_2$  and  $C_1$  about each other given a determined distance ( $d$ ) between them is observed as

$$Tw(C_3, C_2, C_1) = \frac{1}{2\pi} \oint_{C_1} [t_1(S) \times d(S)] \cdot d'(S) dS \quad [3]$$

Where  $d(S) = (X_2(\sigma(S)) - X_2(S)) + (X_3(\sigma(S)) - X_3(S))$  is perpendicular to  $t_1(S)$

Literature proposes that in modeling DNA helices, the coefficients of linkage of closed curves reflect the sum of the writhe of one curve around the twist of the second curve about the first (Călugăreanu,

1961; White, 1969; Swigon, 2009). In a triple helix involving three curves writhing and twisting round each other, we can then deduce the above proposition as

$$Lk(C_1, C_2, C_3) = Wr(C_1) + Tw(C_3, C_2) \quad [4]$$

The importance of this deduction in innovation linked systems like a triple helix is that any change in  $Tw$  that results in variations in the performance of universities will induce corresponding changes in  $Wr$ . Thus, it is expected that as the chirals grow thicker and

denser, with the distance between the individual systems approaching zero, the probability of inter-institutional partnerships should increase. Secondly, this also helps to model the ripple effect of external events on the triple helix in general.

### III. FLEXIBILITY OF PARTNERSHIPS

In continuation of our theoretical analogy, we adopt discrete mathematics, to model performance dependent flexibility of partnerships in such a way as to closely depict the structure of Triple Helix relations. Our approach is to consider that for 2-nodes in a university network, indexed as  $n$ , their location of  $x^n$  in Cartesian space with a determined direction can be defined by the frame  $(d_1^n, d_2^n, d_3^n)$ . The defined frame, allows for the relative orientation and position of university actors (researchers) and the subsequent institutional growth to be kinematically deduced as  $(\theta_1^n, \theta_2^n, \theta_3^n, \beta_1^n, \beta_2^n, \beta_3^n)$ . Thus the network helix of a University considering

$$\alpha^n = \frac{1}{2} \sum_{i=1}^3 \sum_{j=1}^3 U_{ij}^{XZ} \Delta \theta_i^n \Delta \theta_j^n + G_{ij}^{XZ} \Delta \theta_i^n \beta_j^n \Delta_j^n + I_{ij}^{XZ} \Delta \theta_i^n \beta_j^n \Delta_j^n \quad [6]$$

Where XZ is the direction of change of the  $n$ th performance of each network.

Thus taking into consideration the fluctuations in university performance, where  $\Delta \theta_i^n = \theta_i^n - \bar{\theta}_{ij}^{XZ}$  and  $\Delta \beta_i^n = \beta_i^n - \bar{\beta}_{ij}^{XZ}$  are the deviations from standardized or expected performance with values  $\bar{\theta}_{ij}^{XZ}$  and  $\bar{\beta}_{ij}^{XZ}$ ;  $U_{ij}^{XZ}$ ,  $G_{ij}^{XZ}$ ,  $I_{ij}^{XZ}$  are also the individual performance indicators of University, Government and Industry networks.

In the ideal, the  $\bar{\theta}_{ij}^{XZ}$  and  $\bar{\beta}_{ij}^{XZ}$  will have no bends, twists, rolls and, writhes. The flexibility of partnerships will inherently rest on the performance of the university network and its impact on innovation generation as well as diffusion.

### IV. STRUCTURE BASED ON GENERIC PRINCIPLES OF HELICOIDS

Helices are generically curved coils for which the tangent makes a constant angle with a fixed line. Organizational helices are expected to be right-handed, thus coiling clockwise just like DNA strands. Per our deductions so far, we proceed by considering the following:

- i. The differential curves of the helices partnership of  $L_k(C_1, C_2, C_3) = \varphi_{Lk}$
- ii. Writhe of curves as they coil around each other is  $Wr(C) = \partial_{Wr}$
- iii. The combined twisting nature of the partnered system of  $T_w(C_3, C_2, C_1) = \partial_{lk}$

Thus, the triple helix system being a combination of twists, writhes, and performance ( $\mu$ ) determined bonding in a directed interaction per a given period can be deduced as:

$$\varphi_{Lk}^t = \partial_{Wr} + \partial_{lk} + \mu \quad [7]$$

However, helices are generically curves with parametric equations thus for the structure of a triple helix, we obtain the parametric conditions where  $\partial_{Wr}$  provides an extrapolated nature of the density of the partnership while the  $\partial_{lk}$  helps explain the dependency

performance can be systematically revealed as tilting, rolling, twisting, shifting, sliding and rising. The flexibility of university performance  $\mu$  can be viewed as an average of the sum of the base networks performance  $\varphi^n$ , per given period ( $t$ ) both being functions of the kinematical variables that is

$$\mu = \frac{\sum_{n=1}^{N-1} \varphi^n (\theta_1^n, \theta_2^n, \theta_3^n, \beta_1^n, \beta_2^n, \beta_3^n)}{\sum_{t=1}^{\infty} \varphi^t (\theta_1^t, \theta_2^t, \theta_3^t, \beta_1^t, \beta_2^t, \beta_3^t)} \quad [5]$$

We suggest that researchers consider the function of  $\varphi^n$  as dependent on the University Network being of the  $n$ th nodes and edge configuration with a quadratic function. The generic flexibility of partnership is quadratically expressed as

nature of each partner within the helix. Conditionally then, the performance linked assumption provides that, the denser the writhes and narrower the twists the stronger the institutional partnerships that will evolve. Again, this helps in computing the probability of innovation diffusion using simple diffusion theories in small world networks. Where the rate of infection is synonymous to the rate of spread or diffusion; just as extinction or death of nodes is synonymous within ability to innovate within the system as the system evolves.

Continuing, we seek to deduce the parametric nature of triple helices in a given space. The considered model for any system to evolve into a helix is given as (Weisstein, 2017):

$$\begin{aligned} x &= r \cos t \\ y &= r \sin t \\ z &= c t \end{aligned} \quad [8]$$

So far, we have assumed that our partnership model is based on three systems starting at varying positions in a Cartesian plane and growing in a given direction (right-handed and upwards: +, +) we can assume that the partnership system forms an interweaving triple helix of curves in form  $x_{(U,G,I)}$ ,  $y_{(U,G,I)}$ ,  $z_{(U,G,I)}$ . In the above equation, the tangents ( $t$ ) are determined as  $t \in [0, 2\pi]$  where  $r$  is the radius of the helix and  $2\pi c$  is the given vertical separation in the loops of the helix. We then consider the constant ( $c$ ) of the helix of any of the systems to be a fixed probability to innovate calculated as the average of such probability over a given period (Tian and Zhang, 2008), and submitted as:

$$c = P_i^t = \int_t^{t+1} q_i x_i^T dT \quad [9]$$

Where:

- i.  $x_i^T$  denotes an agents stock of innovation knowledge at period  $t$ .
- ii.  $i$  denotes agent seeking innovation.

iii.  $q_i$  the conditional probability of agent  $i$  innovates per given performance knowledge level, in the instance that the agent has not innovated already.

Basing the constant of loops on the individual probabilities to innovates helps to determine individual

$$\tan \alpha = \tan(U + I + G) = \frac{\tan U + \tan I + \tan G - \tan U \tan I \tan G}{1 - \tan I \tan G - \tan G \tan U - \tan U \tan I} \quad [10]$$

Proceeding growths and mergers can then be extrapolated based on prior information on performance, individual system characteristics and perceived gains when one considers that the system can grow and evolve.

Structurally then, the extrapolated model of a triple helix will be the integration of  $\varphi_{Lk}^t$  with an initial systemic tangent of  $\tan \alpha$  calculated as the innovation probability of all three systems having integrated based on a combined average of  $c$ . If this assumption holds, then the Triple Helix partnership of Universities, Government and Industry attains the graphical

writhes and twists within each system. A partnership helix is expected to occur at the point where all three systems intersect. The intersection of all three systems is determined as their tangent, and expressed as:

characteristics of a DNA and mathematically can be expressed the same. By using conditional probability deductions to showcase the union of the individual helixes in relation to the points of tangent being contingent on the probability of innovation as an indication of performance and growth opportunities, the triple helix is presented as a network of partnership infused with learning. Seeing triple helix systems as learning and evolving systems allows us to review it as a neural network of interactions that predicts system growth and evolution as well as innovation generation as shown in Figure 2 below.

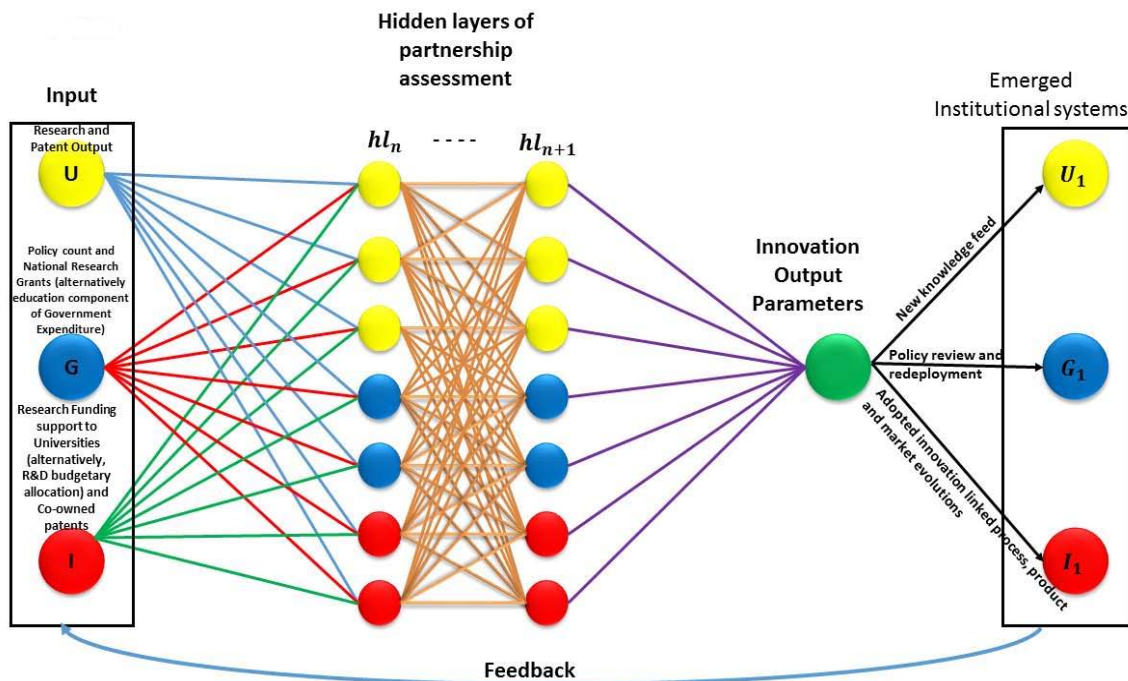


Figure 3: Neural Structure of Triple Helix Networks with feedback based sustainability properties

Our deductions thus far have focused on mimicking helix partnerships a living organism with core members serving as its DNA. In Figure 3, we further extend our living organism assumption to the level of learned sustainability, thus rendering the system susceptible to growth, evolution, and development. The model proposes the adoption of the factors of organization assessment as a means of deducing innovation output parameters. University performance could be reflective of its patent and research output, while Government is assessed using policy count and proportionate contribution to academic research grants. Industries co-joined research output with university vis-

à-vis contributions to research, allows for neurally extrapolating innovation performance. Eventually, the feedback from the innovation performance parameters will inform further activities within the system, with universities producing new knowledge that pushes the whole cycle to repeat itself. The concept of feedback allows for flexibility of partnership bonds, while providing the contingent conditions for sustained participation of all members. Thus where feedback yields weak or no results, the partnership, may over time, eventually break up and in biological terms die.

## V. PLOTTING SUGGESTIONS

There is the observed influence of Government in virtually any Higher Education System in the world. We assume that the partnership being of a clockwise nature will fall in the three dimensional Cartesian plane of  $0 \leq U, G, I \leq 1$ . If we assume that the systems will start at different points in the plane with a given distance that narrows, vanishes and separates; as partnerships are formed and or dissolved then we can plot University systems to Government system with an initial separation  $0 > .5$ . Since Industry, tends to be a coaxed member in the partnership contingency, with calculated benefits as the enticing carrot at the end of the partnership stick, it would be recommended to plot Industry as having the relative starting separation of  $0.5 \leq 1$  Cartesian points from university. Ideally plot government and industry to start from opposing points of University. We suggest that plotting algorithms retain university systems in the middle with government and industry on either side of it. Allow for partnership development to be contingent on university performance increases.

## VI. CONCLUSION

The appreciation of innovation partnerships transcends the boundaries of simple analogies. The dynamics, evolutions, and implications for institutional growth have been expressed in prior works. This paper has tried to adopt deductions from the field of biology to try and explain the complex interactions between innovations partnered networks. The knowledge we hope will provide clarity on the internal mechanism that results in the twists, turns and collusions within and among innovation partners. Future works could review this in relation to the proposed quadruple helix, by considering the fourth dimension (social stakeholders) of the partnership as the nuclei walls within which the partnership operates.

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We shall provide you intimation regarding launching of e-version of journal of your stream time to time.This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.





Journals Research  
inducing researches

The FARSBA can go through standards of OARS. You can also play vital role if you have any suggestions so that proper amendment can take place to improve the same for the benefit of entire research community.

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The FARSBA member can apply for grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A. Once you are designated as FARSBA, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria. After certification of all your credentials by OARS, they will be published on your Fellow Profile link on website <https://associationofresearch.org> which will be helpful to upgrade the dignity.



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The FARSBA is eligible to earn from sales proceeds of his/her researches/reference/review Books or literature, while publishing with Global Journals. The FARSBA can decide whether he/she would like to publish his/her research in a closed manner. In this case, whenever readers purchase that individual research paper for reading, maximum 60% of its profit earned as royalty by Global Journals, will be credited to his/her bank account. The entire entitled amount will be credited to his/her bank account exceeding limit of minimum fixed balance. There is no minimum time limit for collection. The FARSC member can decide its price and we can help in making the right decision.

The FARSBA member is eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get remuneration of 15% of author fees, taken from the author of a respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account.



## MEMBER OF ASSOCIATION OF RESEARCH SOCIETY IN BUSINESS (MARSBA)

The ' MARSBA ' title is accorded to a selected professional after the approval of the Editor-in-Chief / Editorial Board Members/Dean.

The “MARSBA” is a dignified ornament which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., MARSBA or William Walldroff, M.S., MARSBA.



MARSB accrediting is an honor. It authenticates your research activities. After becoming MARSBA, you can add 'MARSBA' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, Visiting Card and Name Plate etc.

*The following benefits can be availed by you only for next three years from the date of certification.*



MARSBA designated members are entitled to avail a 25% discount while publishing their research papers (of a single author) in Global Journals Inc., if the same is accepted by our Editorial Board and Peer Reviewers. If you are a main author or co-author of a group of authors, you will get discount of 10%.

As MARSBA, you will be given a renowned, secure and free professional email address with 30 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders, Auto-Responders, Email Delivery Route tracing, etc.





We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The MARSBA member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.



Once you are designated as MARSBA, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.



# AUXILIARY MEMBERSHIPS

## Institutional Fellow of Open Association of Research Society (USA)-OARS (USA)

Global Journals Incorporation (USA) is accredited by Open Association of Research Society, U.S.A (OARS) and in turn, affiliates research institutions as “Institutional Fellow of Open Association of Research Society” (IFOARS).



The “FARSC” is a dignified title which is accorded to a person’s name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as “Institutional Board of Open Association of Research Society”-(IBOARS).

*The Institute will be entitled to following benefits:*



The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

The author fees of such paper may be waived off up to 40%.

The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.



The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

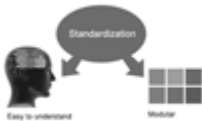
The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of “Open Association of Research Society, U.S.A (OARS)” so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.



The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.



We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.



After nomination of your institution as “Institutional Fellow” and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf. The board can also take up the additional allied activities for betterment after our consultation.

**The following entitlements are applicable to individual Fellows:**

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.



Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals : Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.



We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth \$ 2376 USD.

**Other:**

**The individual Fellow and Associate designations accredited by Open Association of Research Society (US) credentials signify guarantees following achievements:**

- The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.



- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10% discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in-depth understanding of the application of suitable techniques to a particular area of research practice.

### Note :

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- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of “Difference of Opinion [if any]” among the Board members, our decision will be final and binding to everyone.

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# PREFERRED AUTHOR GUIDELINES

**We accept the manuscript submissions in any standard (generic) format.**

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from <https://globaljournals.org/Template.zip>

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at [submit@globaljournals.org](mailto:submit@globaljournals.org) or get in touch with [chiefeditor@globaljournals.org](mailto:chiefeditor@globaljournals.org) if they wish to send the abstract before submission.

## BEFORE AND DURING SUBMISSION

Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

1. Authors must go through the complete author guideline and understand and *agree to Global Journals' ethics and code of conduct*, along with author responsibilities.
2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s) names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
5. Authors should submit paper in a ZIP archive if any supplementary files are required along with the paper.
6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

## Declaration of Conflicts of Interest

It is required for authors to declare all financial, institutional, and personal relationships with other individuals and organizations that could influence (bias) their research.

## POLICY ON PLAGIARISM

Plagiarism is not acceptable in Global Journals submissions at all.

Plagiarized content will not be considered for publication. We reserve the right to inform authors' institutions about plagiarism detected either before or after publication. If plagiarism is identified, we will follow COPE guidelines:

Authors are solely responsible for all the plagiarism that is found. The author must not fabricate, falsify or plagiarize existing research data. The following, if copied, will be considered plagiarism:

- Words (language)
- Ideas
- Findings
- Writings
- Diagrams
- Graphs
- Illustrations
- Lectures



- Printed material
- Graphic representations
- Computer programs
- Electronic material
- Any other original work

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1. Substantial contributions to the conception and acquisition of data, analysis, and interpretation of findings.
2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

### Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

### Copyright

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### Appealing Decisions

Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

### Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

### Declaration of funding sources

Global Journals is in partnership with various universities, laboratories, and other institutions worldwide in the research domain. Authors are requested to disclose their source of funding during every stage of their research, such as making analysis, performing laboratory operations, computing data, and using institutional resources, from writing an article to its submission. This will also help authors to get reimbursements by requesting an open access publication letter from Global Journals and submitting to the respective funding source.

## PREPARING YOUR MANUSCRIPT

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.



### ***Manuscript Style Instruction (Optional)***

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

### ***Structure and Format of Manuscript***

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

- a) A title which should be relevant to the theme of the paper.
- b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
- c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
- d) An introduction, giving fundamental background objectives.
- e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
- f) Results which should be presented concisely by well-designed tables and figures.
- g) Suitable statistical data should also be given.
- h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

- i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
- j) There should be brief acknowledgments.
- k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.



## FORMAT STRUCTURE

***It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.***

All manuscripts submitted to Global Journals should include:

### **Title**

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

### **Author details**

The full postal address of any related author(s) must be specified.

### **Abstract**

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

### **Keywords**

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

### **Numerical Methods**

Numerical methods used should be transparent and, where appropriate, supported by references.

### **Abbreviations**

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

### **Formulas and equations**

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

### **Tables, Figures, and Figure Legends**

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.



## Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

## PREPARATION OF ELECTRONIC FIGURES FOR PUBLICATION

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

## TIPS FOR WRITING A GOOD QUALITY MANAGEMENT RESEARCH PAPER

Techniques for writing a good quality management and business research paper:

**1. Choosing the topic:** In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

**2. Think like evaluators:** If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

**3. Ask your guides:** If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

**4. Use of computer is recommended:** As you are doing research in the field of management and business then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

**5. Use the internet for help:** An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



**6. Bookmarks are useful:** When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

**7. Revise what you wrote:** When you write anything, always read it, summarize it, and then finalize it.

**8. Make every effort:** Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

**9. Produce good diagrams of your own:** Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

**10. Use proper verb tense:** Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

**11. Pick a good study spot:** Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

**12. Know what you know:** Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

**13. Use good grammar:** Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice. Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

**14. Arrangement of information:** Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

**15. Never start at the last minute:** Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

**16. Multitasking in research is not good:** Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

**17. Never copy others' work:** Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

**18. Go to seminars:** Attend seminars if the topic is relevant to your research area. Utilize all your resources.

**19. Refresh your mind after intervals:** Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

**20. Think technically:** Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.



**21. Adding unnecessary information:** Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

**22. Report concluded results:** Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

**23. Upon conclusion:** Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

## INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

### **Key points to remember:**

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

### **Final points:**

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

*The introduction:* This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

### **The discussion section:**

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

### **General style:**

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

**To make a paper clear:** Adhere to recommended page limits.

### *Mistakes to avoid:*

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.



- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

#### **Title page:**

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

**Abstract:** This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

*Reason for writing the article—theory, overall issue, purpose.*

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

#### **Approach:**

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

#### **Introduction:**

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

*The following approach can create a valuable beginning:*

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.





**Approach:**

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

**Procedures (methods and materials):**

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

**Materials:**

*Materials may be reported in part of a section or else they may be recognized along with your measures.*

**Methods:**

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

**Approach:**

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

**What to keep away from:**

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

**Results:**

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.



**Content:**

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

**What to stay away from:**

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

**Approach:**

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

**Figures and tables:**

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

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Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.



**Approach:**

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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<i>Methods and Procedures</i>	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
<i>Result</i>	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
<i>Discussion</i>	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



# INDEX

---

---

## A

Ambiguous · 2, 11  
Analogy · 53, 55  
Anonymity · 41

---

## C

Collusions · 59  
Concretely · 39, 46, 47  
Consensus · 1, 16, 18  
Contingencies · 49

---

## D

Deoxyribonucleic · 49  
Dezinflacionar · 18

---

## E

Emetuar · 26  
Emigrants · 2  
Endogeneity · 61  
Erdoganin · 24, 28  
Extrapolate · 1, 49

---

## H

Harnessing · 49

---

## I

Incubator · 60, LXIII  
Indulge · 39, 46  
Inevitably · 40, 46  
Intercensal · 13

---

## M

Mimicking · 57

---

## O

Ominous · 16

---

## P

Paguash · 26  
Postulate · 5  
Provoking · 49  
Proyecciones · 13

---

## R

Rendering · 57

---

## S

Synergies · 50

---

## T

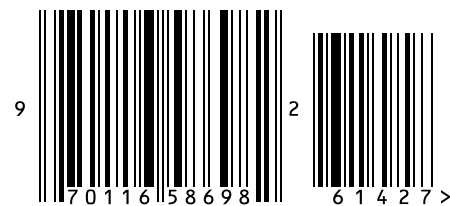
Transcends · 59  
Trefoil · 49  
Tribulations · 51



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