THE "SIR" IMPACT OF DEMONETIZATION – NUMERICAL MEASURE OF SHORT-TERM DISRUPTION CAUSED BY DEMONETIZATION

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ABSTRACT

The advent of demonetization in India is providing enormous opportunities to grow in terms of digitization, clean India, sustainable economic growth. Demonetization has both negative and positive aspects. Looking at the positive side, demonetization will contribute to sustainable economic growth in the medium and long term. On the negative side, demonetization has caused short-term disruption to the economy, which has not been quantified. Therefore the current research is conducted to assess the **"*SIR*"** impact of demonetization on Indian Economy. ―*SIR*‖ stands for Sustainability, Innovation and Rapidity. Accordingly, the research is divided into three parts as: ―The ―SIR‖ impact of demonetization - statistical evidence testifying the contribution of demonetization to long-term sustainable economic growth in India‖, which has been presented at the ―International Conference on Recent Trends in Technology and its impact on the economy of India‖ on 24th October in Punjab. The Second part of the work ―The ―SIR‖ impact of demonetization-Measure of Innovation‖, has been published in the International Journal of Advance Research, Ideas and Innovations in Technology, Nov-Dec 2017, Issue-6, Vol:3. The third part of the work- ―The ―SIR‖ impact of demonetization - Measure of Rapidity of Economic Growth‖ has been accepted for publication in the International Journal of Engineering Research and Technology and Management'. The present paper which is a sub-division of the first part of the current research numerically estimates the degree of disruption caused in the short-run, to the economy by demonetization, using Companion by Minitab software. The results of the study clearly indicated that to the extent of 23.59% demonetization has caused short term disruptions to the economy in India.

Keywords:
Statistical Evidence, GDP, Demonetization, Sustainable, Macroeconomic

INTRODUCTION

The concept of demonetization and its contribution to economic growth has become one of the most attractive topics for discussion in all political, academic and other decision-making forums of the current times. The critics of demonetization are absolutely right about the adverse short-term impact of the policy. It has caused major inconvenience to a vast majority, particularly to those who have the least financial resources. Of course, it will shave off some amount of GDP growth for anywhere between a quarter and three to four quarters because of the economic disruption it has caused in different sectors of the economy. According to some critics, this alone is sufficient to damn demonetization. After all, the short-run is all that matters because in the long run we are all dead, as the noted economist Keynes put it. While that proposition may be true for individuals, it certainly is not true for nations. There is also a medium-term which is longer than an electoral cycle or two. Medium-term is certainly longer than a quarter or two but shorter than a generation which runs over 30 or 40 years. India has a very long future, even if individuals do not. The critics of demonetization are absolutely right about the adverse short-term impact of the policy. The real impact of demonetization must be weighed in the medium or long-term run and not in the short-run. Though, it is acknowledged theoretically that the negative impact of demonetization on the economy is only nominal and short-term, at least by some optimists, it is noteworthy that no statistical evidence is given to vouchsafe that the long-term impact of demonetization on the growth of the economy is increasing and sustainable. It is in this context the current research holds its significance.

STATEMENT OF THE PROBLEM

The nation is moving towards digital India, and now it needs to ensure economically also that it adopts a digital model i.e. the use of ─Digital Cash‖. Demonetization is a step which is taken to ensure that India adopts digital model that lead to sustainable growth in the economy. Studying the demonetization will help to know the potential of the nation in laying strong foundation for future sustainable growth besides, helping us to know quantified positive as well as negative aspects of the decision. It is in this context the current research holds its significance. The present paper makes numerical estimation to the short-term disruption caused by demonetization to the Indian economy.

OBJECTIVE OF THE STUDY

The current research is undertaken to numerically prove to what an extent demonetization has caused short term disruptions in the economy. We have considered four important macroeconomic parameters such as Gross Domestic Product (GDP), Gross Value Added (GVA), Per-Capita GDPand Debt-to-GDP ratio, for the purpose.

METHODOLOGY

Gross Domestic Product (GDP) is one of the important macro-economic indicators that is often used for measuring the growth of an economy. The expenditure method is the most widely used approach for estimating GDP, which is a measure of the economy's output produced within a country's border irrespective of who owns the means to production. The GDP under this method is calculated by summing up all of the expenditures made on final goods and services. There are four main aggregate expenditures that go into calculating GDP: consumption by households, investment by businesses, government spending on goods and services, and net exports, which are equal to exports minus imports of goods and services. Considering the four components, GDP is forecasted based on 2011 prices incorporating the impact of demonetization. The current research paper deals with analysis of the second part of the first objective done using Companion by Minitab software. This software is preferred as it is both an analytical as well as interpretative one.

General description of Companion by Minitab Software

It is common to think that process improvement initiatives are meant to cater only to manufacturing processes, simply because manufacturing is where Lean and Six Sigma began. However, many other industries, in particular, banking and financial services, also rely on data analysis and Lean Six Sigma tools to improve processes.
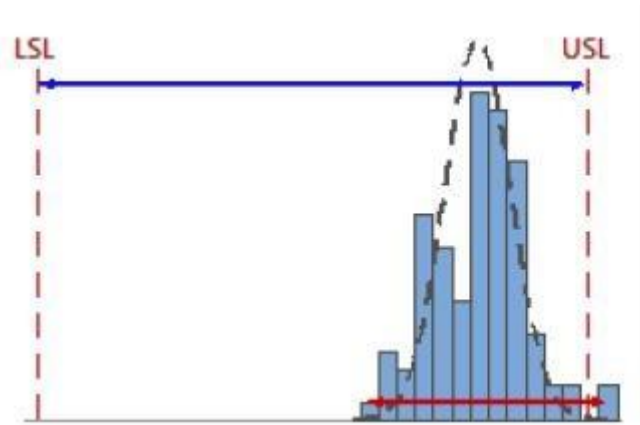
One major U.S. bank's longstanding success stems from a focus on continuous process improvement in all areas of their business. From finding new ways to making banking services more convenient, to optimizing internal processes for efficiency, this financial institution's top focus is quality, and they rely on Minitab Statistical Software for the analysis of their quality data.

Companion by Minitab is a software platform which is used in all fields of knowledge including Finance, Banking, and the other management subjects, for understanding the process improvements needed, which is done literally effortless, by the software. Among the first-in-class tools available with the software is a Monte Carlo simulation tool that makes this method extremely accessible. The Monte Carlo method uses repeated random sampling to generate simulated data to use with a mathematical model. This model often comes from a statistical analysis such as a designed experiment or linear regression analysis. The simulation done using a mathematical model of the system, allows to explore the behavior of the system faster, cheaper, and safer than experimented on the real system.
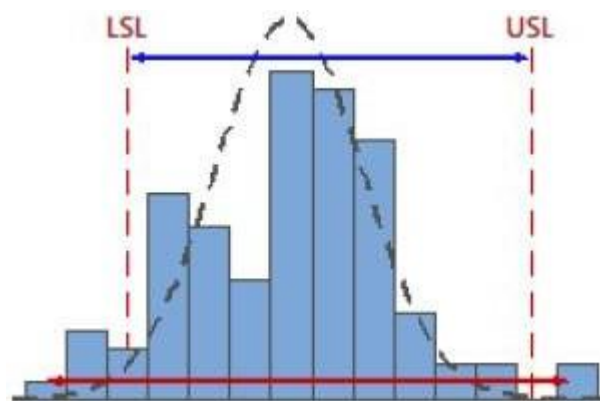
For our research we have used Monte Carlo Simulation (MCS) with multiple regression analysis. We have computed the multiple regression equation considering the same components used for calculating the GDP and GVA growth, using SPSS software. With this linear model we entered the process input values into the equation and predicted the process output. However, in the real world, the input values will not be a single value due to the variable nature of the input values. It is this input variability that causes variability and defects in the output. We collected data to determine how input variability relates to output variability under a variety of conditions. After understanding the typical distribution of the input values using the multiple regression equation that models the process, we generated a vast amount of simulated input values and entered them into the process equation to produce a simulated distribution of the process outputs.

The simulation results highlighted the problems in the process by locating the parameter outside the specification limits. These limits are identified by the software as the two capability indices known as Capability Process Index (Cpk) and Cp.
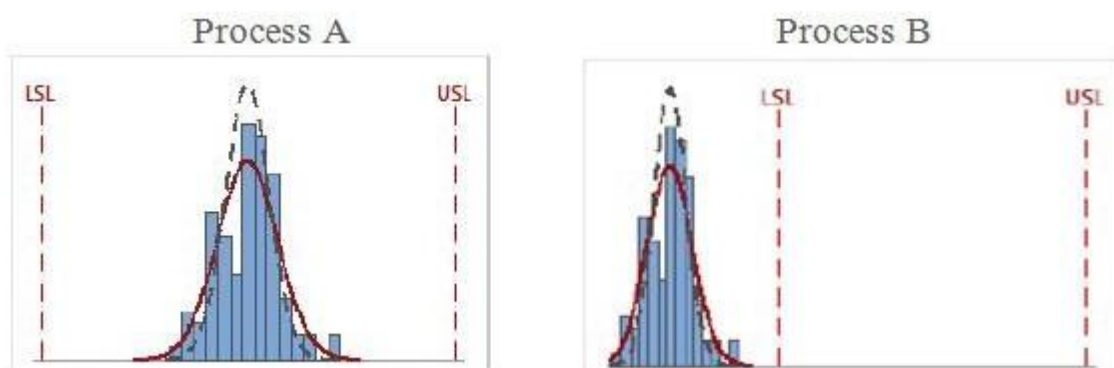
Cp: Cp is the ratio of the specification spread to the process spread. The process spread is often defined as the 6-sigma spread of the process (that is, 6 times the within-subgroup standard deviation). Higher Cp values indicate a more capable process. When the specification spread is considerably greater than the process spread, Cp is high.

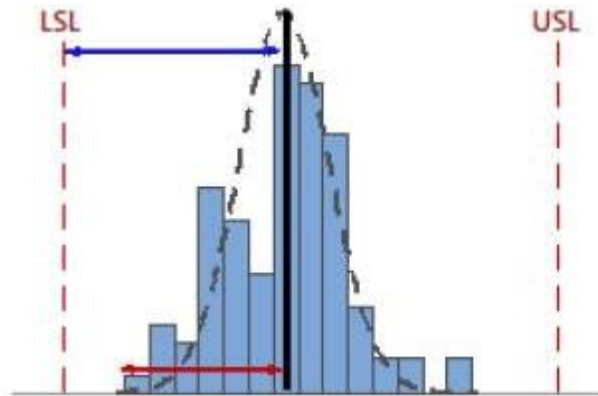When the specification spread is less than the process spread, Cp is low.

By using the 6-sigma process spread, Cp incorporates information about both tails of the process data. But there's something Cp doesn't do—it doesn't tell you anything about the location of the process data.
For example, the following two processes have the about same Cp value (≈ 3):
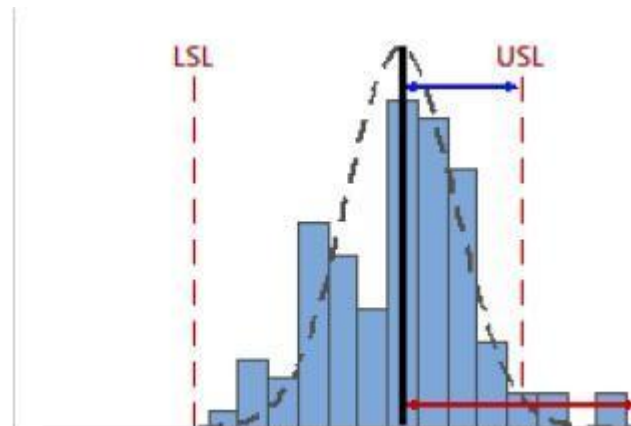
Obviously, Process B has a serious issue with its location in relation to the spec limits that Cp just can't "see."
Cpk**:** Like Cp, Cpk is also a ratio of the specification spread to the process spread. But unlike Cp, Cpk compares the distance from the process mean to the closest specification limit, to about half the spread of the process (often, the 3-sigma spread).

When the distance from the mean to the nearest specification limit is considerably greater than the one-sided process spread, Cpk is high.
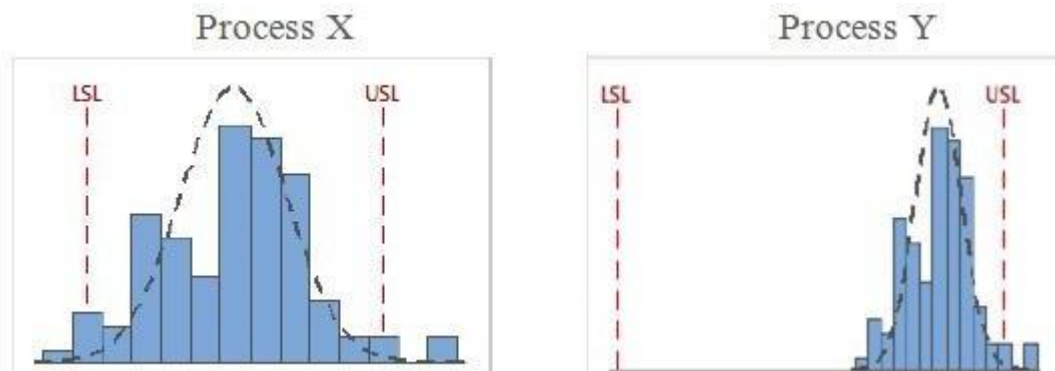

When the distance from the mean to the nearest specification limit is less than the one-sided process spread, Cpk is low.

Notice how the location of the process *does* affect the Cpk value—by virtue of its being calculated using the process mean.
Yet there's something important that Cpk doesn't do. Because it's a "worst-case" estimate that uses only the nearest specification limit, Cpk can't "see" how the process is performing on the other side.
For example, the following two processes have the about same Cpk value (≈ 0.9):

Notice that Process X has nonconforming parts in relation to both spec limits, while Process Y has nonconforming parts in relation to only the upper spec limit (USL). But Cpk can't "see"any difference between these two processes.

To get the two-sided picture of each process, in relation to both spec limits, you can look at Cp, which would be higher for Process Y than for Process X. If we have both a lower and upper specification limit for your process, Cp and Cpk each might —know‖ something about our process that the other one doesnot. That —something‖ could be critical to fully understand how your process is performing.

To improve the process the Minitab will give the solution in the form of parameter optimization to make changes in the inputs when necessary. If even after performing the parameter optimization analysis, the capability process (Cpk) is less than the accepted limits, we will go ahead with performing sensitivity analysis by changing the standard deviation of the inputs.

We have also changed these input distributions to conduct sensitivity analysis and answer "what if" types of questions. Today the simulated data is routinely used in situations where resources are limited or gathering real data would be too expensive or impractical. Along the way, Companion interprets simulation results and provides step-by-step guidance to help find the best possible solution for reducing defects.

DATA ANALYSIS AS PER COMPANION BY MINITAB SOFTWARE

The Companion by Minitab software works with mathematical models. Considering the absolute values of the seven components of GDP for five years from 2013 to 2017, Multiple Regression Equation was computed considering GDP as the dependent variable and the other components as the independent variables, using SPSS. This Multiple Regression Equation constituted the basis for conducting the simulation test for GDP and all the other parameters, using the software. The calculated regression equation eliminated three parameters i.e., Private consumption, Imports and Change in Stocks from the equation output. The balance of four components i.e., Gross Fixed Capital Formation (GFCF), Valuables, exports and discrepancies were considered and the co-efficient were generated in the regression equation. The mean and standard deviation of all the four components were calculated using their absolute values and fed into the software. Besides, the upper and lower confidence limits were calculated at 5 % level of significance, assuming that the growth rates of GDP follow normal distribution in the long run. These limits are known as Lower and upper specification limits (LSL) and (USL). With this information the software produced the first step result which is shown in the figure 1.1, below. These results indicate that 23.59 % of GDP is outside the limits reflecting corrective action required in the components contributing to its growth.As per the quarterly assessment of GDP made by the Ministry of Statistics and Programme Implementation (MoSPI), Govt. of India, the GDP for the fourth quarter of 2016-17 came to 6.1%. same prediction can be arrived at, from the figure-1.1. As per the figure1.1, 23.59 % of the forecasted annual GDP of 8.06 % comes to

6.1%. (8.06% - 23.59% of 8.06% = 6.16).

The figure 1.1 indicates that demonetization has created chaos in the economy to the extent of 23.59%, which is of course temporary.
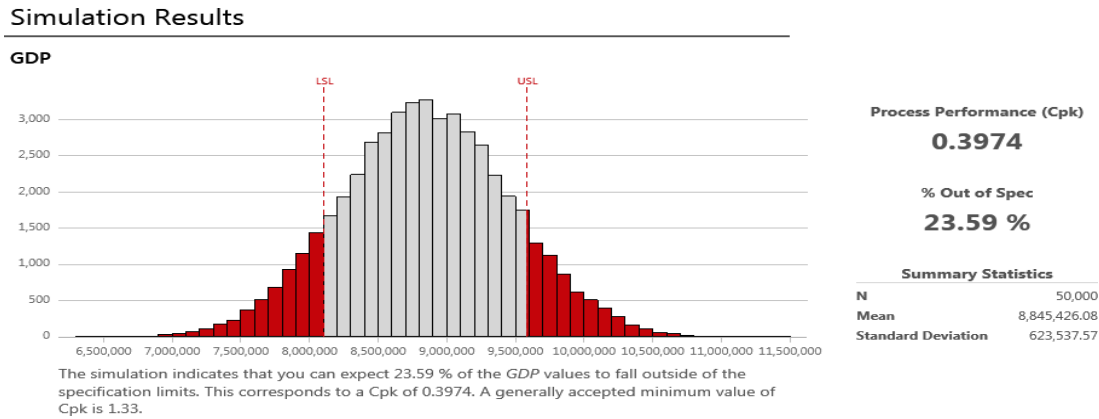

Figure 1.1: simulation results using Companion by Minitab

The disparity in the area within and outside the upper and lower specification limits (USL, LSL) is measured in the software by Capability process index (Cpk) as given in figure 1.2 below.If the calculated Cpk is less than the standard i.e., 1.33, the tests are to be subjected to Parametric Optimization test. To perform the Parametric Optimization test, the mean and standard deviationof all the independent components are fed into the software which will run the Parameter Optimization test (PO).
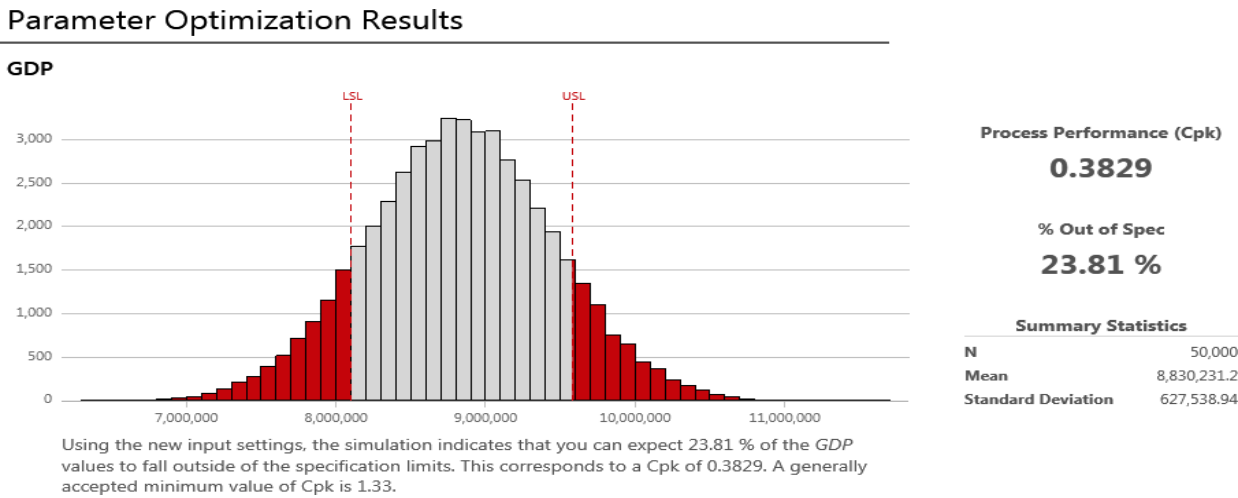

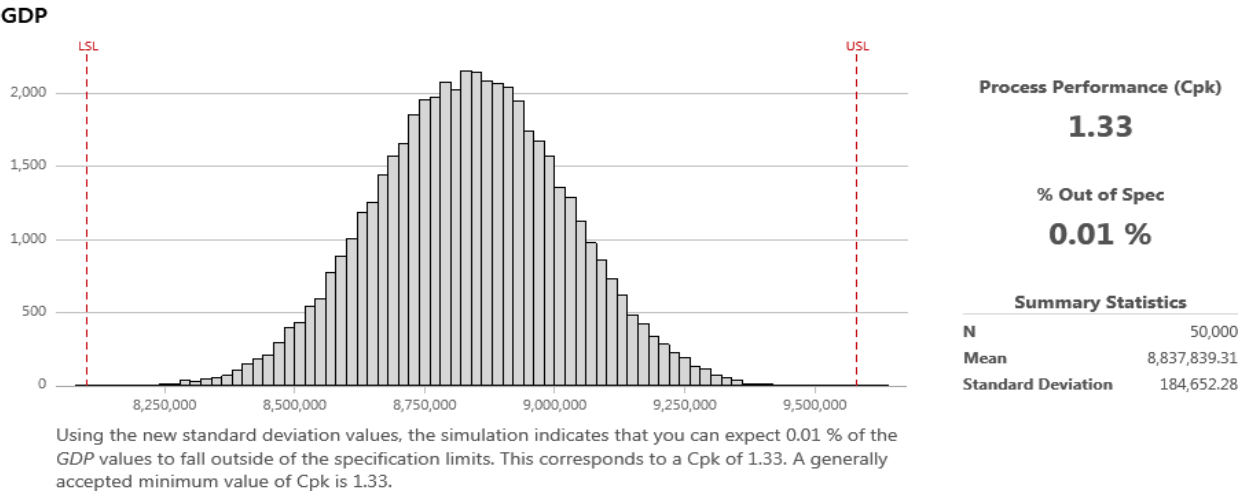*Figure 1.2: Parameter Optimization Results using Companion by Minitab*

Figure 1.3: Sensitivity Analysis Results using Companion by Minitab

The first PO process has reduced the Cpk value from 0.3984 to 0.3829 giving an indication to go for sensitivity analysis (SA) which is called as the *Depth Analysis of the Components,* to understand which of the four components is more critical in impacting the GDP.As per the Figure 1.3 GFCF is identified as the most influencing factor. On an experimental basis the standard deviation (SD) of the GFCF is reduced by 50 % which in turn has optimized the process capability and has increased the Cpk value to 0.5112 retaining all the other values at the same level. This process of alternating PO test and SA was repeated six times till the calculated Cpk touched 1.33 standard as shown in the figure 1.3. The sensitivity analysis helps in analyzing the area of improvements. It also throws light on the amount of spending on each of the components. Underspending and overspending of few of the components made the cpk very low and to reach the standard ratio. As per the output in the sensitivity analysis, special attention should be given to Gross Fixed Capital Formation (GFCF). It not only quantifies the disruptions caused by the demonetization but also gives suggestions where improvements are needed to eliminate the area outside the limits.

Implication of the entire process on GDP

The entire process on GDP done by using Companion by Minitab implies that demonetization has created disruptions up to 23.59% in the economy. With the help of Companion by Minitab output, we can analyze the areas of improvements and attention to bring back the GDP rate to its sustainable level which is forecasted as 8% per annum and which is presented in the first part of our research work. The software output also that some of the components of GDP are either overestimated or underestimated that are compensated by the other components which are within the range. Even though the GDP is shown increasing, the growth is not following any symmetric pattern. Companion by Minitab assists in maintaining the forecasted GDP rate at 8% by highlighting the steps that government can take. The government should focus on building the quality in each of the components of GDP not just GDP rate.

SUGGESTION

The following suggestions, if implemented will lay a strong foundation for the sustainable, healthy and quality economic growth in India, in the medium and long-term period during post-demonetization scenario:

- **Developing quality in the GDP growth rate**
  Government can study the process of sensitivity analysis done using Companion by Minitab which provides insights into what governement can do to maintain the forecasted GDP growth rate in future. Accordingly, the governemnt can spend its money in building the economy which prevents overspending and underspending of money in any of the components of the GDP.

- **Not freeze on existing policies**

Governement and the policy makers should not freeze on the existing policies. Continuous efforts must be made to innovate more of such drives which will support the existing policies in taking the economy ahead.

- **Non-complacency behaviour**
  Decision making forums and the citizens should not become complacent at the success of the drive. It must move forward with innovative ideas to make India a digital country which will enable uprooting of the problems like black money, counterfeit notes, etc.
- **Look forward and move on**
  Insead of criticing any of the policy makers, it will be good if we follow the policy and go along with the change and make India a stand out country in the world in terms of Innovation, Digital country and a clean country.

CONCLUSION

As per the current research on the impact of demonetization on the economy in India, the GDP will not only grow upwards but will also remain sustainable at 8% in the long run. But it is also proved in the study that this long term growth is achieved at the cost of short term disruptions caused to the economy by the demonetization. These disruptions were measure as 23.59 %. The study thus assures that the negative impact of demonetization on the economy is limited in size and duration, and hence we can conclude with great confidence that the demonetization exercise is a gallant decision taken, for achieving the great vision of new India.

REFERENCES

[1] Nithin Kumar A and Sharmila (2016). Demonetization and Its Impact on Indian Economy. International Journal of Humanities, Arts, Medicine and Science. ISSN (P):2348-0521. ISSN (E): 2454-4728. Vol. 4. Issue12, Dec 2016. Pp 23-26.

[2] Dr. Pratap Singh and Virender Singh (2016). Impact of Demonetization on Indian Economy. International Journal of Science Technology and Management. ISSN (O) 2394-1537. ISSN (P) 2394-1529. Vol. No.5, Issue No. 12, December 2016.

[3] S Vijay Kumar and T Shiva Kumar (2016). Demonetization and Complete Financial Inclusion. International Journal of Management Research & Review. ISSN: 2249-7196. Volume 6. Issue 12.

[4] Nikita Gajjar (2016). Black Money in India: Present Status and Future Challenges and Demonetization. International Journal of Advance Research in Computer Science and Management Studies. ISSN:2321-7782. Volume 4, Issue 12, December 2016.

[5] Office of the Development Commissioner (2016). Demonetization and Promoting use of digital payment system.

[6] Economic Consequences of demonetization of Rs. 500 and Rs. 1000 notes. (2016). Care Ratings: Professional Risk Opinion.

[7] Lokesh Uke (2017). Demonetization and its effects in India. SSRG International Journal of Economics and Management Studies. Volume 4. Issue 2. February 2017.

[8] Dr. SwetaSinghal (2017). Demonetization and E-Banking in India. International Journal of New

[9] Technology and Research (IJNTR). ISSN: 2454-4116. Volume3. Issue1. January 2017. Pp 20-25.

[10] Manpreet Kaur (2017). Demonetization: Impact on Cashless payment system. International Conference on Recent Trends in Engineering, Science and Management. ISBN:978-93-86171-21-4. 8th January, 2017.

[11] Tax Research Team(14-Nov-2016 NIPFP Working paper series) No.182

[12] Team, BS Web (7 December 2016). "Several BJP men caught with crores; Karnataka biggest hotspot for illegal cash transactions" – via Business Standard.