

Effect of Motor Vehicle Importation on Indigenous Automobile Manufacturer in Nigeria Using Statistical Process Control Method

Raimi Oluwole Abiodun¹ & Nenuwa Isaac Omosule

Abstract— The study examined the annual production unit of motor vehicles of selected foreign countries manufacturers on how it affects the indigenous automobile manufacturer in Nigeria. The study employed data from Organization Internationale des Constructeurs d'Automobiles (OICA) using time series period of seven (7) years between 2008 and 2014 which is analyzed using statistical process control method with the aid of a statistical software known as MINITAB 16. The findings in the study which is investigated through the mean chart (\bar{X}) and standard deviation chart (\bar{S}) shows that production unit in the selected countries is under control through the quality of their motor vehicles been produce which is affecting indigenous manufacturers in the country as a result of their obsolete technology in place in most of the manufacturing industry. It is therefore recommended that the government should re-shape the indigenous automobile industry for better so that they can compete with their foreign counterparts in the automobile manufacturing industry.

Index Terms— Motor vehicle, Manufacturer, Mean chart, Standard deviation chart

I. INTRODUCTION

The Nigeria automobile indigenous industry was born with greater potentials and resounding expectations so as for her to compete globally and hold her head high with countries that they shares common fate with like Saudi Arabia, Iran, Brazil and South Africa whom are having crude oil as their main source of budget revenue. But it is quite unfortunate that the industry is not performing well as expected by falling into a quagmire of decay.

The automobile indigenous industry which should serves as a stimulus to the development of other basic industries in the country such as machine tool, iron and steel, petro-chemical, rubber, etc., is very low in terms of it performance at various areas.

The automobile industry in Nigeria back to the early 1960's was pioneered by some private companies through the establishment of auto assembly plants that used completely knocked down (CKD) or semi-knocked (SKD) parts. However, this was on a very limited scale in terms of output of production. During this period, the Nigerian automobile industry had the capacity to produce 108,000 cars, 56,000

commercial vehicles and 6000 tractors annually. However, from the 1980's, the industry shrunk from 90 percent capacity utilization to 10 percent capacity utilization. Despite federal government regulation to increase tariff and custom duties on imported motor vehicle into the country so as to discourage importers who purchase motor vehicle from abroad, it is still clearly observed that demand on importation of motor vehicle is very high. Consequentially, this in turn reduce standardization of technology and a less efficient utilization of costly equipment in the indigenous industry. Other issues that serves as a limitation to the industry is lack of patronage both from Nigerians and the government, poor and non conducive operating environment, poor capital base, poor performance of local content suppliers, as well as obsolete technology.

Farzana *et al.*, (2009) investigated on the level of improvement of manufacturing performance in manufacturing companies by adopting hourly data system and statistical process control practices. The purpose of their research work is to find out the frequencies and time duration of machine breakdowns as well as the major causes of breakdowns affecting productivity. Their findings revealed that any breakdown can cause a huge cost and the best approach to address any breakdown is the preventive measure.

Parkesh *et al.*, (2013) analyzed the importance of statistical process control as it is largely used in industries for monitoring the process parameters. The analysis of their study revealed that SPC is a standard method for visualizing and controlling processes on the basis of measurements of randomly selected samples. It is also revealed in their study that the decisions about what needs to be improved, the possible methods to improve it, and the steps to take after getting results from the charts are all made by human and based on wisdom and experience.

Mostafaeipour *et al.*, (2012) introduced statistical process control techniques in Yazd ceramic tile manufacturing plant in Iran for reducing unwanted ceramic tile defects and wastages. Their research study was able to present a complete process to help manufacturer identify defects for process improvement with immediate benefits for the current development cycle in the plant.

Prajapati (2012) attempted on some implementation of SPC techniques in an automobile industry that is offering its customers the widest and latest range of sealing solutions for various application in the industry. The findings shows that after implementing the SPC tools to remove the root causes, the percentage rejection is reduced from 9.1% to 5% and process capability of 0.953 is achieved.

Noskievicova and Jarosova (2013) investigated on complex application of statistical process control in conditions of profile bar production. The result of their findings revealed

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Raimi Oluwole Abiodun, Postgraduate student at Department of Mechanical Engineering, Federal University of Technology, P.M.B 704, Akure, Ondo State, Nigeria. +234(0)8139744004.

Nenuwa Isaac Omosule, Assistant Lecturer at Department of Mechanical Engineering, Rufus Giwa Polytechnic, P.M.B 1019, Owo, Ondo State, Nigeria. +234(0)8032278964.

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that the proposed approach can be used for repetitive metallurgical processes and that the statistical analysis can bring the real economic benefits.

II. METHODOLOGY

The data for this research study was extracted from the official website of International Organization of Motor Vehicle Manufacturers. They are also known as Organization Internationale des Constructeurs d'Automobiles (OICA). Importations of motor vehicle were strictly considered from country where Nigeria

mostly imports from. And these countries are Japan, France, Germany, China, South Korea and Belgium respectively. The annual production unit of motor vehicle

from these countries were collectively considered using statistical process control (SPC) method. The purpose of using the SPC method was to investigate the quality of production of these countries in terms of their capacity as it affects the measure of shrinkage of our indigenous automobile industry. The mean chart (\bar{X}) and standard deviation chart (S) will basically be used to analyse this effect.

III. DATA PRESENTATION

The research data for this study covers a time series period of seven (7) years. This comprises of annual production unit of motor vehicle from countries where Nigeria mostly imports from.

Table 1: Annual production unit of motor vehicle from countries where Nigeria mostly imports from.

Year	period	Japan Production (Jp)	France Production(Fp)	Germany Production(Gp)	China Production(Cp)	South Korea Production(Sp)	Belgium Production(Bp)
2008	1	11575644	2568978	6045730	9299180	3826682	724498
2009	2	7934057	2047693	5209857	13790994	3512926	537354
2010	3	9628920	2229421	5905985	18264761	4271741	555302
2011	4	8398630	2242928	6146948	18418876	4657094	595084
2012	5	9943077	1967765	5649260	19271808	4561766	538848
2013	6	9630181	1740000	5718222	22116825	4521429	503504
2014	7	9774558	1817000	5907548	23722890	4524932	516832

Data Source: OICA Manufacturer, 2015

IV. DATA ANALYSIS

The data for this study were analysed using statistical process control method which will basically comprises of mean chart (\bar{X}) and standard deviation chart (S) for the purpose of this research with the aid of a statistical software known as Minitab 16. Figure 1 shows the mean chart (\bar{X}) and standard deviation chart (S) of Table 1.

V. DISCUSSION OF FINDINGS

All of the points on the control chart are within the control limits. Thus the process mean and process standard deviation appear to be stable. Thus, is in control. The process mean (\bar{X}) is 6686089 and average standard deviation (S) is 6307571. There is a partial random dispersion of the collective production unit of the motor vehicle of the selected countries above and below the mean. This implies that motor vehicle production in these prominent countries where Nigeria

imports from shows a significant impact in terms of their quality and capacity. Nigerians relies so much on importation of motor vehicle from this selected countries rather than showing interest to their own indigenous made own car in the country. It can also be observed that there is no significant record of annual motor vehicle production unit in Nigeria between 2009 and 2014 from the website of International Organization of Motor Vehicle Manufacturers. This has a negative impact on the indigenous automobile industry and a strong positive effect on countries where Nigeria mostly import from as shown in the chart in Figure 1. This is as a result of a unique confidence most Nigeria derived from foreign motor vehicles imported into the country. This has affected the automobile plant of our indigenous manufacturing company to shut down and be converted to production halls for mere rectification bay and dealership showrooms of imported fully built unit of motor vehicles from this selected country. This is in agreement with the research work done by Cornelius (2011) that automobile plants in Nigeria are merely coupling vehicle parts produced overseas with little input to the component production of major units.

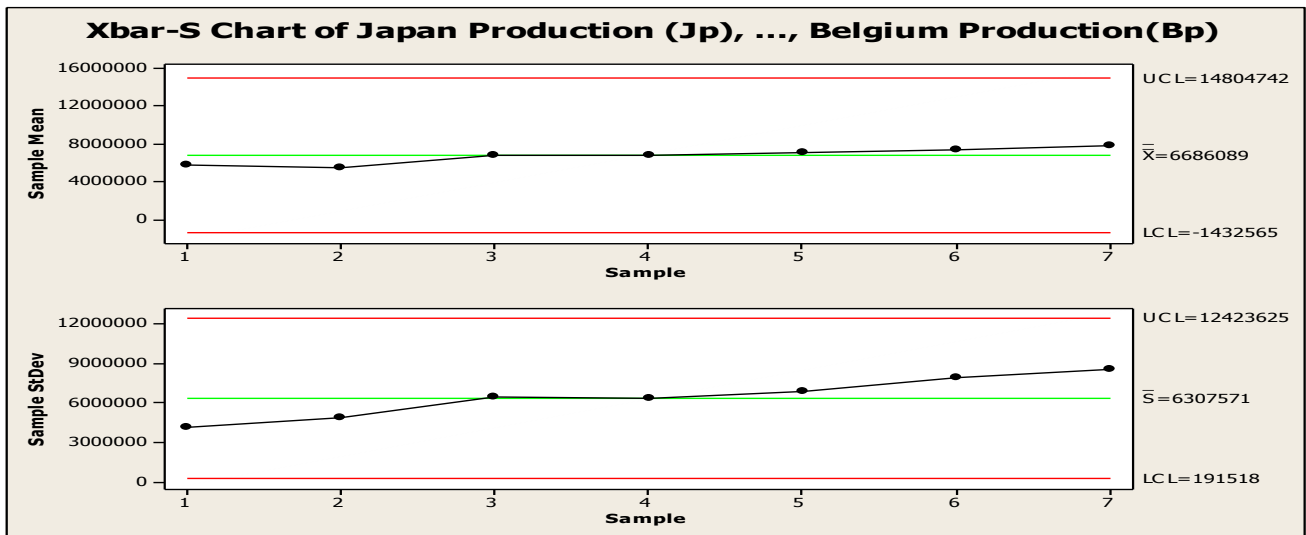


Figure 1: Xbar-S Chart of Japan Production (Jp),..., Belgium Production (Bp)

VI. CONCLUSION

The quality of the types of motor vehicle produced in Nigeria is of sub-standard and can hardly compete with foreign automobile manufacturers in recent times. There has been no significant patronage to indigenous made motor vehicles by Nigerians due to the lack of confidence they are having in the technology structure of the automobile industry. Most Nigerians prefer purchasing motor vehicle from foreign manufacturers irrespective of the cost attached to it during clearing because of the trust and confidence they are having on foreign technology of the automobile industry abroad. However, this has crippled the production level of the indigenous automobile Nigeria industry with no significant level of production between 2009 and 2014. It is now important and calls for urgent necessity from the government and investors that the indigenous automobile industry should be well sharpen to standard so as to compete with their foreign counterparts in the automobile manufacturing industry.



Mr. Raimi Oluwale Abiodun graduated from University of Ado-Ekiti, now Ekiti State University (EKSU) Nigeria in 2009 with a Bachelor of Engineering (B.Eng) in Mechanical Engineering. He is currently pursuing a Masters in Mechanical Engineering, Production Option from the Federal University of Technology, Akure, Nigeria.

He is currently working as the Laboratory Assistant in the Department of Civil Engineering, Rufus Giwa Polytechnic, formerly Ondo State Polytechnic, Owo, Nigeria. He has three international research papers to his credit and many unpublished research work. He is a member of International Association of Engineers (IAENG) with membership number 149643. His major research interests are Design optimization and implementation, Modelling on various machining operations and computer programming. He also has high level of proficiency in using the following statistical software which is as follows: SPSS, E-VIEW, MINITAB, and MATLAB

REFERENCES

- [1] S., Farzana, I.R., Nahid, and A., Abdullahi, (2009): Implementation of Statistical Process Control for Manufacturing Performance Improvement. Journal of Mechanical Engineering, Transaction of the Mech. Eng. Div., The Institution of Engineers, Bangladesh. Vol. ME 40, No. 1, June
- [2] Internationale des Constructeurs d'Automobiles (OICA), (2015): Annual Record for International Organization of Motor Vehicle Manufacturers. Available at: www.oica.net
- [3] A., Mostafaeipour, A., Sedaghat, A., Hazrati, and M., Vahdatzad, (2012): The use of Statistical Process Control Technique in the Ceramic Tile Manufacturing: a Case Study. International Journal of Applied Information Systems (IJ AIS). Vol 2, No. 5, February
- [4] D., Noskievicova, and E., Jarosova, (2013): Complex Application of Statistical Process Control in Conditions of Profile Bars Production. A Conference Paper presented at Faculty of Metallurgy and Materials Engineering, VSB-TU Ostrava, between 15th -17th, Brno, Czech Republic, EU
- [5] V., Parkesh, D., Kumar, and R., Rajoria, (2013): Statistical Process Control. International Journal of Research in Engineering and Technology. Vol. 02, Issue 08, August
- [6] O.A., Cornelius, (2011): A Critical Evaluation of Motor Vehicle Manufacturing in Nigeria. Nigeria Journal of Technology. Vol. 30, No. 1, March