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# *Method of Measuring the Vapor Pressure and Concentration of Fluids using VLE and Vibrating Tube Densitometer Apparatuses*

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**Momin E. Abdalla**

*Chemical Engineering Department, Khartoum University*

**B. Windheim**

*Institute for Thermodynamics, Gottfried Wilhelm Leibniz University Hannover*

**Jannis M. Ebhardt**

*Institute for Thermodynamics, Gottfried Wilhelm Leibniz University Hannover*

**S. Kabelac**

*Institute for Thermodynamics, Gottfried Wilhelm Leibniz University Hannover*

This work presents the vapor pressure and concentration measurement of newly discovered environmentally friendly refrigerants 1,1-difluoroethane (R152a) and 1,1,1,3,3-Pentafluorbutane (R365mfc), besides their mixture. The experimental procedure used in this work was a VLE recirculation type apparatus in which the liquid phase is circulating around the equilibrium cell. Special attention was given to enable a highly accurate vapor pressure measurement up to maximum pressure of 25 bar. The liquid sampling method was perfected through the use of quick plug valves at the circulation loop of the VLE apparatus. This approach has a great effect in solving the problems of changing the volume of the fluids inside the equilibrium cell, since the sampling unit needs a minimum amount of fluid to be sampled. Moreover a new method for measuring the concentration of this mixture through using a vibrating tube densitometer apparatus (DMA-HPM) has been realized. This apparatus was able to supply data in the temperature range of -10 to 200 °C and pressure of 0 to 1400 bar, with an uncertainty of 0.1%. The experimental data was validated using the Volume Translated Peng Robinson Equation of State and high precision fundamental equations of state by McLinden from National Institute of Standard and Technology (NIST). Other models such as Modified Huron Vidal, Wong Sandler, Lee Kesler and Hoffman Florin have been verified. Amongst all the models, McLinden et.al model achieved vapor pressure deviations less than 0.073% for R365mfc. The concentration deviations reached -3.1%, -9.8% for a composition of 33.6% R152a and 44.1% R365mfc respectively. The deviations of VTPR and VTPR-MHV2 have led to similar results data in the pure fluids and the mixture respectively.

**KeyWords:** vapor pressure, concentration, VTPR, vibrating tube, R152a, R365mfc.

## 1. Introduction

The last two decades have witnessed a significant increase in the concentration of harmful materials like Chlorofluorocarbons (CFCs) and Hydro-chlorofluorocarbons (HCFCs) based refrigerants in the atmosphere.

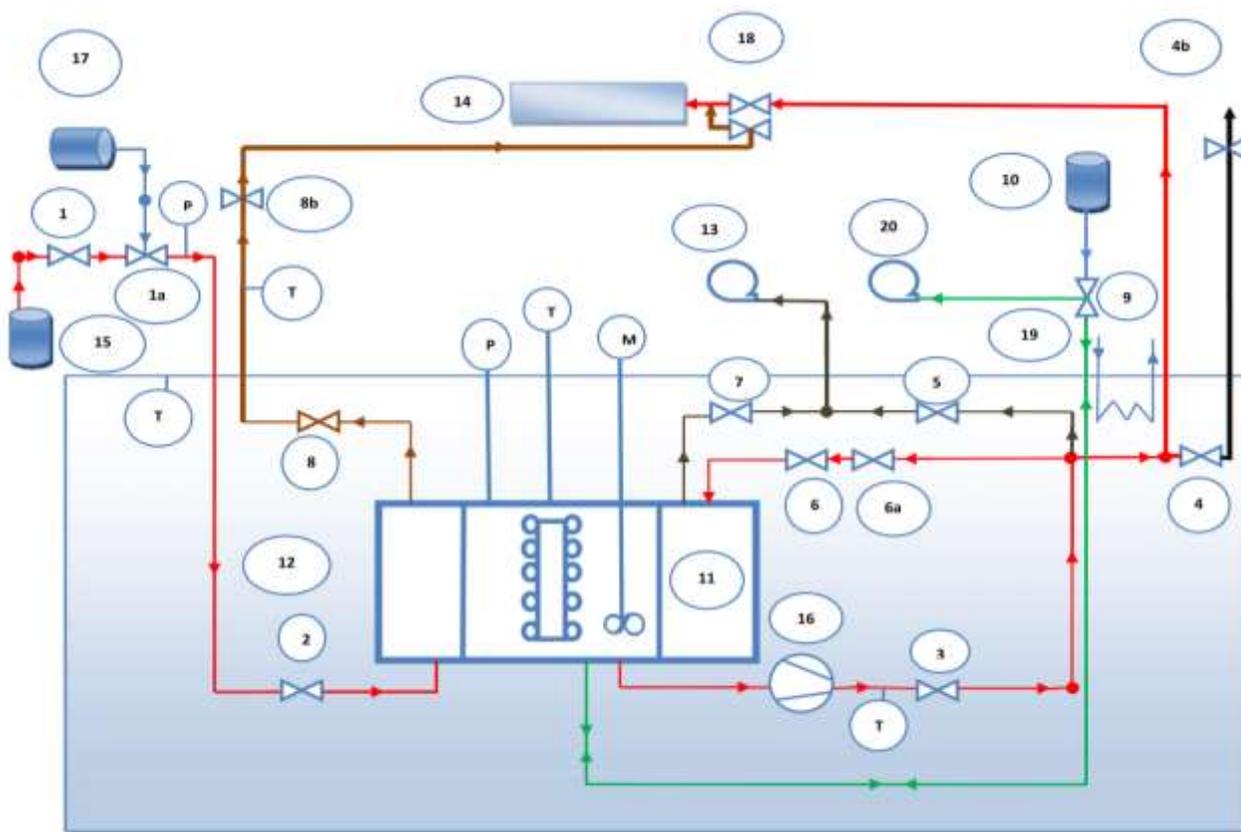
These materials have been widely used as solvents, foam blowing agents, aerosols and especially as refrigerants due to their preeminent properties such as stability, non-toxicity, non-flammability and availability. However, these substances have a harmful effect on the earth's protective ozone layer. Since the declaration of the Montreal protocol in 1987, the use of these substances has been consequently regulated [1]. Moreover the CFCs had been detected as substances contributing to global warming. This paper supports more accurate density data for these environmentally friendly materials, including the pure fluids and mixtures of R152a and R365mfc. The R152a is a HFC type refrigerant. This fluid has zero ODP and a GWP value of 120. The boiling point temperature at a pressure of  $p=1.013$  bar is  $\vartheta^s=-24.0^\circ\text{C}$ , the molecular weight  $M=66.1$  kg/kmol. R152a is a medium pressure refrigerant for the medium temperature refrigeration range [2]. The physical, thermodynamic and refrigeration characteristics are similar to those of the refrigerants R12 and R134a. Although R152a is a good refrigerant substitute for R12, it is not used in its pure form because of its flammability (flammability limits 3.7–21.8% by volume in air). For this reason, R152a is labeled as "highly flammable". For all the experiments in this work, the same samples for R152a have been used in accordance to the specifications provided by the manufacturer GHC Gerling Holz & Co. Handels GmbH, the samples had a purity of  $\geq 99.5\%$  and were used without further purification [2]. The R365mfc is a HFC type refrigerant. This fluid has zero ODP and a GWP value of 782. The boiling point temperature at a pressure  $p=1.013$  bar is  $\vartheta^s=+41.4^\circ\text{C}$ , the molecular weight is at  $M=148.07$  kg/kmol. R365mfc is a new fluid which is mainly used for the production of rigid polyurethane foams used for insulation purposes where a liquid foaming agent with a low thermal conductivity and a high vapor pressure at low temperatures are needed. Regarding thermodynamic properties and safety requirements, R365mfc is employed as a main component in binary blends with 7 or 13 mass% with 1,1,1,2,3,3,3-Heptafluoropropane (R227ea) in the production of liquid foaming agents [2]. Besides the fact that this fluid has no negative impact on the ozone layer, further environmental benefits can be achieved using R365mfc, like in the production of polyurethane foams. To the best of our knowledge, only a very limited amount of data for the thermodynamics properties of R365mfc is available in the literature, more data were mentioned by Fröba et.al [23][24]. For all the experiments in this work the same samples for R365mfc have been used in accordance to the specifications provided by the manufacturer Solvay Fluor & Derivate GmbH, Hannover, the samples had a purity of  $\geq 99.7\%$  and were used without further purification [2].

## 2. Experimental Methods

### 2.1 Vapour Pressure

The experimental apparatus was originally built and operated by Zimmermann et.al[3] at the University of Siegen, Germany. Later on, the institute of Thermodynamic at Helmut Schmidt University-Hamburg had completed various stages of the construction of this apparatus, more detailed information about which can be found in [4][5]. The final version of the experimental set up was carried out at the institute for Thermodynamics, Hannover University, Germany. The

purpose of designing and fabricating this apparatus was to provide accurate liquid and vapor mixture properties such as vapor pressure and vapor liquid equilibrium data working at isothermal conditions, as an investigation of the newly developed refrigerant mixture (R152a, R365mfc). The new construction of this apparatus includes better and more accurate sampling techniques acting in a vibrating tube densitometer to improve the analyzing process of the liquid and vapor samples, in a qualified and easy manner and also to tackle some of the problems which usually occur in such apparatuses.



**Fig.1.** Phase equilibrium apparatus flow diagram.

**Table I.** Experimental setup, Equipment List:

T	Temperature Measurement
P	Pressure Measurement
M	Mixer
1,1a,2	Inlet Valves
3,6,6a	Recirculation Valves
5,7	Evacuation Valves
8,8b	Vapor Phase Sampling Valves, Outlet Valve
9	Heat Exchanger and Circulator
11	Equilibrium Cell
12	Isothermal Bath
13	Vacuum Pump

14	Density Measurement Apparatus
15,10	Inlet Cylinder
16	Circulation Pump
17	Air-Nitrogen Cylinder
18	Inlet valves to Density Measurement Apparatus
19	Inlet, Outlet valve
4,4b	Outlet valve
20	Water jet pump

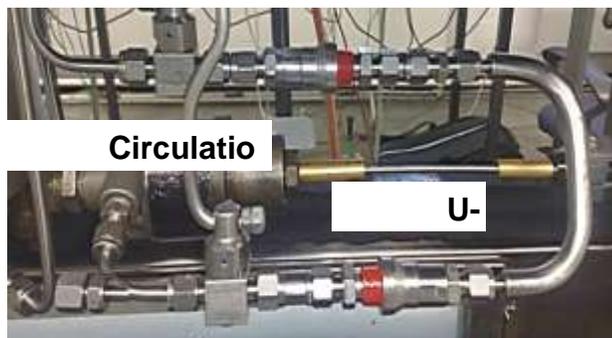
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The measurement of the vapor-liquid equilibrium was conducted in a circulation type apparatus as shown in Fig.1. The apparatus consists of an equilibrium unit, a sampling unit, and a supply unit. The core of the apparatus is the equilibrium unit, which consists of an equilibrium cell, a recirculation pump, and a constant temperature controlled bath. The equilibrium cell was designed to hold maximum pressure of 20 bar. The temperature of the isothermal bath and equilibrium cell was maintained at a set point by a circulated thermostat (Haake N3), located at the upper side of the apparatus. Both the equilibrium cell (stainless steel, material No 1.4541) and the recirculation pump (NO1OST-26E, KNF Neuberger) were immersed in this bath (type: Baysilon-M20, Bayer) which was charged with ethylene glycol. After confirming that the bath and the cell temperature are maintained at equal set point, the circulation pump would start circulating the liquid phase to the equilibrium cell. The aim of this pump is to ensure proper mixing, and enabling the equilibrium to be reached quickly. The temperature was kept constant within  $\pm 1$  mK. In the measuring cell is also housed an agitator connected with electrical motor (M80 Multifix) to ensure a well mixing of the thermostat fluid and to accelerate the homogeneity of the coexisting phases. Before supplying any fluid; the whole apparatus must be evacuated. The vacuum pump (Leybold AG, type D4B) and a water jet filter pump (type Brand, No 159665) was used to evacuate the apparatus down to 10-30 mbar. Generally the apparatus has two entrances, valves 1, 1a (Autoclave engineers-30VM4074, 316 stainless-steel), and 2, 10 (Swagelok) assist in the process of charging the apparatus, valves 3, 6a, 6 (Swagelok) are liquid circulation valves which assist in the sampling process. Valves 4, 4b, 5, 7, 19 (Swagelok) assist in the process of evacuation. Valves 8, 8b (Swagelok) assist in the sampling of the vapor phase. The pressure is measured with a pressure transducer (type: P3290S076020, tectsis) with a precision of 0.1%. To detect the pressure gradients an additional manometer (Haenni, -1-24 bar, No 1.4571) was installed between valves 1a and 2. The temperature in the measuring cell is measured by means of metal-resistance thermometer (Pt100, accuracy class A).

## 2.1 Concentration

After equilibrium is reached, the vapor and the liquid samples should be trapped and passed to the analysis unit, in which the phase equilibrium compositions are determined. From former experimental observations sampling of the liquid phase is more problematic, unlike the vapor phase. To encounter this problem in the sampling of the liquid phase, a good idea was suggested. To the best of our knowledge, it was the first to implement in this work. It was recommended to construct two additional quick plug valves 3 and 6a (316 stainless steel, Swagelok) within the circulation loop, as shown below, to sample a minimum amount of the fluid phase in a U-tube located between these two valves, (see Fig.2). The plug valve was equipped with two connections (6mm) and designed to withstand a maximum working pressure of  $p=206$  bar. Valve 3 was connected with the first quick connector. This quick connector body is connected

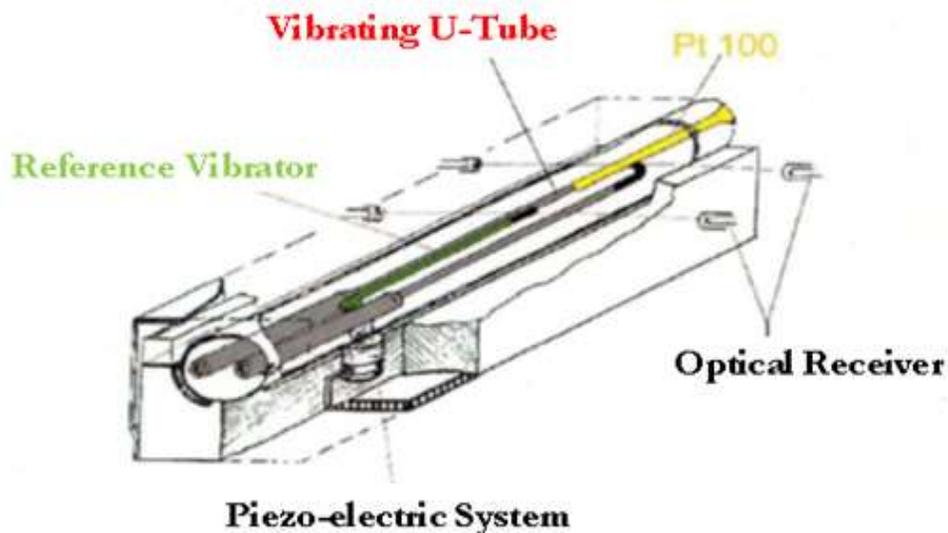
with a U-tube constructed of stainless steel and designed to hold the required sampled fluids. The upper part of the U-tube is connected with the second stem and body quick connector and regulated by valves 6a and 6. The stem and the body was designed to operate at temperature range of  $\vartheta = -26-205^{\circ}\text{C}$  and maximum operating pressure of  $p = 205\text{bar}$  at  $\vartheta = 21^{\circ}\text{C}$ .



**Fig.2.** Liquid sampling line in phase equilibrium apparatus.

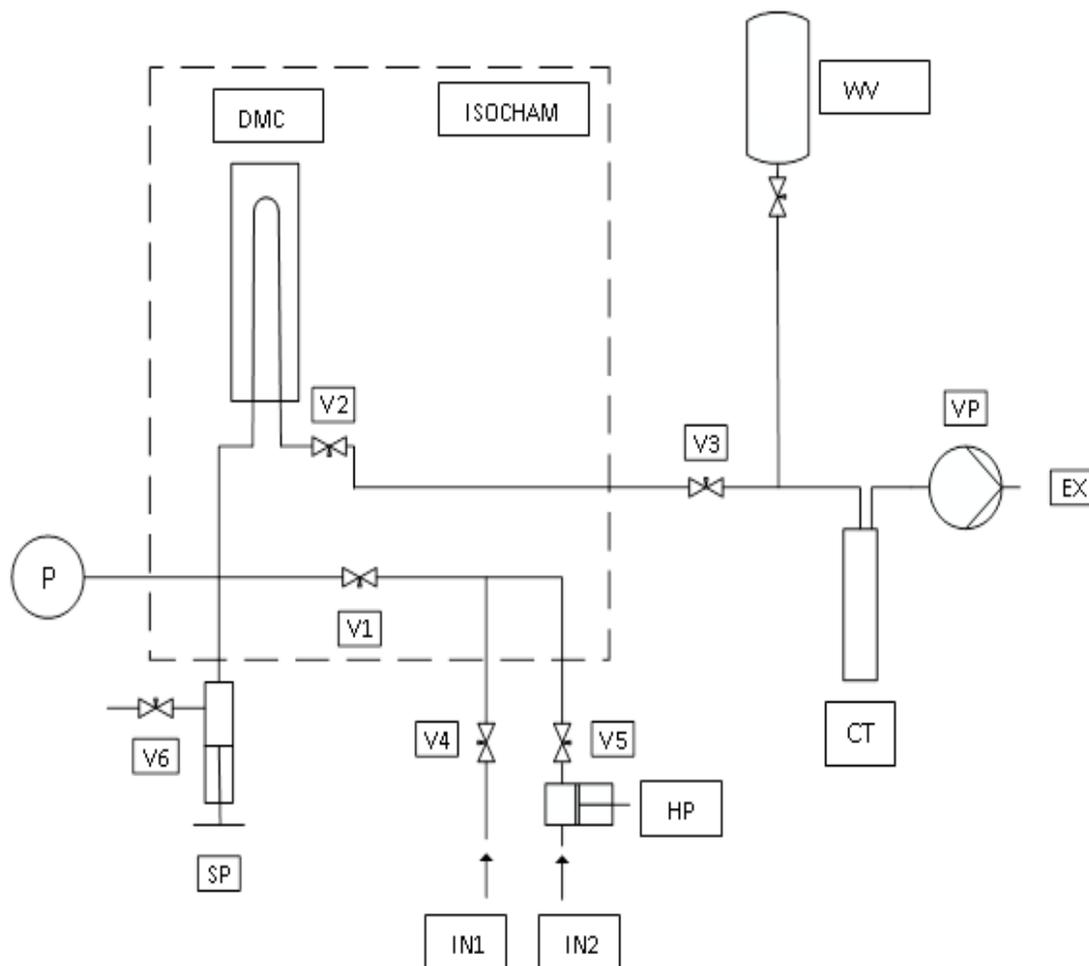
By this method the problem of changing the volume in the equilibrium cell and possibly changing the homogeneity of the phases was solved. The temperature and pressure of the mixture are maintained at the required values while the liquid phase is continuously withdrawn from the equilibrium cell and recirculated by the circulation pump. The circulated liquid reenters the cell at the upper side through a hole, 6mm in diameter and pours through the vapor phase. The temperature in the circulation loop should be very close to the temperature of the equilibrium cell and for this purpose a thermocouple sensor was inserted between the discharge line of the circulation pump and valve 3 to detect the temperature gradients at the circulation line. The length of the U-tube is about 170 mm and is able to hold up to 10 ml in fluid volume. The U-tube is then connected with the entrance IN1 at the analysis unit, (see Fig.3). The vibrating tube densitometer apparatus was used to analyze the composition of the sample. The principle of this apparatus relies on a fixed relation between the natural frequency of the vibrating-tube and the density of fluid contained in the tube. Most of the theory behind vibrating densitometers can be derived from a simple mass spring model, detailed information is found in [6].

The vibrating-tube is usually bent in U-shape, sometimes in V-shape, and its two legs are firmly fixed to a rigid body; the body in the front side is omitted. The vibration of the tube is detected with a photo-detector, by counting the blinking of light from the light source blocked by the flag attached to the tip of the U-tube. There is an electronic vibration circuit to activate and sustain a continuous vibration of the tube with its natural frequency, by means of the electromagnet fixed to the cell and the permanent magnet on the tube. This principle is an electro-optical system as shown in Fig.3. The direction of the vibration should be normal to the U-surface, and no twists are provided to occur [26].



**Fig.3.** Vibrating tube densitometers with electro-optical system [25].

As shown in Fig.4, the density meter (DMA HPM, Anton Paar) was used to detect the liquid density in a temperature range of  $\theta = -10-45^{\circ}\text{C}$ . Due to the high temperature dependency of density, the measuring cell is heavily thermostatted. The temperature of the U-tube is controlled within  $\pm 0.02^{\circ}\text{C}$  using an external thermostat (Lauda, E CORE 1050) to regulate the temperature inside the cell, whereas the whole apparatus was maintained in an isothermal isolation chamber ISOCHAM. Since the apparatus does not have any source for pressure generation, an auxiliary pressure generation was integrated into the apparatus. The pressure was measured by a high accurate pressure sensor (type: PAA35X-C-300, omega) with a high precision of  $0.1 \pm \text{kPa}$ . The pressure measuring unit was successfully integrated into the density measuring cell via hand spindle pump SP (type Ruska, No 41619). To ensure fine adjustment and recharging of the pressure, an additional hand pump HP was integrated with the spindle pump. After evacuating the apparatus, all side products were accumulated in an external waste vessel WV or by using a cold trap CT unit. The apparatus has two entrances for feeding IN1 and IN2, which were regulated manually by valves V4 and V5. The valves V1 and V2 are responsible of regulating the flow rate of the sample into the measuring cell. Evacuation of the apparatus was achieved by a water jet pump (type Brand, No 159665) up to 30 mbar. All valves used were needle valves (type: Autoclave 30VM4081-material of construction 316 stainless steel). Those valves have a small port and a threaded, needle-shaped plunger to allow precise regulation of flow, although they are generally only capable of relatively low flow and are approved for a total allowable pressure up to 2068bar. To avoid any dead volume problem all fittings were conducted directly to the target measuring unit particularly in the connection of the spindle pump and the pressure sensor.



**Fig.4.** Density measurement apparatus flow diagram.

**Table II.** Equipment List

P	Pressure Measurement
DMC	Density Measuring Cell
ISOCHAM	Isolation Chamber
VP	Vacuum Pump
CT	Cold Trap
WV	Waste Vessel
IN1,IN2	Inlet
EX	Exit
HP	Hand Pump
SP	Spindle Pump
V4,V5	Inlet Valve

The measuring cell (type DMA HPM) was equipped with an internal heat exchanger which regulates the temperature of the surface of the vibrating U-tube. For this purpose an auxiliary thermostat (type Lauda ECORE 1050) [7] was integrated and the temperature was controlled up to  $\vartheta = \pm 0.005^\circ\text{C}$ . The temperature gradient between the measuring cell and the environment was also considered. Therefore, a house made isolation chamber was constructed to enhance the isothermal condition of the ambient air. After reaching the equilibrium the liquid and vapor sample in the U-tube had to be injected to the vibrating densitometer unit in which the period of oscillation, the temperature and pressure were measured. Meanwhile the density of each sample was detected by:

$$\rho = A * \tau^2 - B \quad (1)$$

$A$  and  $B$  are transducer constants. They are dependent on temperature and pressure. The determination of those parameters must be done by calibration. This is carried out by measuring at least two standard materials of known density [8]. To verify the concentration of the pure fluids and mixtures a specified algorithm written in Matlab was executed. The required concentrations for the mixture were detected as a function of the density and the period of oscillation according to equation (1).



**DMA**

**U-**

**Fig.5.** Moving U-tube after injection of sample in DMA-HPM.

### 3. Prediction Method

The equation type of Hoffman Florin (2), (3) respectively has been implemented to detect the vapor pressure [9]. This equation based on the charts developed by Cox [9] and it has two adjustable parameters  $\alpha$  and  $\beta$  which was calculated as follows:

$$\ln \frac{P^s}{P_0} = \alpha + \beta * f(T) \quad (2)$$

$$f(T) = \frac{1}{T} - 7.9151 * 10^{-3} + 2.6726 * 10^{-3} * \log T - 0.8625 * 10^{-6} * T \quad (3)$$

The equation can be fitted to two or more known data points for the vapor pressure. The parameter  $\alpha$  and  $\beta$  can then be calculated via:

$$\alpha = \ln \frac{P_1^S}{P_0} - \ln \frac{P_1^S}{P_2^S} * \frac{f(T_1)}{f(T_1) - f(T_2)} \quad (4)$$

$$\beta = \frac{\ln \frac{P_1^S}{P_2^S}}{f(T_1) - f(T_2)} \quad (5)$$

A more convenient equation of Lee and Kesler [10] was also used to estimate the vapor pressure as follows:

$$P^S = P_c \exp(A + wB) \quad (6)$$

In this equation A and B are functions on the critical temperature of the fluid.

**Table III.** Properties of the fluids.

Component	$M_w$ (kg/kmol)	$T_c$ (K)	$P_c$ (bar)	$\rho_c$ (kg/m <sup>3</sup> )	$\omega$
R365mfc	148.07	460.0	3266.0	473.84	0.377
R152a	66.051	386.41	4516.8	368.0	0.27521

The group contribution EOS developed by Gmehling and his coworker Ahlers [11] has been also executed. Based on the realization of applying a volume translation to the EOS was proposed by Peneloux and Freze [12] and directly applied to the Peng-Robinson EOS as follows [13]:

$$P = \frac{RT}{v+c-b} - \frac{a}{(v+c)(v+c+b)+b(v+c-b)} \quad (7)$$

The translation parameter ( $c$ ) indicates the deviation between the experimental and the calculated liquid volume at a reduced temperature  $T_r = 0.70$ .

$$c = v_{\text{calc}} - v_{\text{exp}} \quad (8)$$

The subscripts ‘exp’ and ‘calc’ represent molar volumes  $v$  obtained from experiment and calculated from the EOS respectively. In the statement of Ahlers and Gmehling [11], if there is no experimental data for liquid densities, the  $c$  term could be estimated from critical data as follows:

$$c = -0.252 \frac{RT_c}{P_c} (1.5448Z_c - 0.4024) \quad (9)$$

For mixture the volume translation parameter  $c$  can be estimated by a linear mixing rule as follows [13]:

$$c = \sum_i x_i c_i \quad (10)$$

The parameter  $a$  and  $b$  are calculated as function of critical data as follows:

$$a_{ii}(T) = 0.45724 \frac{R^2 T_c^2}{P_c} \alpha(T) \quad (11)$$

$$b_i = 0.0778 \frac{RT_c}{P_c} \quad (12)$$

The  $\alpha$  values for different compounds are presented as function of the acentric factor  $\omega$ , for each temperature is given by:

$$\alpha(T) = \alpha^{(0)} + \omega(\alpha^{(1)} - \alpha^{(0)}) \quad (13)$$

To apply equation (13), Ahlers [11] has used special equation for subcritical conditions. This equation is generalized for aromatics, ketones, alcohols and the refrigerant fluids [14]:

$$\alpha^{(0)} = T_{r_i}^{-0.1883273} \exp[0.1048767(1 - T_{r_i}^{2.1329765})] \quad (14)$$

$$\alpha^{(1)} = T_{r_i}^{-0.6029386} \exp[0.5113343(1 - T_{r_i}^{2.2059312})] \quad (15)$$

The mixing rule for this model is similar to the Huron-Vidal mixing rule; just the reference pressure is equal to 1 bar and not infinity. The residual part of the activity coefficient is used. The relative van der Waals volumes  $r_i$  was terminated in this mixing rule. The new  $g^E$  mixing rule in equation (20) has introduced the VTPR-  $g^E$  mixing rule [11].

$$a_m = b_m \left( \sum_{i=1}^n x_i \frac{a_i}{b_i} + \frac{g_{res}^E}{q_1} \right) \quad (16)$$

Where  $q_1 = -0.53087$ ,  $p^{ref}=1$  bar and  $g_{res}^E$  is calculated according to the UNIFAC parameters [13]. In this work, the  $g_{res}^E$  was obtained according to the UNIFAC method stated by Kleiber et al. [15][16] as presented in Fig.6. Further model known as Modified Huron-Vidal Second-Order mixing rule (MHV2) was recommended by Dahl and Michelsen (1990) [17]. The MHV2 equation gives the following expression:

$$q_1 \left( \alpha_m - \sum_{i=1}^n x_i \alpha_{ii} \right) + q_2 \left( \alpha_m^2 - \sum_{i=1}^n x_i \alpha_{ii}^2 \right) = \frac{g_{res}^E}{RT} + \sum_{i=1}^n x_i \ln \left( \frac{b_m}{b_i} \right) \quad (17)$$

The values of  $q_1$  and  $q_2$  depend on the EOS used. The abbreviation  $\alpha$  is a shortcut notation used to combine the co-volume and the energetic parameters. Furthermore, the model developed by Wong and Sandler [18][19], has been integrated with PR-EOS. The co-volume parameter in Wong and Sandler model was calculated as a function of the composition dependence of the second virial coefficient and the energetic mixing parameters of the cubic EOS [19].

$$b_m - \frac{a_m}{RT} = \sum_{i=1}^n \sum_{j=1}^n x_i x_j B_{ij} \quad (18)$$

The cross term  $B_{ij}$  is estimated as follows:

$$B_{ij} = b_{ij} - \frac{a_{ij}}{RT} = \frac{1}{2} \left[ \left( b_{ii} - \frac{a_{ii}}{RT} \right) + \left( b_{jj} - \frac{a_{jj}}{RT} \right) \right] (1 - k_{ij}) \quad (19)$$

Where  $k_{ij}$  is a binary parameter which is regressed using low-pressure experimental data and the mixture energy parameter  $a$  is similar to that of MHV1 model:

$$a_m = b_m \left( \sum_{i=1}^n x_i \frac{a_{ii}}{b_i} + \frac{g^E}{\Lambda} \right) \quad (20)$$

Where  $\Lambda$  is a constant depending on the EOS used. For the Soave-Redlich-Kwong and Peng-Robinson EOS  $\Lambda$  is equal to  $-0.693$  and  $-0.623$  respectively. The  $b_m$  parameter in the Wong-Sandler method was calculated by substituting equation (20) in the second virial equation, and rearranging to get an explicit function for  $b_m$ :

$$b_m = \frac{\sum_{i=1}^n \sum_{j=1}^n x_i x_j B_{ij}}{1 + \frac{g_\gamma^E(T, \text{lowP}, x_i)}{RT} - \sum_{i=1}^n x_i \left( \frac{a_i}{b_i RT} \right)} \quad (21)$$

Then the energy parameter of Wong-Sandler mixing rule may be expressed as:

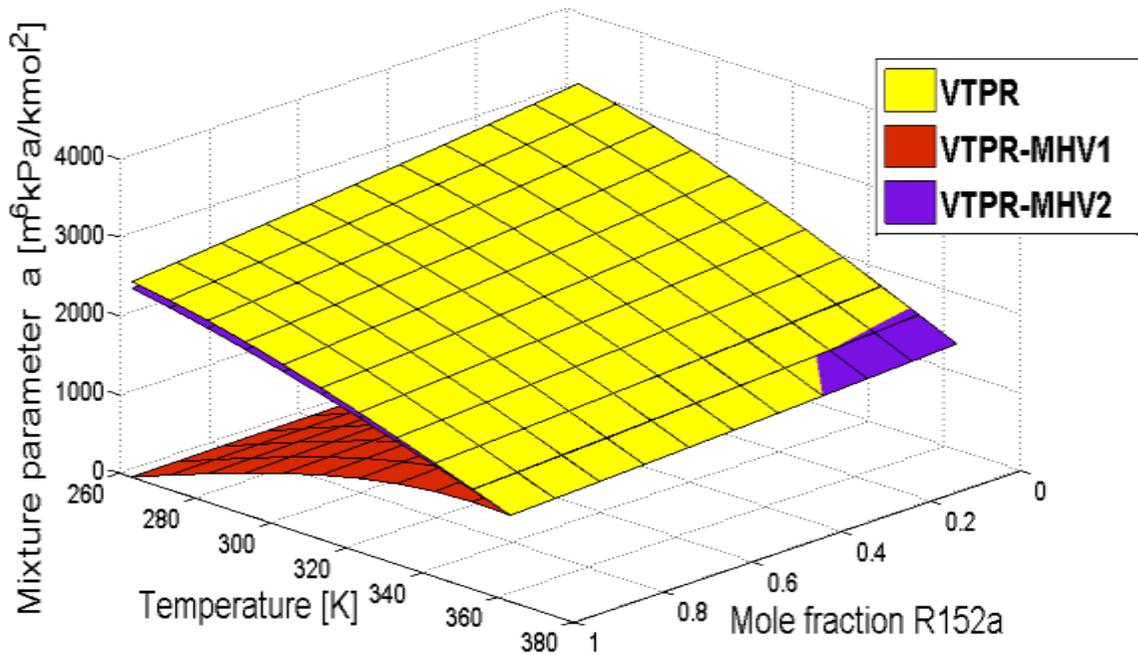
$$a_m = RTQ \left( \frac{D}{1-D} \right) \quad b_m = \left( \frac{Q}{1-D} \right) \quad (22)$$

Where  $Q$  and  $D$  are defined as follows:

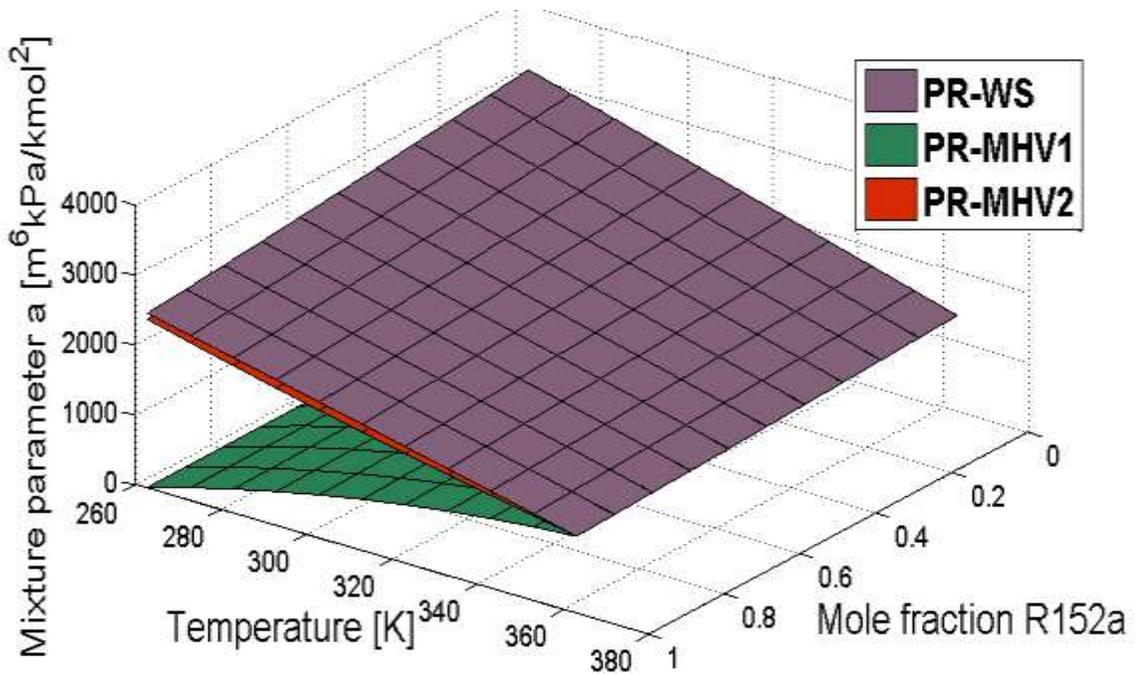
$$Q = \sum_{i=1}^n \sum_{j=1}^n x_i x_j B_{ij} \quad (23)$$

$$D = \frac{1}{RT} \left( \sum_{i=1}^n x_i \frac{a_i}{b_i} + \frac{g_\gamma^E(T, \text{lowP}, x_i)}{\Lambda} \right)$$

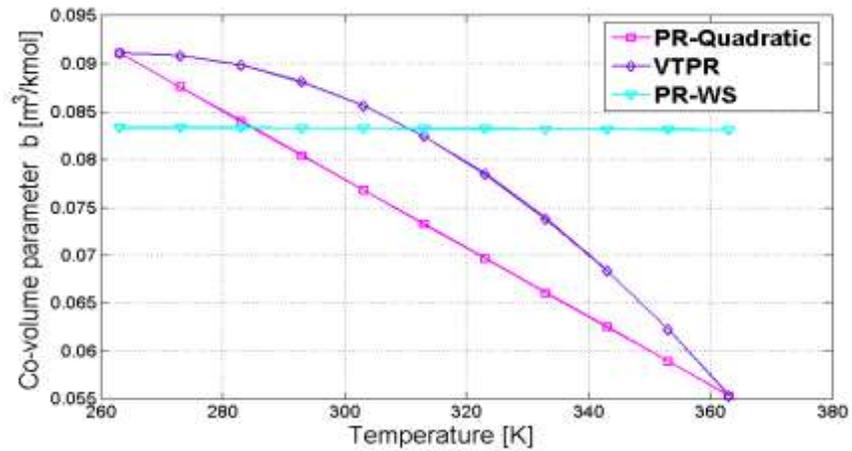
#### 4. Results and Discussions



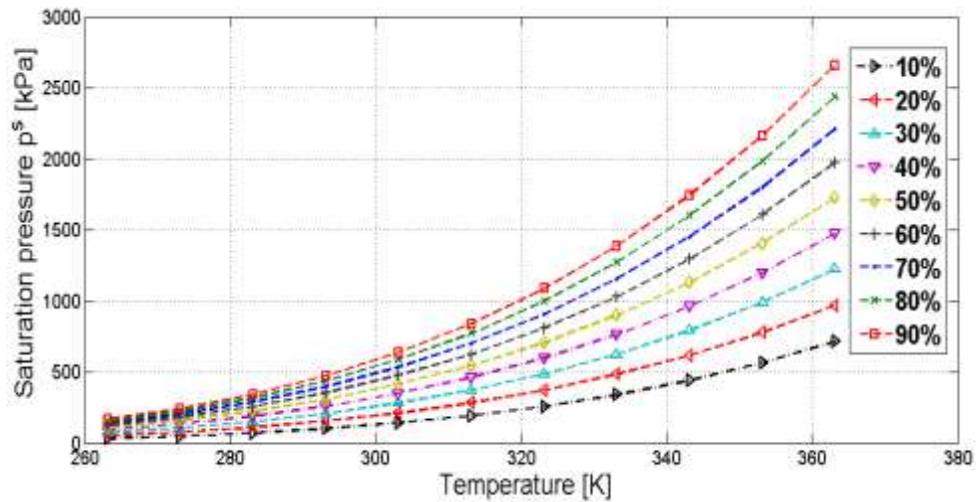
**Fig.6.** Mixture energy parameter ( $a$ ) predicted for VTPR EOS with VTPR; MHV1 and MHV2 mixing rules for the system R152a (1) and R365mfc (2).



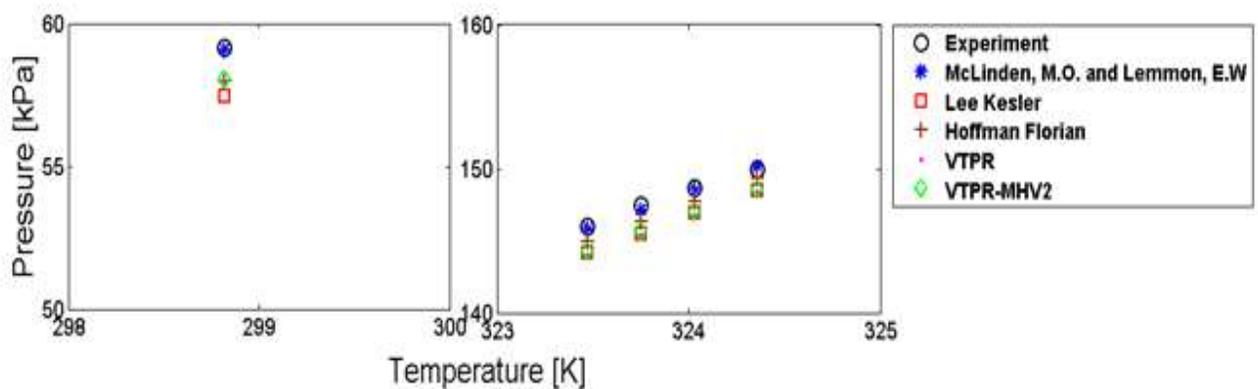
**Fig.7.** Mixture parameter ( $a$ ) predicted for PR EOS with WS, MHV1 and MHV2, mixing rules for the system R152a (1) and R365mfc (2).



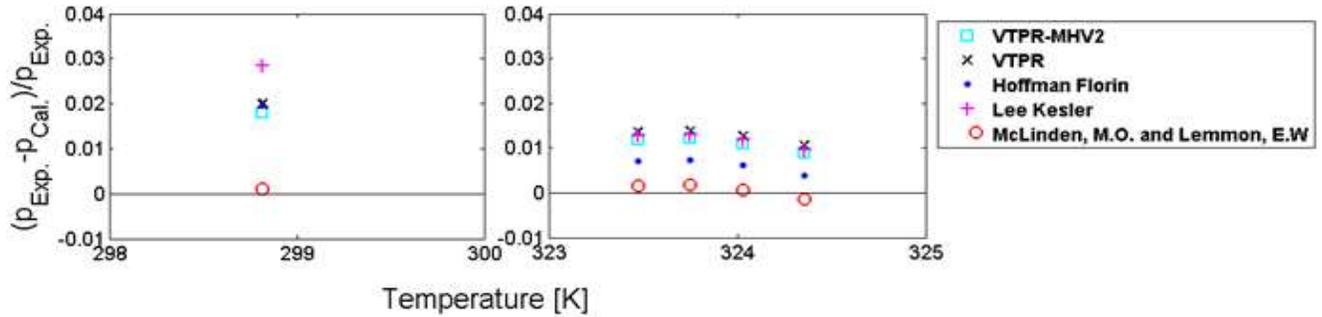
**Fig.8.** Co-volume parameter for predictive models with 30% R152a.



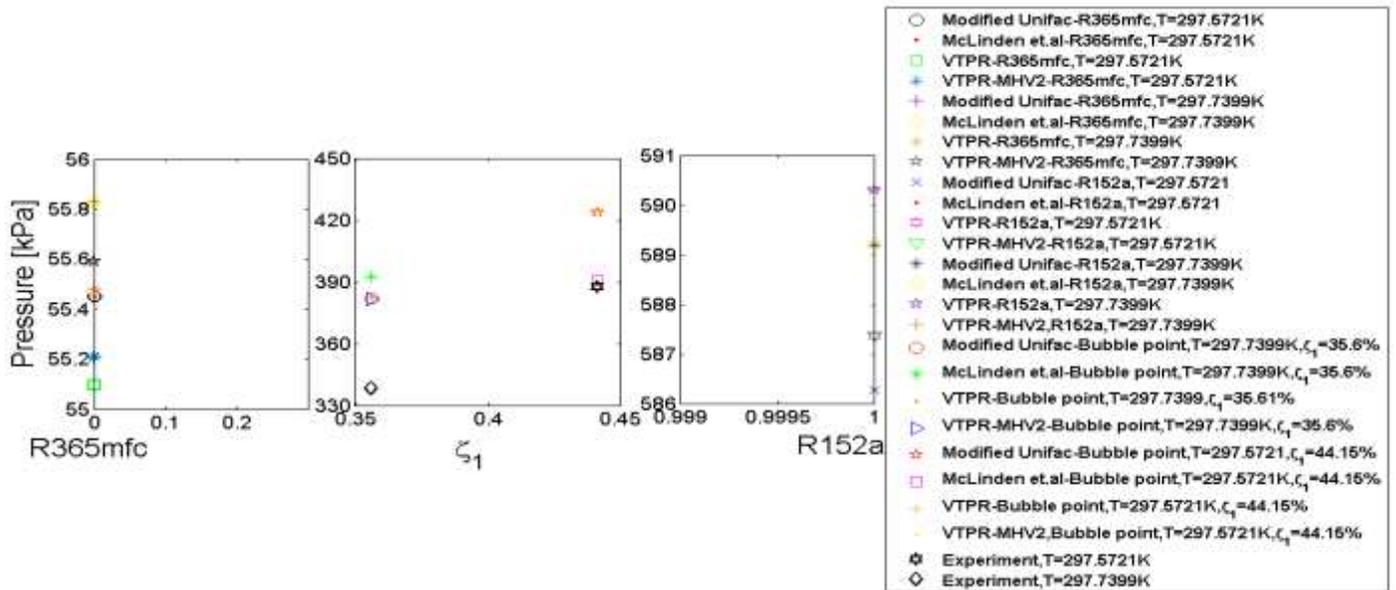
**Fig.9.** Bubble pressure temperature diagram of the mixture of R152a, R365mfc by VTPR.



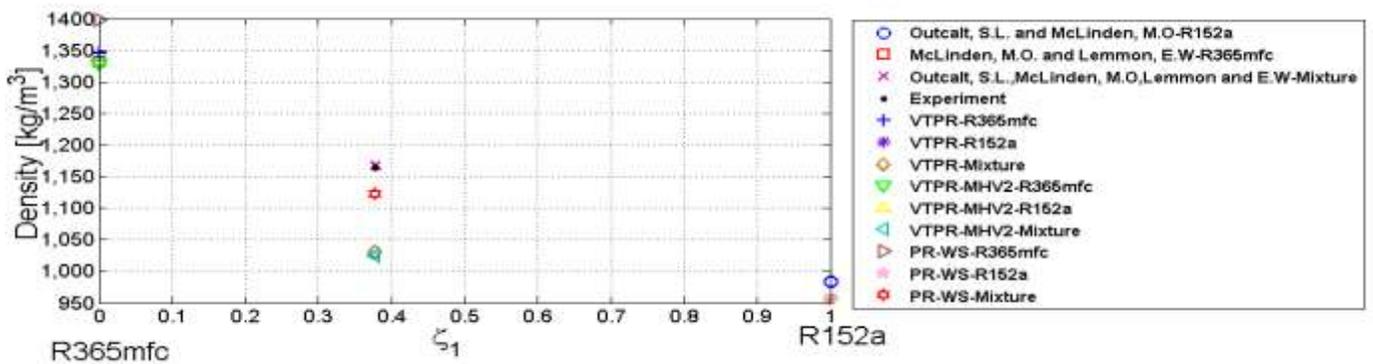
**Fig.10.** Variation of vapor pressure for R365mfc with saturation temperature.



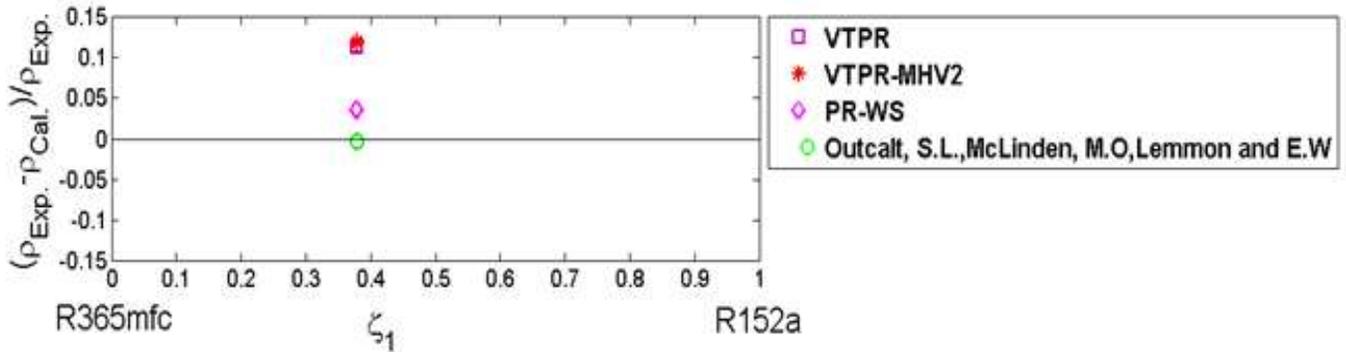
**Fig.11.** Relative deviation in vapor pressure measurement data of R365mfc.



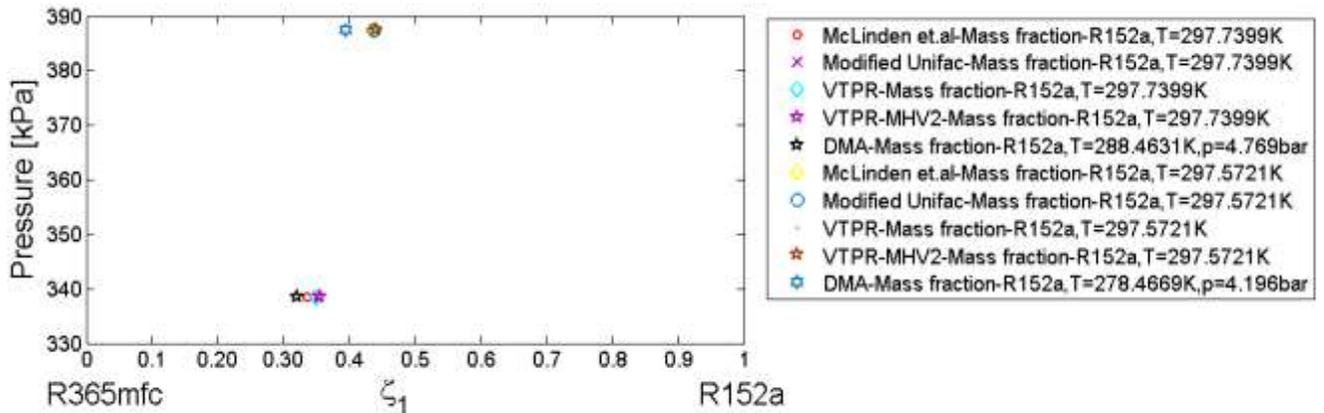
**Fig.12.**  $p, \zeta_1$  diagram for R152a and R365mfc at  $T=297.57, 297.74$ K.



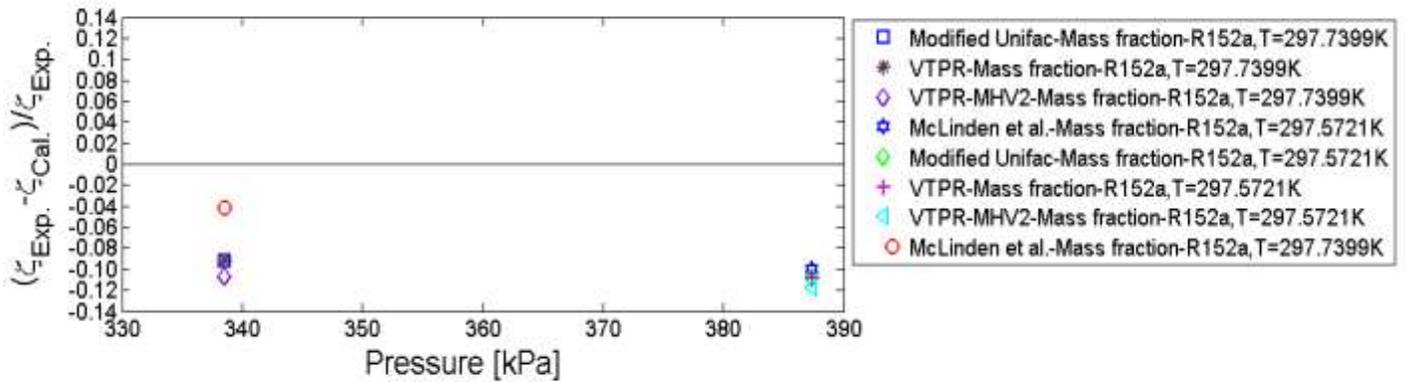
**Fig.13.**Mixture liquid density measurement data of R152a and R365mfc.



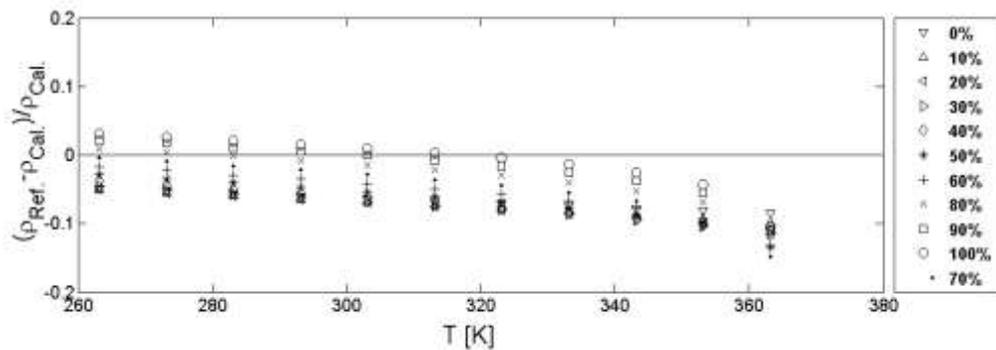
**Fig.14.**Relative deviation in mixture liquid density measurement data of R152a and R365mfc.



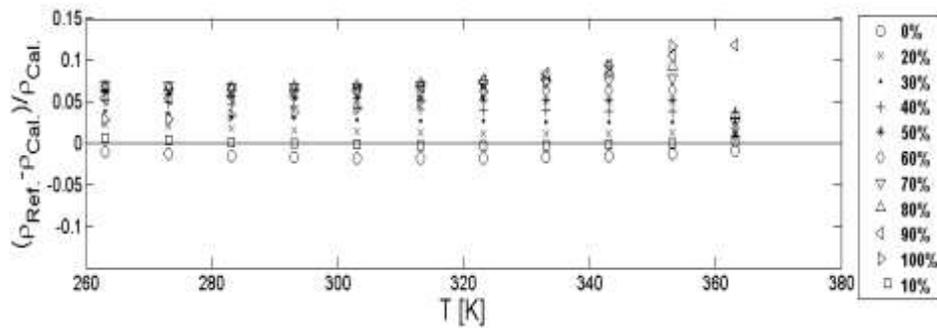
**Fig.15.**Measurement of mass fraction for the system R152a-R365mfc from vapor pressure and liquid density data.



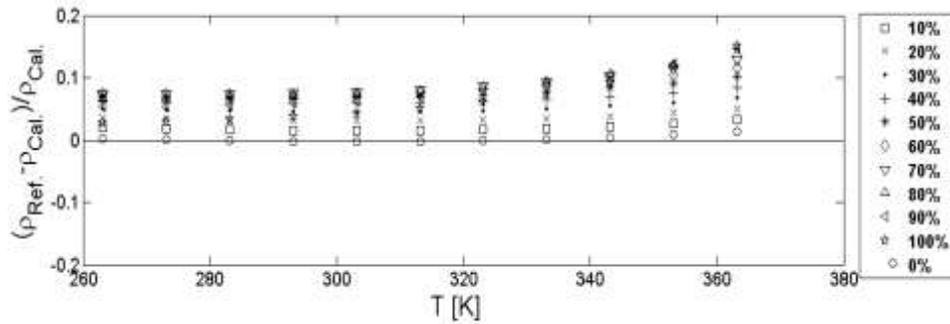
**Fig.16.** Relative deviation in liquid mass fraction measurement data of R152a and R365mfc.



**Fig.17.** Relative deviation to experimental data [21][22] in saturated liquid density for the system R152a and R365mfc from PR-WS ( $k_{ij}=0$ ).



**Fig.18.** Relative deviation to experimental data [21][22] in saturated liquid density for the system R152a and R365mfc from VTPR.



**Fig.19.** Relative deviation to experimental data [21][22] in saturated liquid density for the system R152a and R365mfc from VTPR-MHV2.

Fig.6 illustrates the attractive parameter for this equation of state as a function of temperature and composition relative to the more volatile component R152a under the use of MHV1, MHV2 and VTPR mixing rules. It is clearly recognized that the areas for the model VTPR and VTPR-MHV2 have the same profile with higher values in respect to VTPR. The non-linearity is clearly observed for the two models VTPR and VTPR-MHV2. The model VTPR-MHV1 show increases in the direction of increasing composition. It is to be resulted, however, that this model fails to improve the attractive parameter at lower composition values. Fig.7 represents the attractive parameter of WS, MHV1, and MHV2 under PR EOS as a function of temperature and composition of mixture, relative to the more volatile component R152a. Both models MHV2 and WS increase as temperature and composition decrease. It is to be noticed that the surface area for WS and MHV2 models lead to similar profile with higher value with respect to WS model. Despite the alterations made on this model, the non-linearity profile could not be clearly confirmed since its attractive parameter still follows the first order MHV model. Nevertheless the value of attractive parameter, at composition value equal to zero, was clearly improved. Likewise the Fig.8 shows the profile of the co-volume parameter, varying with temperature at different compositions of working fluid. The results confirm that the co-volume parameter of quadratic mixing rule decreases as the temperature increases. It is observed that in the case of VTPR the nonlinear shape of co-volume parameter has a positive influence on enhancing the co-volume parameter of PR. The VTPR co-volume parameter was developed by Chen et al. [20] who have shown that the b mixing rule has a sensitive influence on the description of asymmetric systems. Instead of a linear mixing rule which is used also in the model of VTPR uses a special mixing rule functions of second cross special parameter of ( $b_{ij}$ ) and compositions of the components, as follows.

$$b_{ij}^{3/4} = \frac{b_i^{3/4} + b_j^{3/4}}{2} \quad (26)$$

The exponent 3/4 was adopted from the group contribution method modified UNIFAC (Dortmund), where the same exponent was used for the relative van der Waals volume parameter  $r_i$  in the combinatorial part. Theoretical investigations of Deiters [11] led to a similar exponent of 0.8. The exponent 3/4 significantly enhances this parameter and improves the prediction of asymmetric systems, as this work followed this criterion. Fig.9 and Fig.10 presented an increase in

the saturation temperature with pressure. By experimentally measuring R365mfc in a temperature range of  $T=298-300\text{K}$  and  $T=323-325\text{K}$ , the relative deviation explained the following facts. The models of McLinden et al. belong to the National Institute of Standard and Technology (NIST)[21], followed by Hoffman Florin are superior compared to VTPR, VTPR-MHV2 and Lee Kesler models. Maximum positive deviation of 2.85% was provided by Lee Kesler, as illustrated in Fig.11, in a temperature range of  $T=298-300\text{K}$ . Minimum positive deviation of 0.073% was reached by model of McLinden et al [21], followed by positive deviation less than 0.38% for the model of Hoffman Florin, in a temperature range of  $T=323-325\text{K}$ . Beside all, the models VTPR, VTPR-MHV2 and Lee Kesler have delivered nearly similar deviation less than 1.9%. Fig.12 present the vapor pressure measured by this apparatus, varied with composition of mixture at composition of 35.6%, 44.1% and temperature of  $T=297.572\text{K}$ ,  $297.7399\text{K}$ , respectively. As shown in this figure, the model of McLinden et al. [21][22] delivers satisfying results compared with measured data, as it reached a maximum deviation less than -15.9%, -0.84% respectively. Additionally, the models of modified UNIFAC by Kleiber et al. [15][16], VTPR, VTPR-MHV2 have led to similar results in predicting vapor pressure of mixture. This is attributed to the assumption made in this work, as the excess Gibbs energy part for both equations of state VTPR and VTPR-MHV2 was related to modified UNIFAC model by Kleiber et al. [15][16]. Meanwhile, they reached a maximum deviation less than -12.9%, -9.4% respectively. Fig.12 shows the variation of mass fraction for the system under investigation and mixture density in a temperature range of  $T=262.43-262.59\text{K}$  and pressure of  $p=4.39-8.74\text{bar}$ . It is clearly recognized as the deviation of the measuring density as long as the models used in this work from linearity. This confirms to prove the efficiency of both models used and the experimental data conducted in this apparatus. Fig.14, presents the variation of mass fraction of mixture and the relative deviation in mixture density for models used in this work. The results have confirmed the superiority of model McLinden et al. [21][22] amongst other models. This model reached a maximum deviation less than 0.43%, followed by the model of PR-WS which reached a maximum deviation less than 3.5%. Meanwhile, the models of VTPR and VTPR-MHV2 led to maximum deviation less than 11.5% and 12.1% respectively. The mixture density data were used to analyze the composition. The sample from the phase equilibrium apparatus was treated in density measurement apparatus (DMA), via moving U-tube, as illustrated in Fig.5. The period of oscillation of the sample is measured at constant temperature and pressure. Fig.15 presents the measured mass fraction by this apparatus, for sample found in a saturation temperature of  $T^s=297.739\text{K}$ ,  $297.572\text{K}$  and saturation pressure of  $p^s=3.341\text{bar}$ ,  $3.822\text{bar}$  respectively. Most important in analysis of the mixture by this apparatus, is that, it could be conducted at various conditions. At composition of 33.6% of R152a, the temperature was set at  $T=288.463\text{K}$  and pressure of  $p=4.769\text{bar}$ , also at composition of 44.1% of R152a, the temperature was set at  $T=278.467\text{K}$  and pressure of  $p=4.196\text{bar}$ . As illustrated in Fig.16, the results confirmed the superiority of the McLinden et al. [21][22] model among others used. A maximum deviation less than -3.1%, -9.8% was reached for a composition of 33.6% R152a, 44.1% R365mfc respectively. The models of modified UNIFAC by Kleiber et al. [15][16] and VTPR delivered similar results, with a maximum deviation less than -9.2%, -10.83%, for this system respectively. Meanwhile, the model of VTPR-MHV2 has provided maximum deviation less than -10.76%, -11.75%, respectively. Furthermore, Fig.17-19 revealed that the models contribute to the cubic equations of state of VTPR and VTPR-MHV2 gave a better prediction in comparison to standard data of McLinden et al. [21] [22] for the saturated liquid density with

minimum relative deviation less than 1% for the pure fluids and a maximum value less than 15% deviation for the mixture.

## 5. Conclusion

The work has demonstrated the capability of the experimental setup used to detect the vapor pressure and to realize the measurement of the concentration of the environmentally friendly system of R152a and R365mfc using VLE and vibrating tube densitometer apparatuses. The work testify necessary applications of the new group contribution equation of state, as it executed the VTPR combined with modified UNIFAC method as well as various mixing rules such as MHV1, MHV2 and WS.

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## Abbreviation

CFCs	chlorofluorocarbons
HCFCs	hydrochlorofluorocarbons
HFCs	hydrofluorocarbons
EOS	Equation of State
GWP	global warming potential
VTPR	volume translated Peng Robinson
HPM	high pressure measurement
DMA	density measurement apparatus
ODP	ozone depletion potential
DDB	dortmund data bank
UNIFAC	universal quasi chemical functional group activity
NIST	national institute of standard and technology
MHV	modified Huron Vidal
WS	Wong Sandler

## Latin letters

A	first parameter of vibrating sensor
B	second parameter of vibrating sensor
T	temperature
p	pressure
v	molar volume
$T_c, P_c$	critical temperature and pressure
$T_r$	reduced temperature
$g^E$	excess Gibbs energy
$g_{res}^E$	residual excess Gibbs energy
$r_i$	relative van der Waals volume of component i

$x_i$  mole fraction of component  $i$  in the liquid phase  
 $q_i$  relative van der Waals surface area of component  $i$

**Greek letters**

$\tau$  period of oscillation  
 $\rho$  density  
 $\vartheta$  temperature  
 $\alpha$  function in cubic equation of state  
 $\omega$  acentric factor  
 $\xi$  mass fraction

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# *SVAR Analysis of Dynamic Effects of Fiscal Policy Shocks on Economic Activities in Nigeria (1970-2009)*

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**Prof Janet Omolara Olusi**

*Department of Economics*

*Obafemi Awolowo University, Ile-Ife, Nigeria.*

*E-mail address: [molax2002@yahoo.com](mailto:molax2002@yahoo.com)*

**Dr Monica Adele Orisadare**

*Department of Economics*

*Obafemi Awolowo University, Ile-Ife, Nigeria.*

*Phone: +234 703 3160 013*

*E-mail address: [m\\_alagbile@yahoo.com](mailto:m_alagbile@yahoo.com), [mdare@oauife.edu.ng](mailto:mdare@oauife.edu.ng)*

## **Abstract**

This paper analyses the dynamic effects of fiscal policy shocks on Economic activities in Nigeria for the time period 1970-2009. Using the Structural Vector Auto regression (SVAR) approach and relying on institutional information about government revenue to identify the automatic responses of economic activity to infer fiscal shocks-government revenue and spending. The main findings of this paper is that positive government revenue shocks in Nigeria have an immediate positive effect on output, private consumption and investment, although the effect becomes insignificant in the period following the shock. While positive government expenditure has a negative effect on GDP, private consumption and a positive effect on private investment in the period of a shock. The result points to the fact that fiscal policy in the course of the last decades has become less effective in stimulating economic activities in Nigeria. Taking the above facts into account; the Study therefore concludes that a one-off changes in government revenue and spending in Nigeria is short-lived and cannot be used in isolation to support economic activity.

**JEL classification: E62**

**Keywords:** Structural Vector Auto regression, Fiscal Policy Shocks, Economic Activities, Nigeria

## 1. Introduction

Fiscal policy has been described as mostly used to achieve macroeconomic policy in recent times Jhingan (2004), Musgrave and Musgrave (2004), Anoruo (2005), Valmont (2006) Hottz-Eakin, Lovely and Tosin (2009). Fiscal policy is one of the major cornerstones of economic policymaking apart from monetary policy. Since the early 1970s fiscal policy has been a major instrument for controlling the economy in Nigeria; the reasons for this are not farfetched, among them are; the need for reconstructions after the civil war; the oil booms of the early 1970s. Other reasons include; the increasing dominance of fiscal policy in the management of the economy as a result of falls in the international price of oil in the late 1980s, the increasing role of the government in the public sector in major (formal) economic activities in addressing the persistent fiscal deficit in the face of declining oil revenue and the persistence oil price shocks and its effects on the Nigerian economy which calls for economic reforms. But despite the importance of fiscal policy in economic management over the years, the main bulk of empirical research was dedicated solely to the effects of monetary policy until recently. With the aftermath of the global crisis of 2008 and its attendant problems of a lower crude oil demand; decline in the international prices of oil which adversely impacted on economic activities and business cycles; and the limited ability of the private sector and businesses to purchase during recessions there is a renewed interest in the role of discretionary fiscal policy as a counter-cyclical measure to mitigate the adverse effects of slowdown of global economic growth (CBN, 2009, Bangwayo-Skeete, 2011).

Several world leaders have used fiscal policy programs to help stem the tide of decline and reset their economies on the path of growth and recovery following decline in output signaling the onset of the economic recession in 2008. For example, the United States assembled substantial stimulus packages running into billions of US Dollars complemented by tax adjustments to upturn the dwindling fortunes. The United Kingdom (UK), Germany, Japan, China and other industrial and emerging economies implemented broad-ranging fiscal stimulus involving direct spending and a host of other interventions to increase expenditure (CBN, 2009). In Nigeria, the Federal government initiated a fiscal stimulus to curtail the obvious slowdown of economic growth by earmarking N361.2 billion for investment in critical infrastructure; and injecting N100.0 billion multilateral loan into critical sectors of the economy. There was also the floating a N200.0 billion bond in the deposit money banks, under the Commercial Agricultural Scheme to improve mechanized/commercial agriculture; and lowering of tariffs regime under the 2008-2012 Nigeria Customs and Tariff book to encourage the importation of raw materials to stimulate domestic industrial production and manufacturing activities (CBN Annual Report, 2009). Although most economists see the necessity of the government fiscal policy measure to revive the economy, it can be doubtful whether the increased fiscal activities of the government can really help stimulate the economy such that the economy will grow up more than it otherwise would be. The role of fiscal policy in influencing economic activity has been one of the most extensively discussed issues by both academics and policy-makers in recent times. Despite this extensive discuss, research and its policy implications for local and global economy; there is yet to be a clear consensus on the basic effects of fiscal policy shocks on output and its components (private consumption, private investment (Perotti, 2002) both in the short and in the long term; neither from a theoretical nor from an empirical points of view. From a theoretical perspective, the effect of fiscal policy shocks on macroeconomic variables can be of different signs; the standard RBC model generally predicts a decline in consumption in response to a rise in government spending of goods and services. In

contrast, the IS-LM model predicts that consumption should rise, hence amplifying the effects of the expansion in government spending on output. Of course, the reason for the differential impact across those two models lies in how consumers are assumed to behave in each case. The RBC model features infinitely-lived Ricardian households, whose consumption decisions at any point in time are based on an intertemporal budget constraint. *Ceteris paribus*, an increase in government spending lowers the present value of after-tax income, thus generating a negative wealth effect that induces a cut in consumption. By way of contrast, in the IS-LM model consumers behave in a non-Ricardian fashion, with their consumption being a function of their current disposable income and not of their lifetime resources. Accordingly, the implied effect of an increase in government spending will depend critically on how the latter is financed, with the multiplier increasing with the extent of deficit financing (Blanchard, 2003). Similarly to the predictions on consumption, the two theories also predict different outcomes for investment. The standard RBC model claims that an increase of government consumption will have a positive effect on investment: an increase of government consumption induces a rise in employment which, if sufficiently persistent, leads to a rise in the expected return to capital and, therefore, may trigger a rise in investment. In contrast, the standard IS-LM model predicts that investment should decline in response to a positive government spending shock: an increase in government consumption (if not followed by an accommodating increase of money supply) leads to an increase in interest rate, which in turn will translate into a decrease in investment. From this discussion it emerges that the predictions of the above mentioned theories are orthogonal to each other.

This study contributes to empirical literature by investigating the relationships among fiscal policy variables, and economic activities in Nigeria by employing Structural Vector Auto regression (SVAR) analysis using time series data for the period 1970 to 2009. By doing this, we provide an additional test on whether fiscal policy shocks generates "crowding-out" or "crowding-in" effects on the private and public sector. In addition, the result will also be used to discriminate between the standard RBC and IS-LM model in the Nigerian context. The rest of this paper is organised as follows: section 2 presents the literature review; section 3 discusses methodology; section 4 presents data analysis and findings and; finally section 5 concludes the study.

## **2. Review of Theoretical and Empirical Literature**

Empirical research focusing on fiscal policy in the last decade followed mostly the seminal work of Blanchard and Perotti (2002) in a VAR analysis which was built upon the innovative work of Sims (1980) in VAR analysis. Since then there have been several other empirical studies for instance (Fragetta and Melina, 2010; Lozano et al. 2009; and Onodje, 2009 etc) typically predict that an increase in government expenditures will increase output, private consumption, employment and real interest rates. In the estimation of Giordano et al. (2007) on the effects of government spending for Italy using VAR they found a positive effect of government spending on both private consumption and private investment. In a similar study for Germany by Hepke-Falk et al. (2006) VAR they also found a positive effects of government spending on both private consumption and private investment; In the same vein Biau and Girard (2005), Blanchard and Perotti (2002) using same methodology to investigate the effects of government spending in France and the US found positive effects of government spending on both private consumption and private investment. These results are similar to earlier results on the effects of government spending on private investment by Argimón et al. (1997) who used panel data for the OECD countries and Erenburg and Wohar (1995) who used time series data for the US. In the study of

Easterly and Rebelo (1993) who used time series data and cross country for the US, developed and developing countries they found a positive effects of government spending on private investment; similarly Grier and Tullock (1989) also used cross-country data for developed and developing countries and found a positive effect of government on private investment. In a panel data analysis (Nien and Ho, 2005) for the OECD; and Karras (1995)'s time series data analysis for developed and developing countries; evidence from these studies found a positive effect of government on private consumption.

In contrast to the empirical evidence of positive effects of government spending on economic activities in the literature; findings of some other authors indicated negative effects; Afonso and Sousa (2009a) found a negative effect of government spending on both private consumption and private investments for Portugal using VAR. In the same vein Coenen and Straub (2005) using VAR for the Euro area, also found a negative effects of government spending on private consumption. These results are similar to Barro (1991) who used Cross-country data for developed and developing countries and found negative effects on private investment. In the studies of Afonso and Sousa (2009b) for US, UK, Germany and Italy; they found insignificant effect of government on consumption and a negative effect on private investment.

However, there are also presence of mixed results in the literature; for example, Lendvai (2007) found mixed macroeconomic impact of unexpected changes in the government expenditure using the SVAR model for Hungary. The findings of Perotti (2004) using VAR for Australia, Canada, Germany and UK indicated a positive effect of government on private consumption and insignificant effects on private investment, this result is similar to the findings of Fatás and Mihov (2001) who used VAR for the US. Burnside et al. (2004), however using a narrative approach VAR for the US found insignificant effects of government spending on private consumption; and positive effects on private investment. While Mountford and Uhlig (2004) also using VAR found insignificant effects on private consumption and a negative effect on private investment for the US.

Using a three-variable baseline VAR which included government spending, net taxes and private real GDP, Blanchard and Perotti (2002) based their influential paper on U.S. data. The identification of the variables is obtained by imposing contemporaneous restrictions on them based on the institutional features of the U.S. tax and expenditure systems. Their results are consistent with standard Keynesian analysis in that positive public expenditure shocks and negative tax shocks have significant and positive effects on GDP and consumption. However, the response of private investment to increased expenditures is negative (and positive to tax reduction). For Finland Kuismanen and Kamppi (2007) results indicate that a positive tax shock has a positive effect on investment and GDP but the response of private consumption is mixed. Kuismanen and Kämpfi (2010) used the Vector Stochastic Process with Dummy Variables (VSPD) method to find out whether fiscal policy decisions have real effects on the economy of Finland. Their conclusion is that increases in public sector revenues seem to have a positive effect on investment and GDP. However, as they have noticed, it would be counterintuitive to claim that increased taxes would lead to increases in private sector activity and therefore it seems more plausible that a good economic era causes both the increases in public revenues and private sector activity.



is necessary to transform the reduced-form model into a structural model. Pre-multiplying the equation (3) by the (k x k) matrix  $A_0$  gives the structural form;

$$A_0 X_t = A_0 u_0 + A_0 u_1 + A_0 A(L) X_{t-1} + B e_t, \dots \dots \dots (4)$$

Where

$$A_0 = \begin{bmatrix} 1 & A_{12}^{(0)} & A_{13}^{(0)} & A_{14}^{(0)} & A_{15}^{(0)} & A_{16}^{(0)} \\ A_{21}^{(0)} & 1 & A_{32}^{(0)} & A_{24}^{(0)} & A_{25}^{(0)} & A_{26}^{(0)} \\ A_{31}^{(0)} & A_{32}^{(0)} & 1 & A_{34}^{(0)} & A_{35}^{(0)} & A_{36}^{(0)} \\ A_{41}^{(0)} & A_{42}^{(0)} & A_{43}^{(0)} & 1 & A_{45}^{(0)} & A_{46}^{(0)} \\ A_{51}^{(0)} & A_{52}^{(0)} & A_{53}^{(0)} & A_{54}^{(0)} & 1 & A_{56}^{(0)} \\ A_{61}^{(0)} & A_{62}^{(0)} & A_{63}^{(0)} & A_{64}^{(0)} & A_{65}^{(0)} & 1 \end{bmatrix}$$

$B e_t = A_0 u_t$ , describes the relation between the structural disturbances  $e_t$  and the reduced form disturbances  $u_t$ . In the following, it is assumed that the structural disturbances  $e_t$  are uncorrelated with each other, i.e., the variance-covariance matrix of the structural disturbances  $S_e$  is diagonal. The matrix  $A_0$  collects the coefficients and describes the contemporaneous relation among the variables collected in the vector  $X_t$ . In the literature this representation of the structural form is often called the *AB* model (Lütkepohl 2005). Without restrictions on the parameters in  $A_0$  and  $B$ , this structural model is not identified.

### The Recursive Approach

The order of variables in the vector of endogenous variable is important, because altering the order implicitly changes the relationship structure of innovations. In practice, the first variable should be that its future period's variance is best explained by its own structural innovations (which can be seen in variance decomposition). Therefore, it is common to place the variables by timeline of their occurrences, i.e. variables that are thought to occur first are placed first in the vector of endogenous variables. The restrictions in this identification scheme are imposed on the contemporaneous responses of the variables but the variables are free to respond in all other periods. In this identification scheme ordering of variables is extremely crucial for the results as outcome can change with the ordering of the variable. Precaution was taken using theoretical justification in deciding the ordering of the variables as it also defines the direction of causal relationship. The recursive approach restricts  $B$  to a  $k$ -dimensional identity matrix and  $A_0$  to a lower  $6 \times 6$  triangular matrix with percent diagonal, which implies the decomposition of the variance-covariance matrix  $\sum_u = A_0^{-1} \sum_e (A_0^{-1})'$ . This decomposition is obtained from the Cholesky factorization  $S_u = PP'$  by defining a diagonal matrix  $D$  which has the same main diagonal as  $P$  and by specifying  $A_0^{-1} = PD^{-1}$  and  $\sum_e = DD'$  i.e. the elements on the main diagonal of  $D$  and  $P$  are equal to the standard deviation of the respective structural shock. The recursive approach implies a causal ordering of the model variables. Note that there are  $k!$  possible orderings in total. In this study the ordering of the variables are as follows:

The Government fiscal variables (revenue and spending) are ordered first followed by interest rate, inflation, private investment, private consumption and lastly output sixth. This implies that the relation between the reduced-form disturbances  $u_t$  and the structural disturbances  $e_t$  takes the following form:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ * & 1 & 0 & 0 & 0 & 0 \\ * & * & 1 & 0 & 0 & 0 \\ * & * & * & 1 & 0 & 0 \\ * & * & * & * & 1 & 0 \\ * & * & * & * & * & 1 \end{bmatrix} \begin{bmatrix} u_t^{TR} \\ u_t^{INT} \\ u_t^{INF} \\ u_t^{PI} \\ u_t^{PC} \\ u_t^{GDP} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ * & 1 & 0 & 0 & 0 & 0 \\ * & * & 1 & 0 & 0 & 0 \\ * & * & * & 1 & 0 & 0 \\ * & * & * & * & 1 & 0 \\ * & * & * & * & * & 1 \end{bmatrix} \begin{bmatrix} e_t^{TR} \\ e_t^{INT} \\ e_t^{INF} \\ e_t^{PI} \\ e_t^{PC} \\ e_t^{GDP} \end{bmatrix} \dots\dots\dots(5)$$

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ * & 1 & 0 & 0 & 0 & 0 \\ * & * & 1 & 0 & 0 & 0 \\ * & * & * & 1 & 0 & 0 \\ * & * & * & * & 1 & 0 \\ * & * & * & * & * & 1 \end{bmatrix} \begin{bmatrix} u_t^{TE} \\ u_t^{INT} \\ u_t^{INF} \\ u_t^{PI} \\ u_t^{PC} \\ u_t^{GDP} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ * & 1 & 0 & 0 & 0 & 0 \\ * & * & 1 & 0 & 0 & 0 \\ * & * & * & 1 & 0 & 0 \\ * & * & * & * & 1 & 0 \\ * & * & * & * & * & 1 \end{bmatrix} \begin{bmatrix} e_t^{TE} \\ e_t^{INT} \\ e_t^{INF} \\ e_t^{PI} \\ e_t^{PC} \\ e_t^{GDP} \end{bmatrix} \dots\dots\dots(6)$$

#### 4. Data Analysis and Discussion of Findings

##### 4.1 Unit root test

The time series properties of the data used were subjected to test by employing using Augmented Dickey Fuller (ADF) and Philips and Perron (PP) tests to test for their unit roots. The results obtained are presented below:

**Table 1: Results of Stationary (Unit Root) Test**

Variables	Augmented Dickey Fuller (ADF)* t Statistic		Philip Perron*		Order of Integration (d*)
	With constant (No Trend)	With constant & Trend	With constant (No Trend)	With constant & Trend	
Δltr	-6.170029	-6.139989	-6.158976	-6.138788	I(1)
Δlte	-7.712691	-7.640727	-7.671210	-7.604570	I(1)
Δint	-2.652784	-7.066728	-6.990112	-7.081887	I(1)
Δinf	-7.071385	-7.048374	-16.44548	-16.20348	I(1)
Δlpi	-5.128057	-5.056642	-5.159609	-5.089831	I(1)
Δlpc	-4.760923	-4.733239	-4.696595	-4.665421	I(1)
Δlgdp	-5.359547	-5.276902	-5.354577	-5.271500	I(1)
Mackinnon Critical Values: 1st Difference					
1%=-3.615588	-3.615588	-4.219126	-3.615588	-4.219126	
5%=-2.941145	-2.941145	-3.533083	-2.941145	-3.533083	
10%=-2.609066	-2.609066	-3.198312	-2.609066	-3.198312	

Sources: Author's Computation

The implication from the results of the unit root test (table 1) is that all the variables expressed in logs are stationary at first difference, that is they are integrated of order one denoted by I (1).

#### 4.2 Co-integration Test

Table 2 reports results of the co-integration test obtained when the linear combination of variables as reflected in various VAR models were subjected to co integration tests.

**Table 2 Co-integration Rank test**

Model: (ltr lte lint linf lint lpi lpc lgdp)				
Eigen value	Likelihood Ratio	5 Percent Critical value	1 Percent Critical value	Hypothesis No. of CE(s)
0.868220	227.4938	125.62.	135.97	None**
0.783881	152.5087	95.75	104.96	At most 1**
0.578741	95.82746	69.82	77.82	At most 2**
0.550921	63.84067	47.86	54.68	At most 3**
0.402617	34.22078	29.80	35.46	At most 4
0.314934	15.15851	15.50	19.94	At most 5
0.030960	1.163638	3.84	6.64	At most 6

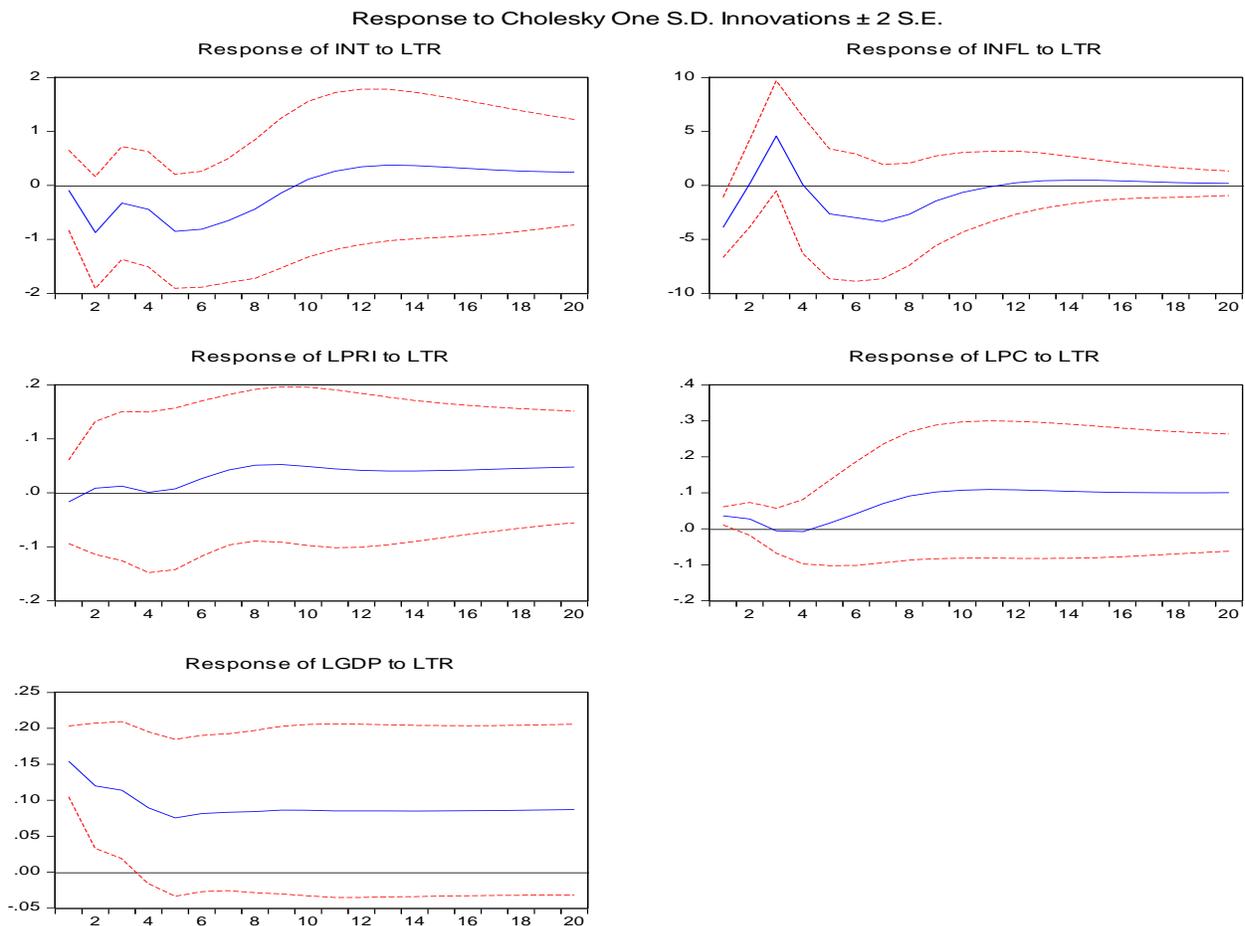
Source: Author's compilation

*Notes: \*\* denotes the rejection of the hypothesis at 5% (1%) significance level. CE(s) denotes the numbers of co-integrating equations. The test was concluded under the assumption of linear deterministic trend in the data. Sample: 1970-2009.*

Overall, at least one co integrating relation could be established among the model variables. However, the fact that there are long run relationships among the variables does not suggest the existence of any pattern of relations among the variables. The VAR in levels can be estimated irrespective of the order of integration and co-integration properties with ordinary least squares (Breitung, 2000) and the appropriate confidence intervals for the impulse responses can be obtained using a suitable Bootstrap procedure. To establish this pattern, the impulse response function (IRF) was derived.

#### Results of SVAR Impulse Response Functions from the Recursive Approach

This section reports the Impulse Response Functions of the estimated coefficients of the contemporaneous relations between fiscal shocks and economic variables, using the recursive approach suggested by Sims (1980). For each of the variables, the horizontal axis of the IRF graph shows the number of periods that have passed after the impulse have been given, while the vertical axis measures the response of relevant variable. Dashed lines represent the intervals of two standard deviations, while the solid lines represent the impulse function. Results obtained are presented in Figures 1 and 2 below.



**Figure 1 Impulse responses after a government revenue shock**

Note: Solid line indicates SVAR impulse responses while broken lines indicate 95% Hall's Percentile confidence intervals calculated with 1000 Bootstrap procedure.

### 4.3 The effects of government revenue on Economic Activities

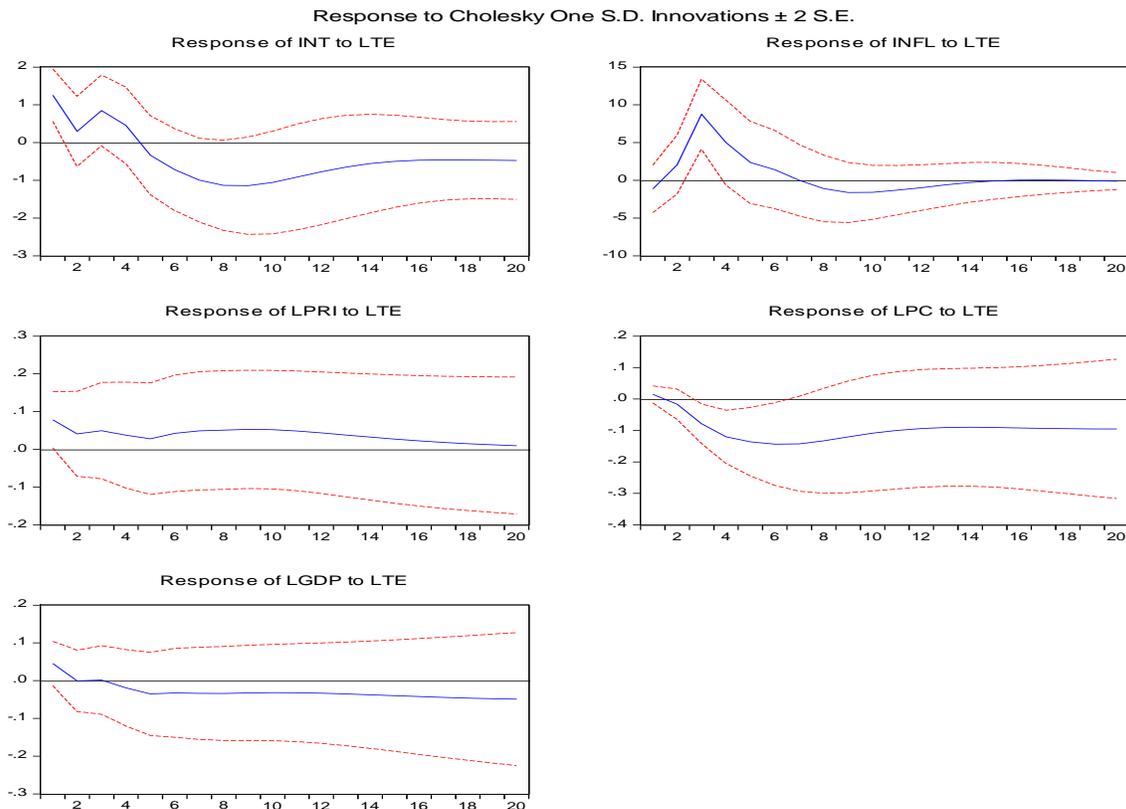
The result of the impulse responses of private consumption, private investment and Gross Domestic Product to a government revenue shock is presented in figure 1 and table 3. A standard deviation shock to government revenue leads to a negative response of nominal interest rates in the short term, but positive and significant in long term in this respect a revenue impulse appears trigger a reduction in interest rate by the monetary authorities. The only explanation appears through the will of Central Bank to face the deflationary risk. This observation is also the same reaction for inflation rate which was also negative in most of the years. A positive revenue shock involves a fall of level prices in the short run. This deflationary profile ended up being cancelled in the medium term. In the long run the cumulative effect becomes non significant.

A one standard deviation government revenue shock leads to negative response of private investment in the short run, increased persistently, turn positive remained persistent, and does not disappear even after the twentieth period. The response of private consumption was positive to government revenue shock by increasing initially statistically insignificantly in the first period, then decline and increased steadily as time passes by and remain persistent but dwindle in the long

run. The response of GDP to the revenue shock although positive throughout the periods was significant in the first three periods due to the parallel increase of government expenditure, but fades thereafter in the long run to become insignificant (figure 1). The increase in the private sector activity as a response to positive government revenue shock (or a policy that increases public sector revenues) found here is more in line with Keynesian view; although is generally thought that increases in government revenue (taxes) decreases economic activity. The results found for the response of the private sector activity mimics that of GDP response to similar shock in the long run.

#### 4.4 The effects of government expenditure shocks on Economic Activities

Looking at figure 2 and considering just the shape of the impulses; it should be highlighted first that the expenditure shock turns out to be very persistently negative on, interest rate, inflation, private consumption and GDP but positive on private investment. Interest rates decrease persistently following a positive shock to government expenditure (figure 2). The evidence from the effects of government spending shocks on prices or inflation is rather mixed; the results show that there was relatively large positive effect on inflation stemming from government expenditure shocks in the short-run. This is consistent with those findings from macro models for Spain, which find relatively large positive effects on inflation stemming from government expenditure shocks (Estrada et al., 2004; Henry et al., 2004). In the long run however, this effect became negative.



**Figure 2: Impulse responses after a government Expenditure Shock**

*Note: Solid line indicates SVAR impulse responses while broken lines indicate 95% Hall's Percentile confidence intervals calculated with 1000 Bootstrap procedure.*

The response of private consumption and GDP were negative and persistent throughout the periods both in the short and long term except in the first period when it was positive but insignificant. The negative findings on the effect of the government expenditure on private consumption is in line with the study by Baxter and King (1993) Ramey (2007) and Furceri and Sousa (2009), Coenen and Straub (2005) and Barro (1991).

On the response of private investment; a shock to government spending triggers a positive response of private investment throughout the periods, unveiling a sizeable crowding-in effect; though this effect dwindles in the long run This result is in line with the accelerator hypothesis that private investment increases after government shocks. It is worth noting that the behavior of private consumption mimics that of GDP: it typically decreases on impact. Some slight differences may be observed though, particularly in the long-run behavior (figure 2). The responses of economic activities to a government spending shock found in this section is in support of the RBC models of the neoclassical which typically predicts a negative or 'crowd-out' effects of government spending on private consumption and GDP and a positive response of private investment.

#### **4.5 Robustness checks**

A variety of robustness checks were carried out with the aim of verifying the reliability of the SVAR model estimated. The following tests were carried out: VAR Residual Serial Correlation LM tests, VAR residual heteroscedasticity tests, VAR residual normality tests and AR root stability. The results of each of the tests confirmed the null hypotheses of the absence of serial correlation, heteroscedasticity and non-normality. The results provide to a large extent evidence of robustness of the model to the violations of the assumptions of ordinary least squares Additional robustness check was performed on the two 6 variables benchmark SVAR models by using a different ordering of the fiscal policy variables in the identification of the fiscal shocks. The results obtained with this alternative specification were very close to those of the benchmark model. When the effects of the ordering of the variables and all other factors in the model specification are considered, it can be concluded that the impulse responses obtained from this framework are robust.

#### **5. Conclusion**

This paper contribute to the empirical literature on the effect of fiscal policy shocks on economic activity in Nigeria, by investigating the impact of changes in government revenue and spending on GDP, private consumption and investment using time series data for the period 1970 to 2009.

To empirically determine the fiscal policy shocks and its effects on economic activity, the study employed Structural Vector Auto regression (SVAR). The findings that emerged from the empirical analyses indicate a positive and a relatively low statistical significance of government revenue shocks upon economic activities and a short-lived impact of innovations. While the effect of government expenditure shock on economic activities was found to be negative on interest rate, inflation rate, private consumption and GDP, but positive and statistically insignificant on private investment; indicating that expansive fiscal policy has no significant or substantial effect on boosting the economy. Consequently, the empirical evidence confirms theoretically that the predictions of the standard RBC models can be taken as valid in Nigeria: since the findings from

our study are in conformity with the predictions of the RBC models of a fall in private consumption and output but a rise in investment. This result points to the fact that fiscal policy in the course of the last decades has become less effective in stimulating output in Nigeria; and indeed can slowdown economic growth. The study therefore concludes that a one-off changes in government revenue and spending in Nigeria is short-lived and cannot be used in isolation to support economic activity.

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# *A microeconomic formulation of financial support for cultural and artistic activities*

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**Shuhei Shiozawa**

*Keio University, Tokyo, Japan*

*email:shiozawa@econ.keio.ac.jp*

## **Abstract**

We discuss behaviors of artistic institutions that perform artistic activities, and behaviors of supporting institutions that financially support artistic institutions. It is quite difficult to evaluate artistic activities. Profit does not necessarily reflect qualities. Since some artistic activities cannot be performed without any financial support, evaluations of qualities are quite important for determining financial supports. We suppose that qualities can be expressed by two parameters, and show that behaviors of artistic institutions depend on financial support, and that the behaviors of supporting institutions depend on how they expect behaviors of artistic institutions. Optimal qualities for supporting institutions are not necessarily performed by artistic institutions. So we consider bargaining process between artistic institutions and supporting institutions to find equilibrium.

**Key words:** artistic institution, supporting institution, quality of artistic activities, evaluation of quality, bargaining process

## 1. Introduction

In this paper we discuss behaviors of artistic institutions like orchestra or opera house that perform artistic activities, and behaviors of institutions like foundation or local government that financially support artistic institutions. In general, it is quite difficult to evaluate artistic activities. Some artistic activities cannot be performed without any financial support from outside. Hence evaluations of qualities of artistic activities are quite important for determining financial supports.

Most economic formulations concerning about donation or altruistic activities are divided into three categories depending on the forms of utility functions, that is, public good model, warm glow model and impact philanthropy model. In the public good model, utility of each consumer depends on consumption of private goods and public goods. In the warm glow model, Andreoni [1990] adopts the utility function, which depends on consumption of private goods and amount of donation of her or him self. In the impact philanthropy model, Duncan [2004] formulates the utility function, which depends on consumption of private goods and influence of her or his donation to total donation of the society. In these models, qualities of public goods produced by donation, and budget constraints of recipients are not considered explicitly. Shiozawa [2014] formulates behaviors of social enterprise as supplying differentiated goods, of which quality is denoted by one parameter, to maximize social surplus under zero profit constraint.

Here, we formulate behaviors of artistic institutions and supporting institutions concerning about financial support for artistic activities, considering qualities of such activities explicitly. We suppose that qualities can be expressed by two parameters. Evaluations by consumers are expressed by revenue from performances by artistic institutions, depending on the two parameters. Given revenue functions, artistic institutions choose qualities, and supporting institutions determine amounts of financial supports.

In Section 2, we express qualities of artistic activities by two parameters and define revenue function, cost function and evaluation function of artistic institutions. And we formulate behaviors of artistic institutions, under nonnegative profit constraint.

In Section 3, we define evaluation function of supporting institutions, and formulate behaviors to determine financial supports. We show that amounts of support depend on how they expect behaviors of artistic institutions. In Section 4, we consider bargaining process between a artistic institution and a supporting institution concerning about qualities and amount of financial support to get an equilibrium, and discuss stability condition. In Section 5, some concluding remarks are mentioned.

## 2. Behaviors of artistic institutions

### 2-1. Qualities of artistic activities

Consider artistic activities like performing opera or concerts. We suppose that the qualities of such artistic performances can be characterized by two parameters  $\alpha_1$  and  $\alpha_2$ . The parameter  $\alpha_1$  denotes titles or programs of the performance. For example,  $\alpha_1$  is corresponding to “The Planets” by G. Horst, or “The Magic Flute” by W. A. Mozart. Some of them are very popular and some of them are not. And some of them are expected to make a lot of profit and some of them

are not. On the other hand, the parameter  $\alpha_2$  denotes quality in a narrow sense. For example,  $\alpha_2$  is corresponding to length of time for rehearsal, or quality of stage setting. The cost of performance depends on  $\alpha_2$ . The parameter  $\alpha_1$  is announced before the performance and recognized by potential consumers. The parameter  $\alpha_2$  is not so explicit like  $\alpha_1$ , but it also affects revenue.

## 2-2. Revenue and preference of artistic institutions

The revenue of each artistic institution from a performance depends on the parameters  $\alpha_1$  and  $\alpha_2$ , and can be denoted by the revenue function

$$R(\alpha_1, \alpha_2) \tag{1}$$

The cost of a performance depends only on the parameter  $\alpha_2$ , and can be denoted by the cost function

$$C(\alpha_2) \tag{2}$$

The profit is defined as revenue minus cost.

$$\pi(\alpha_1, \alpha_2) \equiv R(\alpha_1, \alpha_2) - C(\alpha_2) \tag{3}$$

Then we introduce the following assumptions.

*Assumption 1.*  $R(\alpha_1, \alpha_2)$  is twice differentiable and

$$R_1(0, \alpha_2) \equiv \frac{\partial R(0, \alpha_2)}{\partial \alpha_1} > 0,$$

$$R_{11}(\alpha_1, \alpha_2) \equiv \frac{\partial^2 R(\alpha_1, \alpha_2)}{\partial \alpha_1^2} < 0$$

$$R_2(\alpha_1, \alpha_2) \equiv \frac{\partial R(\alpha_1, \alpha_2)}{\partial \alpha_2} > 0, R_{22}(\alpha_1, \alpha_2) \equiv \frac{\partial^2 R(\alpha_1, \alpha_2)}{\partial \alpha_2^2} < 0,$$

$$R_{12} \equiv \frac{\partial^2 R(\alpha_1, \alpha_2)}{\partial \alpha_1 \partial \alpha_2} = 0,$$

$$\exists \alpha_1^R \text{ such that } \frac{\partial R(\alpha_1^R, \alpha_2)}{\partial \alpha_1} = 0.$$

*Assumption 2.*  $C(\alpha_2) = c\alpha_2 + \bar{C}$ ,  $c > 0$ ,  $\bar{C} > 0$ .

*Assumption 3.* There exist  $\alpha_1^{\bar{0}}$ ,  $\alpha_1^0$  and  $\alpha_2^{\pi}$  such that

(i) for any  $\alpha_1 > \alpha_1^{\bar{0}}$ ,  $R(\alpha_1, \alpha_2) - c\alpha_2 - \bar{C} < 0, \forall \alpha_2$ ,

(ii) for any  $\alpha_1 < \alpha_1^0$ ,  $R(\alpha_1, \alpha_2) - c\alpha_2 - \bar{C} < 0, \forall \alpha_2$ ,

(iii)  $R_2(\alpha_1, \alpha_2^\pi) - c = 0$ 、

(iv)  $R(\alpha_1^R, \alpha_2^\pi) - c\alpha_2^\pi - \bar{C} > 0$  .

Assumption 3 indicates the range of artistic activities that can be performed without any financial support.

We can define the set of  $(\alpha_1, \alpha_2)$ , which makes a same amount of profit.

$$\{(\alpha_1, \alpha_2) : \pi((\alpha_1, \alpha_2)) = \bar{\pi}\} \tag{4}$$

That is an iso-profit curve for the artistic institution. The slope of the curve is derived by

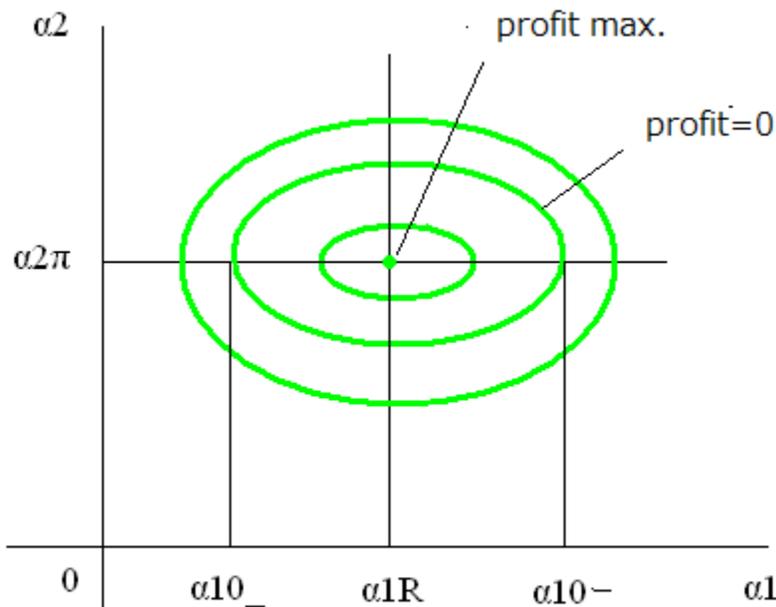
$$\frac{\partial \pi}{\partial \alpha_1} d\alpha_1 + \frac{\partial \pi}{\partial \alpha_2} d\alpha_2 = R_1 d\alpha_1 + (R_2 - c) d\alpha_2 = 0 \tag{5}$$

so that

$$\frac{d\alpha_2}{d\alpha_1} = -\frac{R_1}{R_2 - c} \tag{6}$$

By Assumptions 1~3, the shape of iso-profit curves is as shown in Figure 1.

Figure 1.



Artistic institutions are supposed to have their own preferences on qualities of their performances. For each institution, the preference is represented by a function. We denote the preference function of an artistic institution by

$$F(\alpha_1, \alpha_2) \tag{7}$$

We introduce the following assumption on the preference function.

*Assumption 4.*  $F(\alpha_1, \alpha_2)$  is twice differentiable and

$$F_1(0, \alpha_2) > 0, F_{11} < 0,$$

$$F_2 > 0, F_{22} < 0, \lim_{\alpha_2 \rightarrow 0} F_2 = \infty, \lim_{\alpha_2 \rightarrow \infty} F_2 = 0,$$

$$F_{12} = 0,$$

$$\exists \alpha_1^F > \alpha_1^R \text{ such that } F_1(\alpha_1^F, \alpha_2) = 0.$$

The last part of this assumption  $\alpha_1^F > \alpha_1^R$  implies the difference between popularity and specialty of the programs in some sense, though it depends on the definition of quality.

For the artistic institution, we define the set of  $(\alpha_1, \alpha_2)$ , which has the same preference level, as

$$\{(\alpha_1, \alpha_2) : F((\alpha_1, \alpha_2)) = \bar{F}\} \tag{8}$$

That is an indifference curve, and the slope of the curve is given by

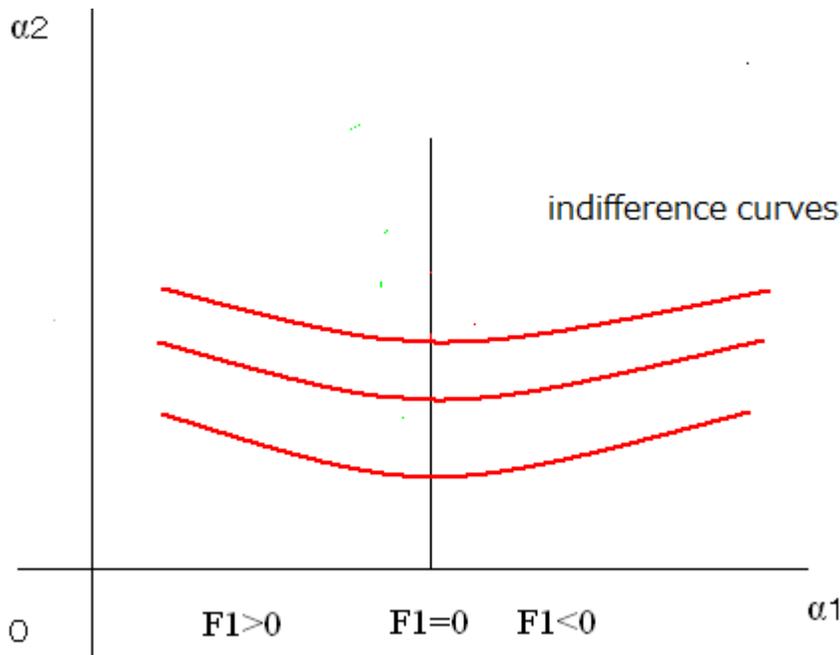
$$F_1 d\alpha_1 + F_2 d\alpha_2 = 0 \tag{9}$$

so that

$$\frac{d\alpha_2}{d\alpha_1} = -\frac{F_1}{F_2} \tag{10}$$

By Assumption 4, the shape of the indifference curves is as shown in Figure 2.

Figure 2.



### 2-3. Optimization problems of an artistic institution

We suppose that artistic institutions are maximizing their objective functions, which are composed of their own preferences and profits, under the condition that the profits including financial support from outside are nonnegative.

The objective function of the artistic institution is expressed as

$$\varphi(\alpha_1, \alpha_2) = aF(\alpha_1, \alpha_2) + (1-a)\{R(\alpha_1, \alpha_2) - C(\alpha_2) + z\} \quad (11)$$

Here the parameter  $a$  is the weight for evaluating its own preference and profit. When  $a = 0$ , its objective is just profit maximization. When  $a = 1$ , profit level does not affect its objective directly.

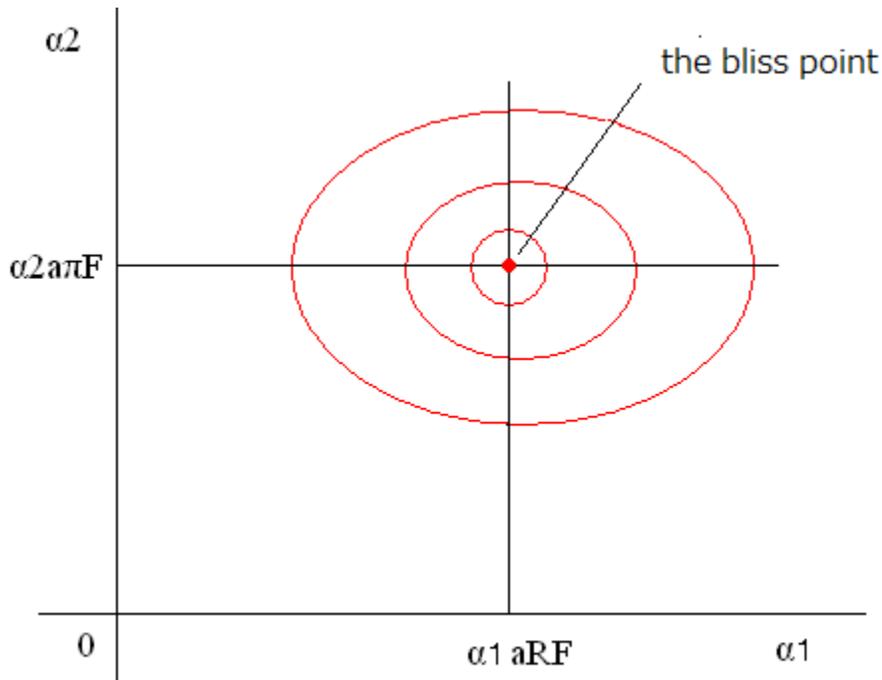
For objective function (11), the slope of indifference curves of the artistic institution is denoted by

$$\frac{d\alpha_1}{d\alpha_2} = -\frac{aF_1 + (1-a)R_1}{aF_2 + (1-a)\{R_2 - c\}} \quad (12)$$

*Definition 1.* We denote the level of  $\alpha_1$  with  $aF_1 + (1-a)R_1 = 0$  by  $\alpha_1^{aRF}$ , and the level of  $\alpha_2$  with  $aF_2 + (1-a)\{R_2 - c\} = 0$  by  $\alpha_2^{a\pi F}$ . The point  $(\alpha_1^{aRF}, \alpha_2^{a\pi F})$  maximizes the objective function (11). We call  $(\alpha_1^{aRF}, \alpha_2^{a\pi F})$  the *bliss point* of the artistic institution.

Under Assumptions 1~4, the shape of indifference curves, that is, the set of  $(\alpha_1, \alpha_2)$  which has the same value of the objective function (11), is as shown in Figure 3.

Figure 3.



**2-4. The case of profit maximization ( $a = 0$ )**

In this case, the artistic institution chooses  $(\alpha_1^R, \alpha_2^\pi)$  to maximize profit. This is the bliss point in the case where  $a = 0$ . Here,  $\alpha_1^R$  is the level of quality  $\alpha_1$ , which maximizes revenue. And  $\alpha_2^\pi$  is the level of  $\alpha_2$  with  $R_2(\alpha_1, \alpha_2^\pi) - c = 0$ , that is, the marginal revenue equals the marginal cost.

**2-5. The case where the objective depends on both profit and its own preferences ( $0 < a < 1$ )**

The artistic institution chooses  $\alpha_1$  and  $\alpha_2$  to maximize the objective function (11) under the constraint that the profit level including financial support  $z$  from outside of the institution should be nonnegative. The constrained optimization problem is the following.

$$\begin{aligned} \max. & aF(\alpha_1, \alpha_2) + (1-a)\{R(\alpha_1, \alpha_2) - c\alpha_2 + z\} \\ \text{s.t.} & R(\alpha_1, \alpha_2) - C(\alpha_2) + z \geq 0 \end{aligned} \tag{13}$$

For the artistic institution, optimal quality  $(\alpha_1, \alpha_2)$  without any constraint should satisfy the following first order conditions

$$aF_1 + (1-a)R_1 = 0 \tag{14}$$

$$aF_2 + (1-a)\{R_2 - c\} = 0 \quad (15)$$

The bliss point  $(\alpha_1^{aRF}, \alpha_2^{a\pi F})$  satisfies these conditions. Therefore if the profit from performing the bliss point is nonnegative, that is

$$R(\alpha_1^{aRF}, \alpha_2^{a\pi F}) - c\alpha_2^{a\pi F} - \bar{C} \geq 0 \quad (16)$$

then the artistic institution chooses the bliss point  $(\alpha_1^{aRF}, \alpha_2^{a\pi F})$ .

On the other hand, if the profit from performing the bliss point is negative, that is

$$R(\alpha_1^{aRF}, \alpha_2^{a\pi F}) - c\alpha_2^{a\pi F} - \bar{C} < 0 \quad (17)$$

then the artistic institution can not realize the bliss point without any financial support. We define the amount of financial support  $z_0$  by

$$z_0 = -\{R(\alpha_1^{aRF}, \alpha_2^{a\pi F}) - c\alpha_2^{a\pi F} - \bar{C}\} \quad (18)$$

This is the amount of deficit when the artistic institution performs the bliss point. When the amount of financial support is equal to or greater than  $z_0$ , then the artistic institution would choose the bliss point. When the amount of financial support is less than  $z_0$ ,

$$R(\alpha_1^{aRF}, \alpha_2^{a\pi F}) - c\alpha_2^{a\pi F} - \bar{C} + z < 0 \quad (19)$$

the artistic institution cannot choose the bliss point. Then the constraint of (13) holds with an equal sign, and the first order conditions are the following.

$$\frac{aF_1 + (1-a)R_1}{aF_2 + (1-a)\{R_2 - c\}} = \frac{R_1}{R_2 - c} \quad (20)$$

$$R(\alpha_1, \alpha_2) - C(\alpha_2) + z = 0 \quad (21)$$

These conditions imply that an indifference curve is tangent to an iso-profit curve at an optimal point.

For qualities less than the bliss point  $\alpha_1 < \alpha_1^{aRF}, \alpha_2 < \alpha_2^{aRF}$  we have

$$\frac{\partial \varphi}{\partial \alpha_1} > 0 \quad (22)$$

$$\frac{\partial \varphi}{\partial \alpha_2} > 0 \quad (23)$$

by Assumptions 1~4, as shown in Figure 3. That is, higher qualities lead higher evaluation. Hence among the combinations of  $(\alpha_1, \alpha_2)$ , which satisfy the first order conditions (20) and (22), the artistic institution would choose  $(\alpha_1, \alpha_2)$  with  $\alpha_1 > \alpha_1^R, \alpha_2 > \alpha_2^\pi$  as shown in Figure 4. And the optimal combination of qualities is denoted by a tangent point of an

indifference curve to an iso-profit curve. Among such tangent combinations of qualities, we define  $(\alpha_1^0, \alpha_2^0)$ , which makes zero profit, by

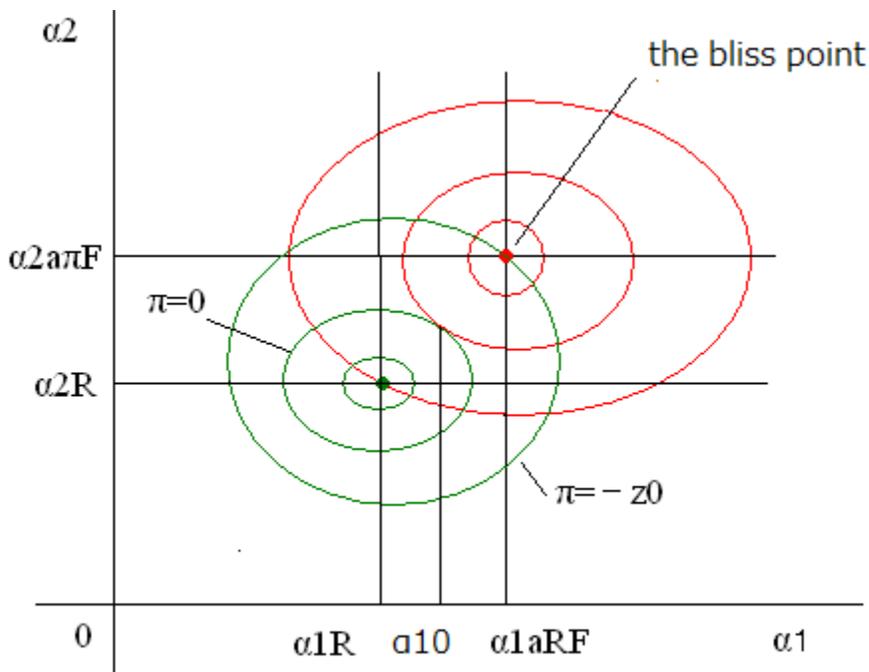
$$\alpha_1^0 > \alpha_1^R, \alpha_2^0 > \alpha_2^\pi \tag{24}$$

$$R(\alpha_1^0, \alpha_2^0) - C(\alpha_2^0) = 0 \tag{25}$$

Then we can derive the following proposition.

*Proposition 1.* Under Assumptions 1~4, for the artistic institution which maximizes its objective function composed of profit and its own preferences, when the amount of financial support is 0, it chooses  $(\alpha_1^0, \alpha_2^0)$ . As the amount of financial support increases, an optimal combination of qualities approaches to the bliss point  $(\alpha_1^{aRF}, \alpha_2^{a\pi F})$ , and when the amount of financial support is equal or greater than  $z_0$ , an optimal combination of qualities stays at the bliss point.

Figure 4.



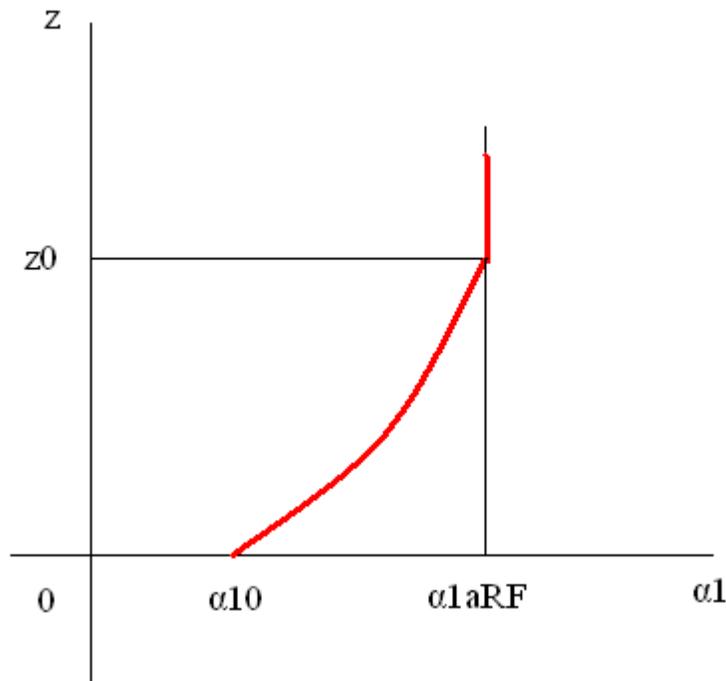
*Definition 2.* Given the amount of financial support  $z$  determined by the supporting institution, the function

$$\alpha_1 = f(z)$$

denotes the optimal level of  $\alpha_1$ , which is a solution of the optimization problem of the artistic institution. We call it the best reply function of the artistic institution.

We will discuss the best reply function in later section. By Proposition 1, the graph of the best reply function is as shown in Figure 5.

Figure 5.



**2-6. The case where the objective depends only on its own preferences ( $a = 1$ ).**

In this case, the artistic institution behaves an NPO, which can not distribute profit. As shown in Figure 2, there is no bliss point. The optimization problem is

$$\begin{aligned} \max. & F(\alpha_1, \alpha_2) \\ \text{s.t.} & \pi(\alpha_1, \alpha_2) + z \geq 0 \end{aligned} \tag{26}$$

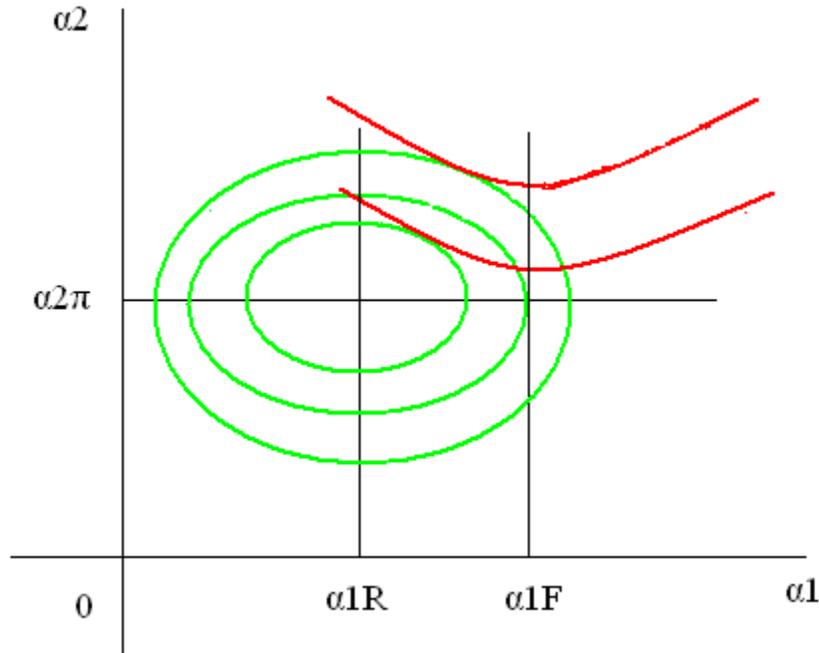
The first order condition for (26) is a special case of (20) and denoted by

$$\frac{F_1}{F_2} = \frac{R_1}{R_2 - c} \tag{27}$$

As shown in Figure 6, a solution is denoted by a tangent point of an indifferent curve to an iso-profit curve. Since there is no bliss point we can derive the following proposition.

*Proposition 2.* Under Assumptions 1~4 and the nonnegative profit constraint, when the artistic institution maximizes its own preferences, as amount of financial support increases an optimal quality  $\alpha_1$  approaches  $\alpha_1^F$  but not coincide with it, and an optimal quality  $\alpha_2$  always increases..

Figure 6.



### 3. Behaviors of supporting institutions

#### 3-1. Qualities of artistic activities for supporting institutions

We suppose that supporting institutions determine amounts of financial support based on their own preferences or evaluation on qualities of artistic activities  $(\alpha_1, \alpha_2)$ . We denote the evaluation function of the supporting institution by  $H(\alpha_1, \alpha_2)$ , and introduce the following assumption.

*Assumption 5.*  $H(\alpha_1, \alpha_2)$  is differentiable and

$$\begin{aligned}
 &H_1(0, \alpha_2) > 0, H_{11} < 0, \\
 &H_2 > 0, H_{22} < 0, \lim_{\alpha_2 \rightarrow 0} H_2 = \infty, \lim_{\alpha_2 \rightarrow \infty} H_2 = 0, \\
 &H_{12} = 0, \\
 &\exists \alpha_1^H \text{ such that } H_1(\alpha_1^H, \alpha_2) = 0, \alpha_1^R < \alpha_1^H < \alpha_1^F.
 \end{aligned}$$

The last part of this assumption  $\alpha_1^R < \alpha_1^H < \alpha_1^F$  depends on the definition of quality, as the last part of Assumption 4. It could be said that the best quality  $\alpha_1$  for the supporting institution is between the revenue maximizing quality and the best quality for the artistic institution in some sense.

#### 3-2. The case where the amount of financial support is determined passively

There may be a couple of ways to determine amounts of financial support. First, consider the case where given a quality level  $\bar{\alpha}_1$  determined by the artistic institution, the

supporting institution determines the amount of financial support to realize the performance of the quality  $\bar{\alpha}_1$  and to minimize deficit. By Assumption 3, when the quality  $\bar{\alpha}_1$  determined by the artistic institution is greater than  $\alpha_1^0$ , or less than  $\alpha_1^0$ , then for any level of  $\alpha_2$  the profit is negative, so that the artistic institution can not perform  $\bar{\alpha}_1$  without any financial support from outside. In this case, the supporting institution chooses the level of quality  $\alpha_2$  to minimize deficit, and determines the amount of financial support equal to the deficit. The problem is

$$\max. R(\bar{\alpha}_1, \alpha_2) - c\alpha_2 - \bar{C} \quad (28)$$

The first order condition is

$$R_2(\bar{\alpha}_1, \alpha_2) - c = 0 \quad (29)$$

The solution of problem (28) is  $\alpha_2^\pi$ , and the amount of financial support is

$$z = -R\{\bar{\alpha}_1, \alpha_2^\pi\} + c\alpha_2^\pi \quad (30)$$

Then we can derive the following proposition.

*Proposition 3.* Under Assumptions 1~4, when the supporting institution determines the amount of financial support to realize the performance of the quality  $\bar{\alpha}_1$  and to minimize deficit, given a quality level  $\bar{\alpha}_1$  determined by the artistic institution, then the amount of financial support reaches the minimum level at  $\bar{\alpha}_1 = \alpha_1^0$  or  $\bar{\alpha}_1 = \alpha_1^0$ , and as  $\bar{\alpha}_1$  departs from  $\alpha_1^0$  or  $\alpha_1^0$ , the amount of financial support increases.

Next, we consider the case where the supporting institution maximizes net evaluations  $H(\bar{\alpha}_1, \alpha_2) - z$  of its own preference, given the level of  $\bar{\alpha}_1$  determined by the artistic institution. As stated before, by Assumption 3, when  $\bar{\alpha}_1 > \alpha_1^0$  or  $\bar{\alpha}_1 < \alpha_1^0$ , the artistic institution cannot make nonnegative profit for any level of  $\alpha_2$ , so that the artistic institution cannot perform  $\bar{\alpha}_1$  without any financial support. In this case, the supporting institution does not necessarily determine the amount of financial support to minimize the deficit. The problem is

$$\begin{aligned} \max. & H(\bar{\alpha}_1, \alpha_2) - z \\ \text{s.t.} & R(\bar{\alpha}_1, \alpha_2) - c\alpha_2 - \bar{C} + z \geq 0 \end{aligned} \quad (31)$$

The first order condition is

$$H_2(\bar{\alpha}_1, \alpha_2) + R_2(\bar{\alpha}_1, \alpha_2) = c \quad (32)$$

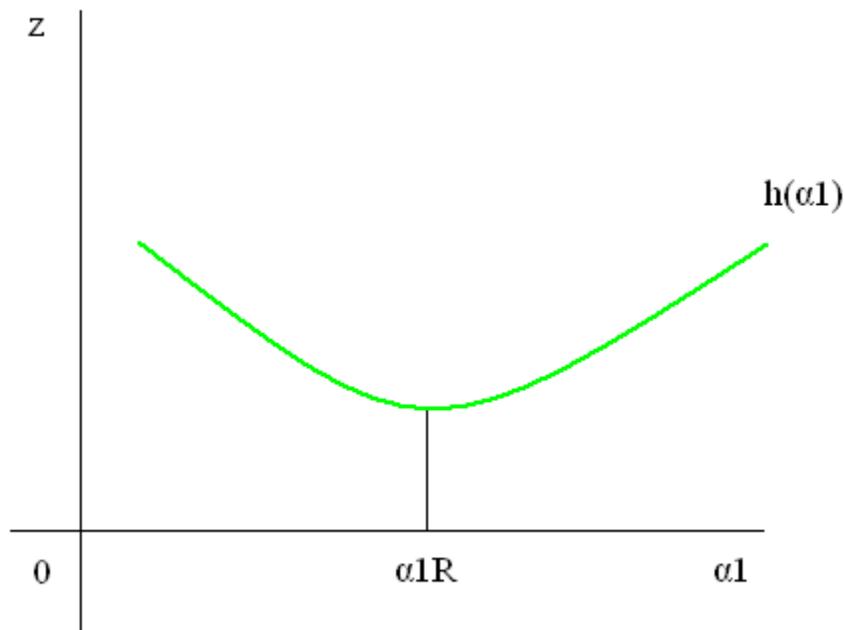
We denote the solution of this problem by  $\alpha_2^{RH}$ , which satisfies the condition (32).  $\alpha_2^{RH}$  is the level of  $\alpha_2$  such that the marginal benefit of financial support is equal to the marginal cost of financial support for the supporting institution. The amount of financial support is equal to the deficit when the artistic institution performs  $\bar{\alpha}_1$  and  $\alpha_2^{RH}$ . That is

$$z = -R(\bar{\alpha}_1, \alpha_2^{RH}) + c\alpha_2^{RH} + \bar{C} \quad (33)$$

By Assumptions 1 and 2, as the quality  $\bar{\alpha}_1$  determined by the artistic institution changes, the revenue  $R(\bar{\alpha}_1, \alpha_2^{RH})$  changes so that the amount of financial support (33) changes. Then we can derive the following proposition.

*Proposition 4.* Under Assumptions 1~4, when the supporting institution determines the amount of financial support to maximize its net evaluation given  $\bar{\alpha}_1$  determined by the artistic institution, the amount of financial support is minimized at  $\alpha_1 = \alpha_1^R$ , and as  $\alpha_1$  departs from  $\alpha_1^R$ , the amount of financial support increases.

Figure 7.



*Definition 3.* Given the level of quality  $\alpha_1$  determined by the artistic institution, the function

$$z = h(\alpha_1)$$

denotes the optimal amount of financial support  $z$ , which is a solution of the optimization problem of the supporting institution. We call it the best reply function of the supporting institution.

We will consider this function in Section 4.

### 3-3. The case where supporting institution chooses quality $\alpha_1$ to maximize its own preferences.

We consider two cases, where the supporting institution chooses quality  $\alpha_1$  to maximize its own preference and makes up the deficit.

First, consider the case where the supporting institution chooses quality  $(\alpha_1, \alpha_2)$  to maximize its own preference under the constraint that the amount of financial support, which is the deficit, is equal to given budget of  $\bar{z}$ . The problem is

$$\begin{aligned} \max. & H(\alpha_1, \alpha_2) \\ \text{s.t.} & \bar{z} + R(\alpha_1, \alpha_2) - c\alpha_2 - \bar{C} = 0 \end{aligned} \quad (34)$$

The first order condition is

$$\frac{H_1}{H_2} = \frac{R_1}{R_2 - c} \quad (35)$$

This implies that the optimal quality is given at the point where an indifference curve is tangent to an iso-profit curve. The amount of financial support that satisfies the condition (35) depends on the amount of budget  $\bar{z}$ . Then we can derive the following proposition.

*Proposition 5.* When the supporting institution chooses quality  $(\alpha_1, \alpha_2)$  to maximize its own preference under the constraint that the amount of financial support, which is the deficit, is equal to given budget of  $\bar{z}$ , then optimal quality  $\alpha_1$  approaches to  $\alpha_1^H$  but never reaches it, and  $\alpha_2$  always increases, as the amount of budget increases.

However the qualities  $\alpha_1$  and  $\alpha_2$  derived in Proposition 5 are optimal only for the supporting institution. As we see in Propositions 1 or 2, the artistic institution does not necessarily choose such qualities when it gets the financial support  $\bar{z}$ .

For the supporting institution, the best quality is  $\alpha_1^H$  by Assumption 5. Then we consider the case where the supporting institution chooses  $\alpha_1^H$  first, and then determines the level of  $\alpha_2$  to maximize the net evaluation by supporting the amount of deficit. The amount of financial support is

$$z = -R(\alpha_1^H, \alpha_2) + c\alpha_2 + \bar{C} \quad (36)$$

And the net evaluation is  $H(\alpha_1^H, \alpha_2) - z$ . So the problem is

$$\max. H(\alpha_1^H, \alpha_2) + R(\alpha_1^H, \alpha_2) - c\alpha_2 - \bar{C} \quad (37)$$

The first order condition is

$$H_2(\alpha_1^H, \alpha_2) + R_2(\alpha_1^H, \alpha_2) = c \quad (38)$$

The level of  $\alpha_2$ , which satisfies (38), is  $\alpha_2^{RH}$  and it also satisfies (32) by Assumptions 1 and 5. And the amount of financial support is equal to the amount of deficit.

$$z = -R\{\alpha_1^H, \alpha_2^{RH}(\alpha_1^H)\} + c\alpha_2^{RH} + \bar{C} \quad (39)$$

Then we consider the case where the supporting institution chooses  $(\alpha_1, \alpha_2)$  to maximize its net evaluation  $H(\alpha_1, \alpha_2) - z$  under the nonnegative profit constraint for the artistic institution. The problem is

$$\begin{aligned} \max. & H(\alpha_1, \alpha_2) - z \\ \text{s.t.} & R(\alpha_1, \alpha_2) - c\alpha_2 + z \geq 0 \end{aligned} \quad (40)$$

The first order conditions are

$$H_1 = -R_1 \quad (41)$$

$$H_2 + R_2 = c \quad (42)$$

When conditions (41) and (42) are satisfied, condition (35) is also satisfied. We denote the level of  $\alpha_1$ , which satisfies these conditions, by  $\alpha_1^{RH}$ . In this case, the condition (42) for the optimal level of  $\alpha_2$  is as same as condition (32) or (38), so that the marginal benefit  $H_2$  of financial support is equal to the marginal cost  $-R_2 + c$  of financial support. The amount of financial support is

$$z = -R(\alpha_1^{RH}, \alpha_2^{RH}) - c\alpha_2^{RH} - \bar{C} \quad (43)$$

Hence we can derive the following proposition.

**Proposition 6.** Under Assumptions 1~3 and 5, when the supporting institution determines the amount of financial support to maximize its net evaluation, the optimal level of  $\alpha_1$  for the supporting institution is between the preference maximizing level and the profit maximizing level. And the optimal level of  $\alpha_2$  is such that the marginal benefit of financial support is equal to the marginal cost of financial support.

#### 3-4. The case where the supporting institution considers behaviors of the artistic institution

Since the level of quality discussed in Section 3-3 is optimal for the supporting institution, it is not necessarily adapted by the artistic institution. Hence we consider the case, where the supporting institution maximizes its net evaluation given the best reply function  $\alpha_1 = f(z)$  of the artistic institution by Definition 2 in Section 2. In such a case, the artistic institution is optimizing under the nonnegative profit constraint given the amount of financial support  $z$ .

The problem is

$$\max. H\{f(z), \alpha_2\} - z \quad (44)$$

The first order condition is

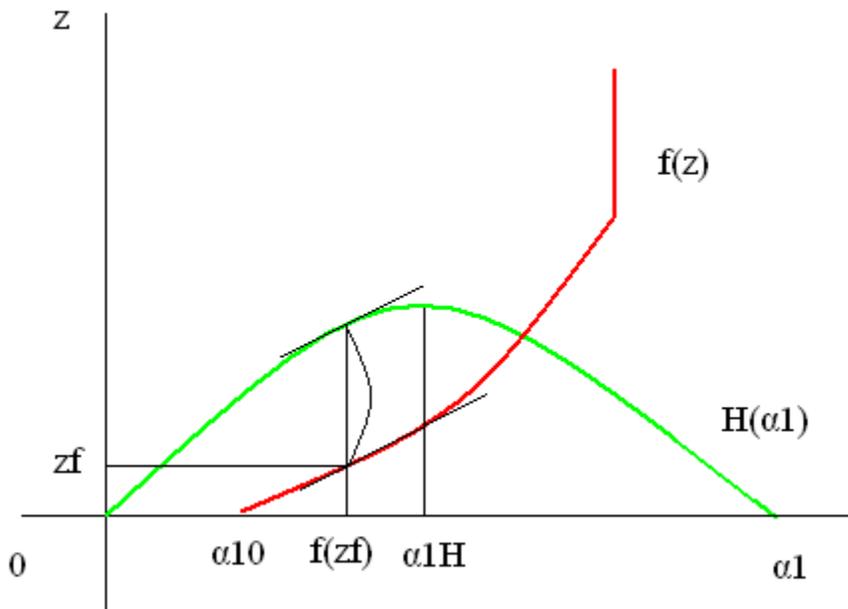
$$H_1 f' = 1 \quad (45)$$

Or

$$H_1 = f^{-1}, \tag{46}$$

We denote the amount of financial support, which satisfies condition (46), by  $z^f$ . While  $z^f$  maximizes net evaluation of the supporting institution, it is not necessarily equal to the amount of deficit of the artistic institution.  $z^f$  and  $\alpha_1 = f(z^f)$  constitute a Stackelberg equilibrium in some sense. The net evaluation of the supporting institution is denoted by the vertical difference between  $H(\alpha_1)$  and  $f(z)$  as shown in Figure 8, and is maximized at  $z^f$ . Then we can derive the following proposition.

Figure 8.



*Proposition 7.* Under Assumptions 1~3 and 5, when the supporting institution expects the best reply function of the artistic institution as  $f' > 0$ , then the level of  $\alpha_1$  which is expected to be realized by the financial support, which maximizes the net evaluation of the supporting institution, is less than the level of  $\alpha_1$  which maximizes its own preference. That is,  $f(z^f) < \alpha_1^H$ .

#### 4. The bargaining process between the artistic institution and the supporting institution

As we have seen in the previous sections, optimal quality for the supporting institution is not necessarily realized by the artistic institution. And it is quite difficult for the artistic institution to expect evaluation by the supporting institution. Therefore it is necessary to exchange information with each other in some ways for both institutions. Hence we consider the bargaining process between the artistic institution and the supporting institution on quality  $\alpha_1$  and amount of financial support  $z$ . The level of quality  $\alpha_1$  is announced to the public before the performance, and it is important information for consumers to determine to choose the performance or not. And

realization of  $\alpha_1$  depends on amount of financial support. So that  $\alpha_1$  and  $z$  cannot be determined independently in general. Here we recognize the relationship between the artistic institution and the supporting institution to determine  $\alpha_1$  and  $z$  as a process to find an agreement.

We suppose that the artistic institution and the supporting institution are acting passively given the behavior of the other institution. The artistic institution announces a level of  $\alpha_1$  to perform, given an amount of financial support  $z$  announced by the supporting institution, according to the best reply function  $\alpha_1 = f(z)$  by Definition 2. And the supporting institution announces an amount of financial support to realize, given a level of quality  $\alpha_1$  announced by the artistic institution, according to the best reply function  $z = h(\alpha_1)$  by Definition 3. An equilibrium  $(\alpha_1^*, z^*)$  is denoted by the following.

$$\alpha_1^* = f(z^*) \tag{47}$$

$$z^* = h(\alpha_1^*) \tag{48}$$

From the standard theory of stability, the stability condition in this case is

$$|h'| < \frac{1}{|f'|} \tag{49}$$

or

$$|h| < |f^{-1}| \tag{50}$$

at an equilibrium. When the equilibrium is less than the bliss point, that is

$$\alpha_1^R < \alpha_1^* < \alpha_1^{a R} \tag{51}$$

then from Proposition 4, we have

$$h(\alpha_1^0) > f^{-1}(\alpha_1^0) = 0 \tag{52}$$

so that we have

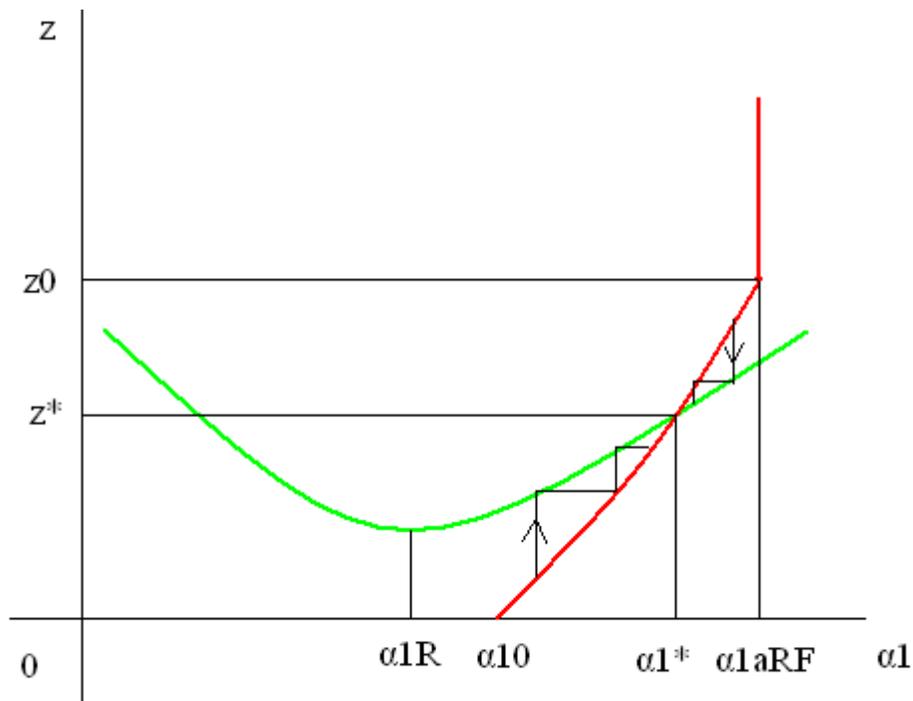
$$h'(\alpha_1^*) < f^{-1}'(\alpha_1^*) \tag{53}$$

Then we can derive the following proposition.

*Proposition 8.* Under Assumptions 1~5, when the equilibrium quality  $\alpha_1^*$  is less than the bliss point, then the equilibrium  $(\alpha_1^*, z^*)$  is stable.

For the artistic institution and the supporting institution, condition (49) or (50) implies relative importance of quality and financial support. We can say that when quality is relatively more important for the artistic institution than the supporting institution, then the bargaining process is stable.

Figure 9.



### 5. Concluding remark

Though our models are simple, we have derived some implications of behaviors of artistic institutions and supporting institutions. We have shown that behaviors of artistic institutions depend on financial support from supporting institutions, and that the behaviors of supporting institutions depend on how they expect behaviors of artistic institutions. Optimal qualities for supporting institutions are not necessarily performed by artistic institutions. Therefore we have discussed bargaining process between artistic institutions and supporting institutions to find equilibrium.

Since there are a lot of artistic activities that cannot be realized without financial support, and artistic activities of high quality may not necessarily be sufficiently supported, our implications might be used as some basis for artistic activities and financial support to realize activities of high quality. Dynamic aspects of such behaviors are important and of interesting. They deserve further research.

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# *An Equal Opportunity Military: African American Veterans and Healthcare Challenges in the Post-Vietnam Era.*

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Fred. Olumide Kumolalo  
*University of Maryland*

The prospect of gaining respect – professionally and constitutionally (economic, social, and political) had always been a driving force for African American men to sign up for what clearly constituted danger to their own wellbeing. This was a major factor while many free African American men chose to work at sea as sailors in the days of slavery. Consequent upon rabid racism and discrimination, jobs were very scarce for black men who became free and the so-called Negro jobs<sup>1</sup> were not sufficient to go round. Pecuniary considerations, love for country, the prospect of gaining respect, and earning citizenship rights were also factors in African American continuous participation in the United States military from the days of the Revolutionary wars in the 18<sup>th</sup> century up to the 21<sup>st</sup> century. The congruency in the desire and the outcome had been, for the most part disparate. While final battles for integration of the military would be fought in the fifth decade of the 20<sup>th</sup> century (1940-1950)<sup>2</sup>, the struggle for consistent equal treatment and equal access to benefits would be ongoing, even to the 21<sup>st</sup> century.

In this short paper, efforts shall be made to review the African American military veterans' access to healthcare in the post-Vietnam era. The fact that benefits remained a major factor that attracts enlistment in the military by African Americans was underscored by Gunnar Myrdal in *An American Dilemma: The Negro Problem and Modern Democracy* (1972) when he stated *inter alia*: "In terms of economic value they offer some of the best opportunities open many young Negro men... A good number of poor Negroes must have raised their level of living considerably by entering the armed forces ..."<sup>3</sup>

Opportunities for education were scarce while skills training was not readily available for African Americans even in the years after World War II despite the unprecedented boom in the

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<sup>1</sup> In the years after the American War of Independence through to the *Ante Bellum* Era, African Americans were denied access to jobs except the very strenuous and dirty jobs nobody else wanted (Negro jobs) – grave-diggers, barbers, hod carriers, porters and shoe shiners, railroad workers, longshoremen – before the Irish took most of these away

<sup>2</sup> For partial discussion of the struggle during the Second World War, see George Q Flynn, "Selective Service and American Blacks During World War II" in *The Journal of Negro History*, 69, 1, 1984 pp14-25 and Phillip McGuire, "Judge Hastie, World War II and Army Racism" in *The Journal of Negro History*, 62, 4, 1977, 351-362

<sup>3</sup> Gunnar Myrdal, *An American Dilemma: The Negro Problem and Modern Democracy*, New York: Pantheon Books, 1972, Vol. 1, 419

economy. Invariably, the military offered an escape route from crushing poverty. This was affirmed by African American paratrooper Lawrence Harkness while trying to explain why he, alongside other African American joined the military. According to him, “we joined because of the pride and the \$55 extra a month.”<sup>4</sup> While pride in one’s country was, without doubt an important consideration, the desire to access the benefits accruing to military men then constituted a major motivation factor in the enlistment of African Americans in the military. Binkin and Eitelberg averred “...young black men and women have entered the nation’s armed forces and have attained an economic status that many of them would find difficult to duplicate in the private sector.”<sup>5</sup> Continuing, they added, “military pay and benefits, job training and educational assistance and social opportunities are particularly attractive to black youths.”<sup>6</sup> These benefits did not always end with discharge from the military.

Even though there had been benefits for veterans in the years after their service dating from the Revolutionary War era, the American government has not always kept faith with its military, especially before the Second World War. This was amply demonstrated in the way and manner in which veterans of the First World War were treated in the wake of the Great Depression and became a major point of reference in shabby treatment for military veterans. This was when serving members of the United States military, obeying orders treated veterans of the World War I in a most embarrassing and insulting manner.<sup>7</sup> This was the ‘Bonus Army’ of 1932.<sup>8</sup> Noteworthy is the fact that as the Second World War was coming to an end, the United States Government enacted the Servicemen’s Readjustment Act of 1944—commonly known as the GI Bill of Rights which, according to President Franklin Roosevelt who signed the bill to law, gave “emphatic notice to the men and women in our armed forces that the American people do not intend to let them down.”<sup>9</sup> Thus American military veterans were reassured that a grateful nation would look out for them. But who exactly was the nation going to look out for?

The administration and dispensation of benefits and socioeconomic goodies had not always been judicious and fair. Whereas there are institutional mechanisms in the military, at least from about the Vietnam War era, that sought to ensure the judicious and equitable access to benefits for Americans in the military, the same had not always been the case when they left active service. There had been indications that post-military service benefits had been fraught with unfairness in its administration to the disadvantage of African Americans. While desire for great benefits (especially considered within the context that opportunities were severely limited elsewhere for African Americans) had been a great source of attraction into enlistment in the military, the administration of, and access to post service benefits had been less than equitable.

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<sup>4</sup> John Darrel Sherwood, *Black Sailor, White Navy: Racial Unrest in the Fleet During the Vietnam War Era*, New York: New York University Press, 2007, 18

<sup>5</sup> Martin Binkin and Mark J. Eitelberg, *Blacks in the Military: Studies in Defense Policy*, Washington, DC: Brookings Institution, 1982, 65

<sup>6</sup> *ibid*

<sup>7</sup> “The Bonus Army Invades Washington, DC, 1932” <http://www.eyewitnesstohistory.com/bonusarmy.htm>; accessed January 30, 2015

<sup>8</sup> For a fuller discussion of the of the ‘Bonus Army,’ see Eyewitness to History in <http://www.eyewitnesstohistory.com/bonusarmy.htm>; accessed January 30, 2015

<sup>9</sup> President Franklin D. Roosevelt’s Statement on Signing the G.I. Bill, June 22, 1944 <http://www.benefits.va.gov/gibill/history.asp>; accessed January 30, 2015

The disparity in desire and outcome for the veterans of the Second World War when it came to benefits administration was the subject of the research carried out by Sarah Turner and John Bound. In their article published by Cambridge University for the Economic History Association, they argued that black veterans suffered discrimination as a consequence of geopolitics.<sup>10</sup> In other words, while African Americans in the North appeared to have benefitted substantially like their white counterparts from the post war G.I Bill, African American veterans in the south were victims of discrimination in benefitting from the provisions of the G.I Bill because they were black. In the years after the Vietnam War and the preponderance of mental health issues after combat duties tours, the questions remained: did the politics and practice of minority participation that dogged the armed forces in the wake of the Second World War continue to affect benefits' administration especially on less obvious issues like mental health, especially at a time when the practice and conduct of modern warfare inflicts such injuries in a hitherto unseen scale? More so considering the fact that accessibility to mental health for the larger population was still an issue of debate.<sup>11</sup>

For African American veterans, there is an enduring perception that they are victims of discrimination in the dispensation and reception of healthcare. Collins *et al* "found that a quarter of African Americans veterans felt they were not treated with dignity and respect."<sup>12</sup> Similarly, Rickles *et al*, in their study, "Perception of Healthcare, Health Status, and Discrimination Among African American Veterans," concluded that, "a significant portion of African American veterans ...reported perceived discrimination in healthcare, low perceived quality of care, and low levels of satisfaction with the healthcare they received."<sup>13</sup> In the years after Vietnam, including the first and second Gulf Wars and the ongoing War on Terror, the number of African American veterans had increased and there had been a corresponding demand for benefits in their post service years. Individual veterans had stories that were not particularly flattering to tell about their experiences with healthcare. A particular example was a veteran who felt despised, demeaned, and disrespected. According to him, "after I had my biopsy and I got the results, I said to my doctor when I went back, 'did you get the results from the biopsy?' He said, 'Oh yes, you have cancer. They will tell you when you get there.'"<sup>14</sup> This was not only insensitive it was simply callous, for a trained healthcare provider to demonstrate such high level of insensitivity and lack of empathy.

This however, feeds into the perception that they were given such despicable treatment on the account of their skin color. The New York Community Media Alliance, in an article in its September 2010 edition titled "Black Veterans Face Harsher Health Care Issues" stated that

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<sup>10</sup> Sarah Turner and John Bound, "Closing the Gap or Widening the Divide: The Effect of the G I Bill and World War II on the Educational Outcomes of Black Americans" in *The Journal of Economic History*, 63, 1, 2003 p171

<sup>11</sup> See Michael Dear, "Locational Factors in the Demand for Mental Health Care" in *Economic Geography*, 53, 3, July 1977, 223-240

<sup>12</sup> K.S. Collins, D.L. Hughes, M.M. Doty *et al*, *Diverse Communities, Common Concerns: Assessing Healthcare Quality for Minority Americans. Findings from the Commonwealth Fund 2001 Healthcare Quality Survey*. New York Commonwealth Fund; in Nathaniel Rickles *et al*, "Perception of Healthcare, Health Status and Discrimination among African American Veterans" *Bouve Faculty Publications*. Paper 23, 2010

<sup>13</sup> Nathaniel Rickles, Silvia Dominguez, and Hortensia Amaro, "Perceptions of healthcare, health status, and discrimination among African American veterans" (2010) *Bouve Faculty Publications*, Paper 23. Accessed March 4, 2012, <http://hdl.handle.net/2047/d20000982>.

<sup>14</sup> The Boston Channel, "African American Discriminated Against", May 24, 2007  
<http://www.thebostonchannel.com/print/13384281/detail.html>

African American veterans face health issues unique, just like the larger Black population.<sup>15</sup> Robert Cocroft<sup>16</sup>, a General and Commander of the National Association of Black Veteran was quoted as stating that “the incidence of diabetes and hypertension that come with high stress are higher in black veterans.”<sup>17</sup> Apart from this, there is also the cultural dimension contributing to healthcare challenges. The Veterans’ Administration (VA) released a video that was designed to increase awareness of the cultural aspects of PTSD for African American Veterans. According to the video “it’s common for PTSD vets to feel that they must keep things private and they cannot trust the government for help... African Americans may experience these feelings more intensely.”<sup>18</sup>

It appears as though the policy makers and planners in VA do not factor this cultural aspect into their calculations while planning healthcare benefits for black veterans. Underscoring the vulnerability of African Americans to mental illness, particularly PTSD, Sidney A. Lee, president of the African American Post Traumatic Stress Disorders Association claimed “Blacks are especially vulnerable to PTSD since they are more frequently assigned to combat units.”<sup>19</sup> The practice of disproportionate assignment of African Americans to dangerous combat zone reached its highest point during the Vietnam War. During the height of the U.S. involvement, 1965 - 1969, African American, who then made up about 11 percent of the American population, constituted 12.6 percent of the soldiers in Vietnam and approximately 15 per cent of the percentage of combat fatalities in that period. Higher exposure to combat and the sustenance of high number of combat fatalities would result in a higher rate of PTSD. Even though African Americans may have had a higher rate (percentage wise) of PTSD, their engagement with the healthcare system, fraught with discrimination as it was, was lower than that of the larger population. Furthermore, the rate of PTSD post Vietnam may have been much higher than reported since African Americans would rather “keep things to themselves.” Further reinforcing the perception or reality of lack of concern for the plight of African American veterans was that the PTSD Museum in Hawaii has documented that all of the PTSD studies were done, with the exception of African Americans for decades.”<sup>20</sup> According to this claim, studies were not conducted for African Americans until the 1990s. Even though the reasons for such lack of study might not be directly related to

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<sup>15</sup> Amity Paye, “Black Veterans Face Harsher Health Care Issues” New York Community Media Alliance, September 16, 2010 [http://www.indypressny.org/nycma/voices/442/news/news\\_5/](http://www.indypressny.org/nycma/voices/442/news/news_5/) accessed November 10, 2011; see also Tony Pugh, Minority Health Care Found Lacking: Disparity Seen in Testing, Surgery, The San Diego Union Tribune, March 21, 2008 p. A 3 in Paula S. Rothenberg ed., Race Class, and Gender in the United States: An Integrated Study New York: Worth Publishers, 2004 p256

<sup>16</sup>Cocroft (b.1946) served with the Army in Korea during the Vietnam War and had an active career in the Army Reserve. He served as the Deputy Secretary of the Wisconsin Department of Veterans Affairs, President the National Association for Black Veterans, and President and CEO of the Center for Veterans Issues (Milwaukee, Wisconsin). He retired at the rank of Brigadier General – source:

[http://www.wisvetsmuseum.com/collections/oral\\_history/transcriptions/C/Cocroft,%20Robert%20\\_OH%20338\\_.pdf](http://www.wisvetsmuseum.com/collections/oral_history/transcriptions/C/Cocroft,%20Robert%20_OH%20338_.pdf); accessed January 30, 2015

<sup>17</sup>Amity Paye, “Black Veterans Face Harsher Health Care Issues.”

<sup>18</sup> ibid

<sup>19</sup> Dwight Ott, “Trauma, PTSD Rates Especially High for Black Veterans” in *The Louisiana Weekly*, New Orleans, La.; Jul 11- Jul 17, 2011. Vol. 85, Is 43; p 23 <http://0-proquest.umi.com.library.ccbcmd.edu/pqdwweb?index=3&sid=3&srchmode=1&vin> accessed on September 19, 2011

<sup>20</sup>ibid

discrimination but it ultimately furthers the cause of discrimination when an entire demography is ignored and thus not understood or grossly misunderstood.

This apparent nonchalant attitude to African American health issues feeds into the perception that African American men in particular are not a priority for the nation. This would be the basis for J. T Gibbs to be so alarmed as to fear population extinction because of what Aminifu Harvey stated as “a national concern about the plight of the African American male.”<sup>21</sup> Even though this was in reference to Social Work with at-risk African American young males, the paucity of literature for such a population might indicate a general trend – that there is a paucity of literature/research on working with African American Veterans with PTSD. The treatment of PTSD goes beyond pharmacotherapy. There are other aspects, which include the psychosocial environment as well as cultural competence. Projecting the research done on other demographics would not possibly be correct for the African American veteran community with its peculiar history and cultural experience. It could thus be argued that apart from failure in policy and subtle acts of discrimination, overtly or covertly that compromises quality care or access to care, the palpable absence of competent professionals who can address the peculiar needs of African American mental needs is a major factor hindering African American veterans’ healthcare needs. There are very few professionals who are actually trained to appreciate, understand and apply the Afrocentric approach to healthcare delivery. This approach to delivery of psychosocial (healthcare) treatment services, according to Harvey, “is based on a humanistic and naturalist orientation.” This school of thought recognizes that “African American culture is a nexus between Western Culture and traditional African culture.” Arguing further, Harvey states that “the Afrocentric approach incorporates the individual, the family, and the community as an interconnected unit, so that any intervention includes interaction with all three entities.”<sup>22</sup>

The factor of cultural competence in healthcare delivery, especially mental health issues like PTSD cannot possibly be overemphasized. Closely related to this is the issue of comfortableness in seeking medical attention. Many African American veterans chose not to seek treatment “because of the stigma associated with mental health problems.”<sup>23</sup> Furthermore, there have been studies that yielded the conclusion that African Americans “feel most comfortable seeking treatment from medical professionals who share their culture.”<sup>24</sup> African Americans, with about 11% of the American population constitute about 5% of the nation’s physicians in the healthcare workforce.<sup>25</sup> Invariably, the challenge in diversity of core healthcare providers becomes another stumbling blocking to accessing quality healthcare by African American veterans. This diversity challenge had long been recognized as critical to improving the quality of

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<sup>21</sup> Aminifu R. Harvey, “Group Work with African American Youth in the Criminal Justice System: A Culturally Competent Model” in Geoffrey Grief and Paul Ephross, eds. *Group Work with Populations At Risk*. (New York: Oxford University Press, 2005, 238.

<sup>22</sup> *ibid*, 241

<sup>23</sup> Vanessa Summers, “My View: Returning Blacks Face Mental Health Obstacles” in *Indystar.com* <http://www.indystar.com/apps/pbcs.dll/article?AID=2009910010425&template=printart> accessed on October 1, 2011.

<sup>24</sup> *Ibid*.

<sup>25</sup> The Institute of Medicine, *The Nation’s Compelling Interest: Ensuring Diversity in the Healthcare Workforce*, (Washington, DC: Institute of Medicine, 2004) in Joint Center for Political and Economic Studies, *Race, Ethnicity & Healthcare Reform: Achieving Equity in Our Lifetime*, Issue Brief, December 2009, 2

patient care.<sup>26</sup>This disparity would grow except there are definite policies put in place to address them. If the disparity grows, the healthcare challenge faced by veterans would further increase.

It was in recognition of the unique problems faced by the larger African American community and *ipso facto* the African American veteran community that led to the emergence, in the late 1960s (the Vietnam era) of three distinct, yet related professional bodies in the healthcare field that were focused on the African American community. These were the Association of Black Psychologist, (1968), the National Association of Black Social Workers, (1968), and The Black Psychiatrists of America, (1969). Out of these three, the Black Psychiatrists Association has been especially active in challenging the *status quo* and calling for remedies that would benefit the African American community and ultimately African American veterans' healthcare needs. It was in reaction to its demands and vociferous criticism of the status quo that led to the creation, by the National Institute of Mental Health (NIMH), of the NIMH Center for Minority Group Mental Health Programs.<sup>27</sup> This association also challenged the system used in the clinical diagnosis of mental health patients, decrying its "lack of focus on ensuring adequate inclusion of patients of African descent ... in the United States."<sup>28</sup> In its letter addressed to Darrel Regie, the director in the Division of Research of the American Psychiatric Association and signed by Patricia Newton and Williams Lawson, respectively president and director of research of the Black Psychiatrists of America (BPA), the BPA described as "unacceptable" the "lack of inclusion of departments of psychiatry led by black psychiatrists serving large populations of African Americans, such as historically black medical institutions (Howard, Meharry, and Morehouse)"<sup>29</sup> The fact that this exchange and discussion was needed within the confines of the larger American Psychiatric Association in 2011 would suggest that a major problem had been ignored for long. This would suggest that the APA's review of the DSM III was fundamentally flawed. Even though "special efforts were made in the preparation of [the now outdated] DSM-IV to incorporate an awareness that the manual is used in culturally diverse populations in the United States ..."<sup>30</sup> it appeared as though the special efforts fell short hence the need for BPA to mount a challenge to the processes adopted by the DSM IV. The challenge to the *status quo* within the American Psychiatric Association was not only needed but should be encouraged. It was because individuals and groups chose to challenge the status quo that coalesced in the Civil Rights Movement of the 1960s and culminated in the various achievements recorded. The actions of the BPA, if sustained, would, on the long run, lead to improved outcomes for African American veterans' mental health. In essence, the BPA might be inferred to be the mental health version of some of the demands of the Civil Rights Movement.

These notwithstanding, as active, relevant, and needed as these associations are and as lofty as their goals are, they have not been particularly successful in maintaining a sustained interest in the peculiar needs of the African American veteran community, a peculiar demography

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<sup>26</sup>Ibid., 1.

<sup>27</sup>[blackpsych.org](http://www.blackpsych.org), *History of the BPA*<http://www.blackpsych.org/id82.html>.

<sup>28</sup> Letter from the Black Psychiatrists of America to the American Psychiatric Association concerning field trials of the DSM-5; February 15, 2011 published on the website of the association (BPA)  
<http://www.blackpsych.org/sitebuildercontent/sitebuilderfiles/DSMVlawson.pdf>

<sup>29</sup> *ibid* p2

<sup>30</sup> American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Health Disorders DSM-IV-TR*, (Arlington, Va., 2009) p. xxxiii

within the community they serve, having its own unique needs. The laudable goals of these associations, praiseworthy as they are have not translated directly to enhancing the quality of care focused primarily on African American veterans more than four decades after they were created. The challenges are gargantuan. As though the BPA struggles were not enough, there are indications lately that African American mental health challenges, and invariably that of veterans, may endure. This is inferred from a report lately that “Black Researchers are Getting Fewer Grants from NIH (National Institute of Health). It was claimed that while white researchers succeed in successful grant application 25% of the time, Black researchers succeed only 15% of the time.<sup>31</sup> If black scientist in the mental health field cannot get sufficient grants to conduct research, demographics like black veterans might continue to take the back seat.

African Americans, for a variety of reasons, prominent among which is access to benefits including healthcare, have joined the military in remarkable high numbers since the abrogation of official discrimination as a consequence of President Harry Truman’s Executive Order number 9981 of 1948 and began serving in integrated unit from the Korean War.<sup>32</sup> Between then and the advent of the 21<sup>st</sup> century, many of them had since become veterans – of the Korean War, the Vietnam War, the First Gulf War, the Second Gulf War and countless number of other United States military activities all over the world. However, their access to benefits, especially concerning healthcare and specifically mental healthcare had been compromised in many instances. While there are no indications of outright discrimination based on race, African American veterans continue to have challenges in obtaining/accessing mental healthcare. The healthcare provider’s personal idiosyncrasy or outright incompetence (especially on cultural issues) had been a major challenge.

Closely related to this is the culture of silence whereby African American veterans would rather keep their mental health issues to themselves because of their fear of how family/community would react. There is also the issue of not knowing who to talk to or where to go for help. Apart from these however, there are issues with policies, procedures, and practice. In a situation where associations like the BPA had to practically fight to get the American Psychiatric Association to be included in reviewing such major instrument as the DSM-IV in preparation for the newly released DSM-V is quite telling. In addition, mental health professional associations including the National Medical Association, the Black Psychiatrists Association, the National Association of Black Social Workers as well as the Association of Black Psychologist should have policy positions on such issues as the mental health of African American veterans, especially considering the immediate and long-term implications it could have on the African American community. A synergy between such associations has great potentials. Invariably, African Americans continue to face challenges over half a century after the formal desegregation of the military. While not downplaying the remarkable progress and change that desegregation had brought including having an African American as Chairman of the Joint Chiefs of Staff,<sup>33</sup> the

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<sup>31</sup> Richard Harris, “Black Researchers Getting Fewer Grants from NIH” in NPR, August 19, 2011  
<http://www.npr.org/2011/08/19/139748454/black-researchers-getting-fewer-grant-from-nih> accessed November 28, 2011

<sup>32</sup> Harry Truman, President of the United States, “Executive Order 9981: Establishing the President's Committee on Equality of Treatment and Opportunity In the Armed Forces.” Washington, DC: The White House, July 26, 1948

<sup>33</sup> Colin Powell, a four star general, was appointed as the first African American Chair of the Joint Chiefs in 1989 by George H. W. Bush, the 41<sup>st</sup> President of the United States and served in that position until 1993

highest position in the United States military, there is the compelling need to revisit the issue of taking adequate care of the individuals who put their lives on the line in the cause of defending their country. If their skin color/race becomes the basis for peculiar attention, the military and the larger society should not be shy of giving this.

One generation after the United States pulled out of Vietnam, it had engaged in two major combats apart from peace keeping operations all over the world and the ongoing War on Terror. The United States military and national policy makers would need, as a matter of urgency and of national importance look into the issue of healthcare, especially mental health for African American veterans. The effect of ignoring this would haunt, not only the affected veterans and their immediate families, but also the larger society because of the multiplier effect on the children of the affect individuals and how they carry the baggage of failed policy (or lack of one) into the marketplace, schools, and the larger society.

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# *Crisis and Crisis Management in the Legislature: The Rivers State House of Assembly Experience, 2011 - 2015*

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**Anthony Egobueze, Ph.D**

*Rivers State House of Assembly*

*Assembly Complex, Moscow Road,*

*Port Harcourt, Nigeria*

*E-mail: otonie@yahoo.com*

**Elem Maduawuchi**

*Ignatius Ajuru University of Education*

*Port Harcourt*

*E-mail: elems\_buchi@yahoo.com*

## **Abstract:**

The legislature is an assemblage of the representatives of the people, elected under a legal framework to make laws for the good governance of the State. The Legislature like every other institution of the State hardly functions without crisis. Crisis is a change, which may be sudden or which may take some time to evolve, that results in an urgent problem that must be addressed immediately. Although crisis events are unpredictable, they are not always unexpected. Crisis management is the process of identifying a potential issue or crisis and coordinating organisational or inter-organisational response as necessary to resolve the crisis. The methodology for this study is qualitative, using documentary evidence and the ex-post-facto research design in terms of reviewing necessary literature. The scope of this study is the Rivers State House of Assembly, 2011-2015. Furthermore, we utilized the Frustration – Aggression Theory (F- A) as a framework of analysis. The study revealed two paradigms in the crisis that engulf the Rivers State House of Assembly in the period under review. The study recommends full autonomy of the Legislature, respect for rule of law and House Rules, continuous training, reorientation of Members and Staff, making parliamentary offices as part - time and less attractive as well as institutional strengthening as the prospects for political stability in the Legislature.

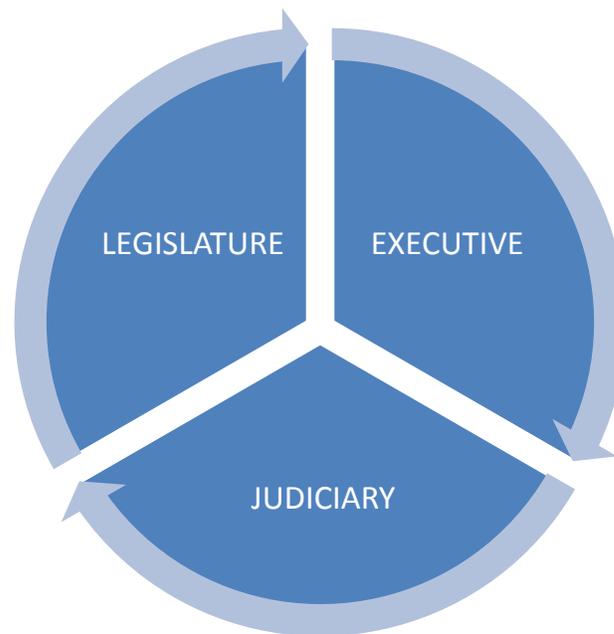
**Introduction:**

As noted by Ekegwe, (2015,24), political power is that particular graduation of this natural, neutral power which enables man to recognize his society and act in concert with others the better for each person to fulfill herself or himself. The fulfillment of this in a liberal society is anchored on liberal democracy.

Democracy functions effectively where there is an elected body saddled with Law making, often referred to as the Legislature or Parliament, an Executive that implements the Law made by the Legislature and a Judiciary that interprets the Law, when in breach. These arms of government are as represented in the segmented cycle below.

*Fig.1: Segmented cycle indicating the three organs of government*

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Governance entails the process of making decisions and implementing them based on different considerations such as popular participation, respect for the rule of law, observance of human rights, transparency, free access to information, prompt responses to human needs, accommodation of diverse interests, equity, inclusiveness, effective results and accountability (UNICEF, 2002). Failure to adhere to these considerations usually results in crisis of governance as the political situations in many African countries demonstrate. The Nigerian experience of crisis of governance can be examined from different perspectives with reference to a number of issues such as colonialism, decolonization, constitutional development, political instability and reforms.

Sections 4(1) and 4(7) of the 1999 Constitution of the Federal Republic of Nigeria provide for the law making function of the legislature at both the Federal and State levels (FGN, 1999).

Consequently, there is a bi-cameral National Assembly made up of the Senate and House of Representatives at the Federal level, and the 36 unicameral State Houses of Assembly, all legislating for peace, order and good governance of the Federation and States respectively (Egobueze, 2013:1). Since the return to democracy in Nigeria in 1999, four Legislative Assemblies have been elected at both the Federal and State levels. These are 1999-2003, 2003-2007, 2007-2011 and 2011-2015. Most of the Legislative chambers at the National and State levels have witnessed one form of crisis and or conflict or the other. Each of these crisis or conflict were propelled by either internal or external or a combination of these factors.

This study attempts to explore the reasons, types, dimensions, management and effects of crisis in the Legislature, especially, the Seventh Assembly of the Rivers State House of Assembly, 2011 -2015.

### **Theoretical Framework**

In this research, we are adopting the frustration aggression Theory (F – A) as our conceptual framework. In psychology, frustration is a common [emotional](#) response to opposition. It arises from the perceived resistance to the fulfilment of individual [will](#). The greater the obstruction, and the greater the will, the more the frustration is likely to be. Aggression is overt, often harmful, social interaction with the intention of inflicting damage or other unpleasantness upon another individual. In humans, frustration due to blocked goals can cause aggression. It is an action with the intent to harm, and can be physical and non-physical (Baron, & Richardson, 1994). The frustration–aggression hypothesis attempts to explain why people [scapegoat](#). It attempts to give an explanation as to the cause of violence. In 1939, Dollard, Doob, Miller, Mowrer, and Sears published a monograph on aggression in which they presented what has come to be known as the frustration-aggression hypothesis (F-A). In this theory, Dollard and *et al*, (Ibid) and Mbah, (2014:127) opine that frustration causes aggression, but when the source of the frustration cannot be challenged, the aggression gets displaced onto an innocent target.

The frustration-aggression theory principally argues that social movements occur when frustration leads to collective, often aggressive behaviour. Frustration has a variety of sources and can take two forms. First, it can be absolute, which happens when people do not have enough to survive, and second, it can be relative, which happens when people have enough to survive but have less than those around them.

The choice of this theory is anchored on the underpinning that the crisis that confronted the 7<sup>th</sup> Assembly of the Rivers State House of Assembly was predicated on the 2015 Project. It was a battle over the control of economic and political powers in the State which is the engine room for the propagation of the 2015 agenda. The principal actors in the crisis are the Presidency, Governor of Rivers State, Members of the Rivers State House of Assembly, some elites from Rivers State extraction, the PDP, State Security apparatus, especially, the men of the Nigeria Police Force. These men were used by the ruling party to suppress and propagate their will, resisting the above culminate to violence. Poverty and unemployment have therefore served as nursery bed for much violence in Nigeria, especially the Rivers State House of Assembly crisis, because unemployed persons were hired for little stipends for political advantage of the political gladiators. The country now has a reservoir of poor people who are determined to sell their conscience at the altar of making money through illegal sources. Serving as political thugs to acquire political power at all cost, provides the key to the heavens' gate, thus, they serve as mercenary fighters, bunkers,

kidnappers and electoral thugs. What this means theoretically is that frustration caused by poverty and unemployment increase the number of people who are prepared to unleash aggression against perceived enemies, and they are ready to kill or be killed for a given cause at token benefit. This explains why all crises that ever occurred in Rivers State in particular and Nigeria at large have a large turnout of people (including the under-aged) as fighters.

In conclusion, while the Rivers State Governor and Members of the Rivers State House of Assembly loyal to him felt aggrieved by the taking away of the party structure from the Governor as a result of his perceived none support for Mr. President in his 2015 Presidential bid through court, frustrated at this, the Governor, through the Assembly suspended the democratically elected Obio – Akpor Local Government Council, the perceived conduit for the support of the PDP in the State. Aggrieved by this, the Presidency, acting through the Minister for State – Education, the PDP and five Members of the House loyal to the Minister, then attempted to impeach the House Leadership, The removal of the Speaker and the House Officer was rumour as a precursor for the impeachment of the Governor. Thus, the above explanation justifies our choice of this theory.

### **Conceptual Clarification of Terms:**

#### **Crisis:**

A crisis is a change, which may be sudden or which may take some time to evolve, that results in an urgent problem that must be addressed immediately. Three elements are common to a crisis: These are threat to the organization, surprise, and a short decision time – line.

#### **Crisis Management:**

Crisis management is the process by which an organization deals with a major event that threatens to harm the organization, its stakeholders, or the general public. Crisis management includes action in the following areas: Crisis prevention, crisis assessment, crisis handling and crisis termination. The aim of crisis management is to be well prepared for crisis, ensure a rapid and adequate response to the crisis, maintaining clear lines of reporting and communication in the event of crisis and agreeing rules for crisis termination.

#### **The Legislature:**

The legislature is an assemblage of the representatives of the people, elected under a legal framework to make laws for the good governance of the State. Through legislation, the Legislature controls all economic, social and political activities of the State. It also scrutinizes the policies of the Executive and provides the framework for the Judiciary to effectively discharge its function. The Legislature is “the institutional body responsible for making laws for a nation and one through which the collective will of the people or part of it is articulated, expressed and implemented.

### **Historical Trajectory of The Rivers State House of Assembly**

The Rivers State House of Assembly is the Legislative arm of the Government of Rivers State, Nigeria. It is a unicameral Legislature with thirty- two Members representing thirty-two State Constituencies (Egobueze, 2012:2). The Rivers State House of Assembly like other legislatures world over has two structures – the political leadership and the bureaucracy. While the Speaker of the House heads the political leadership, while the Clerk of the House heads the

bureaucracy. The Clerk is assisted by the Deputy Clerk who heads the Legislative Department, Section 93 of the 1999 Constitution as amended provides for the office of the Clerk and such other Staff and it states that:

*There shall be a Clerk to a House of Assembly and such other staff as may be prescribed by a Law enacted by the House of Assembly, and the method of appointment of the Clerk and other staff of the House shall be as prescribed by that Law.*

The House has had a chequered history. The first Assembly was inaugurated on 1979 with forty two Members. This Assembly lasted till 1983 when its life span ended. The Second Assembly commenced full legislative assignment on October, 1983 with about forty two Members, and ended its life span abruptly on December 31<sup>st</sup> after a military interregnum led by General Muhammad Buhari. The third Assembly came into being in 1990 -1993 through a diarchic structure at the centre, and presidential system at the Sub- national level. This Assembly was again sacked by General Ibrahim Babangida. The fourth and Fifth Assembly were inaugurated on May, 1999 and May, 2003 respectively. Unlike the other Assemblies that predated it, this Assembly had thirty two Members; this was as a result of the creation of Bayelsa State out of the present Rivers State. The thirty two State Constituencies have continued to exist till date. The Sixth Assembly, of the Rivers State House of Assembly was inaugurated on 30<sup>th</sup> May, 2007, while the Seventh Assembly was which our case study is, was enthroned on May. Like other Houses since after the creation of Bayelsa State, This House has 32 Members returned as elected.

The House in the Second Republic was controlled by two parties, viz, National Party of Nigeria (NPN), Nigerian Peoples Party (NPP) the Peoples Democratic Party (PDP), All Peoples Party (APP), later All Nigerian Peoples Party (ANPP) and Alliance Democracy (AD), while all the others have had only members of the Peoples Democratic Party (PDP) without an opposition party member in the House. However, the crisis of the 9<sup>th</sup> July, 2013 led to the division and the disintegration of the robust relationship that once flourished in the House, the umbilical- cord was separated between the mother and child, feud ensued mother. The House currently has the following Officers: the Speaker, Deputy Speaker, House Leader, Deputy House Leader, House Whip and Deputy House Whip. Worthy to note is that all other Members of the House are Chairmen of Committees and each of them is a member of not less than four Committees. Finally, there is an effective bureaucracy headed by the Clerk, who is the Accounting Officer House.

The legislature is the yardstick for measuring the views of the people in a democracy. It is also the watch dog of public funds in that it not only appropriates for the State but scrutinizes how the funds so appropriated are spent. Finally, the legislature is constitutionally mandated to direct investigations into the conduct of the affairs of State, institutions, organizations and individuals within the State. In other words, the legislature has the right to summon any public or private organization or individual to appear before it to answer questions based on petitions received and or motions made. The Rivers State House of Assembly as a legislative body upholds these mandates. The tripartite functions of the legislature namely, Representation, Legislation and Oversight are central to this research because they manifest in the intervention of the legislature in conflict management.

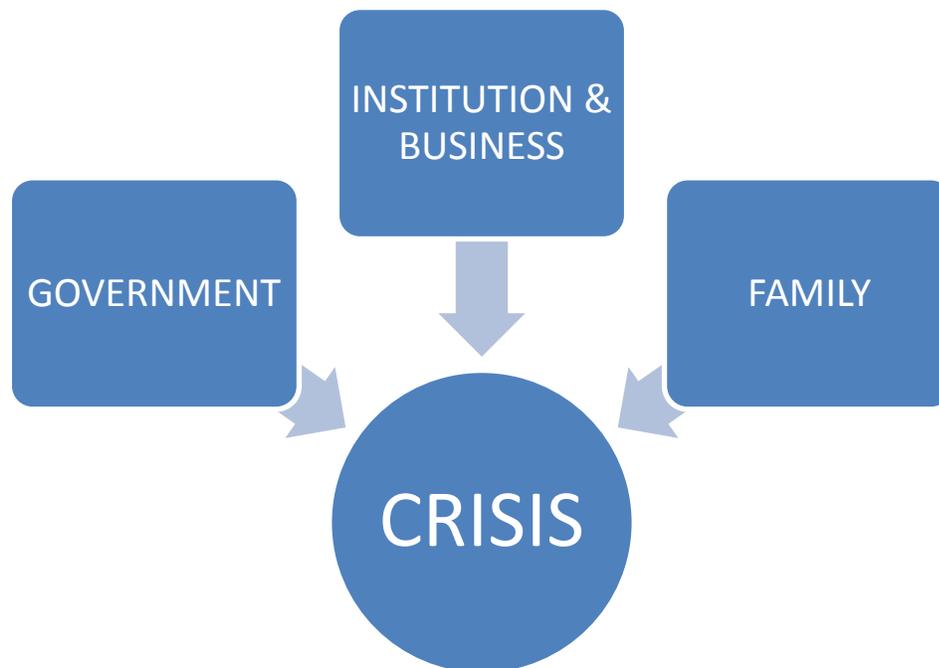
**Types of Crisis:**

Crisis may assume one or some of the following forms:

1. Natural disaster
2. Technological crises
3. Confrontation
4. Malevolence
5. Organizational Misdeeds
6. Workplace Violence
7. Rumours
8. Terrorist attacks/man-made disaster

These crises may affect one or all of the following:

*Fig. two: Basic block list used to show the causes of crisis*

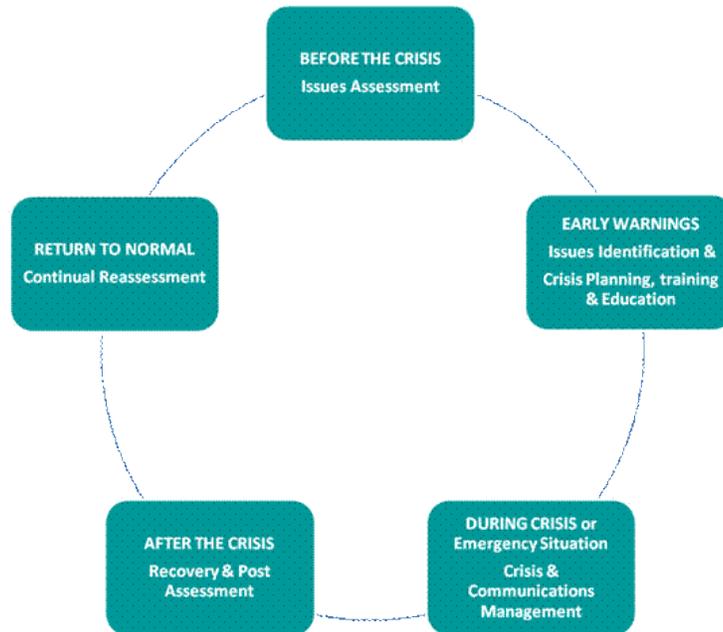


Crisis could take the following stages;

1. Before the crisis

2. Early warning (Triggering event)
3. During Crisis (Planning and preparation)
4. After Crisis (Assessment and Modification)
5. Resolution (Return to normalcy)

*Fig. 3: Steps in crisis prevention*



Bernstein Jonathan, a Management expert identifies ten steps to crisis prevention, these are:

1. Reverse-engineer your industry's crises
2. Conduct a Vulnerability Audit
3. Engage in crisis planning and training
4. Collect Intelligence
5. Optimize physical systems for crisis prevention and response
6. Make sure you can talk to each other during a crisis
7. Create your crisis response teams by capability, not just by position
8. Backup, backup, backup
9. Ensure that all employees' crisis-related knowledge and skills remain current
10. Regroup regularly to reverse-engineer, self-audit and adapt plans accordingly

### **Strategies for crisis prevention**

- 1 Identify and Isolate the Issue – This allows one to step back and assess the situation.

**2** React quickly – Communicate often – timing is critical. No one wants to wait for information in the 24-hour news world we live in.

**3** Take control and set the agenda – in other words tell your own story. Be the first to set the record straight.

**4** Hire a professional – the issue won't simply go away – Enough said.

**5** Make changes, communicate what they are – If changes are made such as an improvement in product design, new rules or employee changes – talk about them. Everyone likes to know that action was taken to fix a situation.

**6** Reflect, Review & Resolve – Take a moment to think about what has happened. Review what worked and what did not and how the crisis would be addressed going forward.

Lastly, plan to proactively make an impact.

### **Issues that may trigger crisis in the Legislature**

Crisis and Conflict have remained dominant features of modern democracies. This as a result of lack of service delivery by the State to the citizens, and unhealthy rivalry of the ruling elites for access to political and economic power as well as wide spread corruption. Nations are almost sliding to self destruction as a result of crisis and conflicts. Contributing to the fore - going, USAID argues that:

*Civil' conflict has become the dominant mode of violence in the post-Cold War era. In 2001, all but one of the world's wars was internal, and widespread, deadly violence now affects nearly 60 percent of the countries of the world. While conflict can be an inherent and legitimate part of social and political life, in many places the costs and consequences of conflict, crisis, and instability have become unacceptably high (USAID,1997 ).*

Since independent till date, contemporary Nigeria has become a hot bed for crises. These crises which most often result into conflicts orchestrated by political elites and their allies have been for selfish realization of regional sentimentalism, ethnic chauvinism, religious bigotry, economic materialism and political domination of the State (Egobueze).

Within a democratic system for instance, crisis refers to those disputes that cannot be resolved according to the rules of the democratic game. Democratic crisis resolution consists of an application of the existing rules of the democratic game, either through the clarification, interpretation and enforcement of these rules and policies by the existing organs of government, or through a process of peaceful discussions and consensus-building among different stakeholders around an outcome that is acceptable to all parties concerned. If this is not possible, policy-making bodies can amend the rules of the game in an attempt to mobilize the support of the main stakeholders to the crisis. In contrast to democratic political crisis management, crisis management in authoritarian or totalitarian states frequently comprise a reliance on more unilateral, top-down enforcement actions by the bureaucracy, police or military forces, rather than attempts to mobilize popular support and consent for a specific outcome.

Democracy is based on the notion that a people should be self-governing and that the representatives of the people should be held accountable for their actions by the people. The

legislature unquestionably occupies the most important place as it formulates and expresses the will of the state. The Legislature, which represents the people and acts as their agent, is therefore at the core of the Western democratic tradition. Although the Legislature is known primarily as a lawmaking body, it is important to recognize that this institution has many other important responsibilities. The foremost function of the Legislature is law making, which is achieved through representation. Landell-Mill, & Ismail, (1992) states that 'in a representative democracy, the Legislature acts as the eyes, ears, and voice of the people'. Representation provides the basis for legislative behaviour. In the capacity of representatives, Legislators participate in law-making and other Legislative business and the represented generally accept legislative decisions as authoritative (Egobueze, 2012, 4). As the elected representatives of the people, Legislators provide legitimacy to the government. In the many decades of military rule in Nigeria, the Legislature was completely sacked, while the Executive and Judicial institutions were still functional, this accounts for while the Legislature is regarded as the symbol of democracy. Certain legislative actions are determined by the specific interest of the Legislators.

Every organization, be it public or private, agrees and or disagrees on issues. These agreement or disagreement could be intra or inter and internal or external. The Legislature is no exception. The Legislature as noted earlier is an Assemblage of persons with diversity in culture, historical antecedents, economic strata, religious inclination, amongst others. Since the Legislature is an arena for interest articulation and aggregation, the prevalent of crisis therefore is not an utopia. Crisis would arise in course of the defence of the specific interest of the Member(s). This in a long way may affect their voting patterns.

Some issues that may ignite crises in the Legislature are as follows:

- Leadership
- Corruption
- Political affiliation
- Greed and selfishness
- Societal influence
- Unbridled ambition
- Impunity of Members
- Independence of the Legislature
- Management / Staff relations
- Leadership/ Management relations
- Disrespect to the House Rules, and absence of the Rule of Law
- Ignorance

### **Issues in the Rivers State House of Assembly Crisis, 2011 – 2015**

It started slowly, but only a very few vicious persons took notice. Others may not have understood the context, dynamics, implications and its eventual trajectory. From the drips of 6<sup>th</sup> May, 2013, when some of the Law makers brought militants that disrupted the House Sitting, acting on the rumour, that the five of them would be suspended by the House, it began to flow faster. It becomes a tornado of sorts, sweeping everything along its path to perdition and doom. At the national level, from the mathematics of the historic 16 being greater than 19 as witnessed in the sham and shameful election into the Chairmanship of the Nigeria Governors' Forum, it permeated into the madness of five being greater than twenty – seven. This was an epic battle over the impeachment of the Speaker of the Rivers State House of Assembly, Rt. Hon. Otelemaba Daniel, as a fore runner for the eventual impeachment of the Governor of Rivers State, His Excellency, Rt. Hon. Chibuike, Rotimi Amaechi. The attempt by the five Law Makers is a reminiscence of the Fourth Assembly and Fifth Assemblies in Nigeria, where Houses of Assembly without forming the required two-third quorum were used by the Presidency, Governors, Chairmen of Councils and 'Godfathers' to remove Governor, Deputy Governors, House Leaderships and Council Leadership. This catastrophic ill wind blew off Governors Alamiesima of Bayelsa, Peter Obi of Anambra, Joshua Dariye of Plateau, Ladoja of Oyo, Ayodele Fayosie of Ekiti and scores of Deputy Governors, Speakers and other House Officers. The macabre dance, ignited the interest of the Judiciary at a time, and some of those Governors regained their mandates from the courts. This disgraceful events that characterized our nascent democracy at the time, are beginning to manifest in different shapes and scales in different States of the Federation, specifically, Ekiti State, where only seven Law Makers sacked the rest of their colleagues and performed very significant functions like the passage of the State Appropriation Bill, clearing of Commissioner nominees, Edo, amongst others.

Commenting on the major cause of the crisis in Rivers State, Hon. Dakuku Peterside, the standard flag bearer of All Peoples Congress (APC) in the Governorship election in 2015 general election states:

*A party congress was conducted peacefully in March 2012. Nobody raised issues until December 2012 when the interest of certain elements in the Presidency converged with certain elements in Rivers State who are incurably ungrateful and who do not fear God. Then, some characters in the judiciary gave themselves to be used and a controversial judgement surfaced. An Abuja High Court gave judgement in an issue it has no business with. One Felix Obuah who never participated in any of the party congress processes started parading himself as Chairman of PDP, Rivers State. The same Felix Obuah has gone about making inflammatory remarks. If history teaches any lesson, it is that these ones too will be consigned to the dust bin of history very soon. I have watched how a certain colleague of mine from Rivers State sold his conscience and tried helplessly to defend the indefensible on television to prove that the INEC monitored single PDP congress in Rivers State produced any other person other than Chief G. U. Ake as state Chairman of the party. All members of PDP in Rivers State know who their leaders are and know who the charlatans are. Rivers people are more intelligent than the ignorance been displayed by the characters parading*

*themselves as officials of PDP in the State. Rivers people know them and know their history (ThisDay).*

Further to the above, Peterside asserts:

*The new leadership of the PDP in Rivers State, recently issued a statement suspending elected members of the State House of Assembly and threatened to work towards impeachment of Governor Chibuike Amaechi..... It is laughable. (ThisDay).*

In a demonstration of the prevailing madness that characterize bourgeois politics in Nigeria, the attempt by five lawmakers to impeach the Rivers State Governor, Rotimi Amaechi set in motion series of drama of infamy in the State. Another angle to the crisis was the attempt by the Rivers State Government to seize control of the Obio/Akpor Local Government that was in the hands of anti-Amaechi forces. The Governor using the State Legislature, suspended a democratically elected Council.

This scenario, seen by many working class elements is the usual in-fighting between the Rivers ruling elite, which does not have any link with the urgent need for the socio-economic transformation of the state. The struggle between Amaechi and the anti-Amaechi forces is cantered on who controls political power come 2015 in Rivers State and to some extent in 2015 general election. Governor Amaechi is not in the good books of the Presidency and top Peoples Democratic Party (PDP) members, this created the factionalization of the PDP at the National Level, especially in Rivers State and fuelled the crisis in Rivers State House of Assembly which eventually led to the exit of the Governor and twenty five Members of the Rivers State House of Assembly from the PDP to the All Progressives Congress (APC).

*To worsen matters, the Rivers State Commissioner of Police, Joseph Mbu, constituted himself into an alternative governor of the state, refusing to perform his duties, displaying sheer arrogance, crudity, insubordination and a lack of respect for duly constituted authority. Under the watchful eyes of this super policeman, mayhem was unleashed in the State House of Assembly and he confessed to being non-challant about a request to provide security for the lawmakers to sit and perform their statutory functions until the Brigade Commander of the 2 Amphibious Brigade in Port Harcourt pleaded with him to do so. Everyone can see the quality of the security a police commissioner provided – the type that enabled thugs and all manner of miscreants to gain access into the hallowed chambers of the House fully armed with various weapons, including guns, despite the fact that Mbu’s men were supposedly searching everyone going into the premises (Eze,2014)*

The Commissioner of Police was not apologetic for his infamous role, his demeanour and utterances showed he would do more, if the opportunity arose again. Incidentally, the then Inspector-General of Police, instead of redeploying him from the Rivers State simply left him there in breach of the Resolution of the bi-cameral National Assembly and set up a team to investigate the circumstances surrounding the mayhem. The Senate Committee on States and Local Government in its Report on the crisis in Rivers State noted; ‘his relationship with the governor has broken down irretrievably’ (NASS, 2013).

The storm in the Rivers State House of Assembly reverberated nationwide on 10<sup>th</sup> July, 2013 as the National Assembly, the ruling People's Democratic Party (PDP), opposition parties and Nigeria Police Force (NPF) all waded into the crisis, played the blame game, with some calling for the removal of the state's Commissioner of Police (CP), Mr. Joseph Mbu (ThisDay). The House of Representative on 10<sup>th</sup> July, 2013 invoked Section 11(4) of the constitution (NASS, 2013), which empowers the National Assembly to take over the functions of any State Legislature that is unable to perform its constitutional functions due to a breakdown of law and order. However, the invocation of Section 11(4) of the constitution would only have effect if the Senate concurs with the House on the matter.

In similitude with the House of Representatives, Senate President David Mark, who described the festering crisis in the state as an embarrassment to the entire country, added that the situation was totally unacceptable and condemnable. In the resolutions, the Senate condemned in strong terms the crisis in Rivers State, which it said "portends danger for our democracy". It also mandated its committee on State and Local Governments to investigate the immediate and remote causes of the crisis and report back to the upper chamber within one week. The Senate also resolved that in the interim, all parties to the crisis should maintain the status quo and refrain from acts capable of jeopardizing peace in Rivers State, adding that the Senate would uphold the constitution at all times (NASS, 2013). Finally, the Senate Committee sent on fact finding mission to Rivers State, laid its Report on the Table on 20<sup>th</sup> July, 2013. Part of the findings of the Committee as contained in its Votes and Proceedings read:

*The crisis at the Rivers State House of Assembly on July 9, 2013, was the expression of deep-rooted political crisis occasioned by the alleged highhandedness of Rivers State Governor Rotimi Amaechi and the perceived undue interference with the political and security structure of the State by President Goodluck Jonathan, his wife Patience and the national hierarchy of the Peoples Democratic Party (PDP), a Senate report considered and adopted at plenary declared yesterday.(Votes and Proceedings, 2013)*

The Senate accordingly concurred with the position of the House of Representatives and invoked Section 11 (4) which states inter alia:

*At any time when any House of Assembly of a State is unable to perform its functions by reason of the situation prevailing in that State, the National Assembly may make such laws for the peace, order and good government of that State with respect to matters on which a House of Assembly may make laws as may appear to the National Assembly to be necessary or expedient until such time as the House of Assembly is able to resume its functions; and any such laws enacted by the National Assembly pursuant to this section shall have effect as if they were laws enacted by the House of Assembly of the State:*

Provided that nothing in this section shall be construed as conferring on the National Assembly power to remove the Governor or the Deputy Governor of the State from office (1999 Constitution)

Since the 9<sup>th</sup> of July, 2013, the complex of the Rivers State House of Assembly had been under lock and key, with the presence of Mobile Police – men and two armoured carriers position on the front of the gate. The underpinning effect of this is, the symbol of democracy had been desecrated. This was an attempt to truncate legislative process, stiffen democracy and cause economic hardship on the citizen in order to ignite uprising by the people, which in the final analysis may lead to the declaration of a emergency rule in the whole State.

However, a Federal High Court in Abuja presided over by Justice Ahmed Mohammed, nullified the takeover of the functions of the Rivers State House of Assembly by the National Assembly. This order precipitated and exacerbated the frontiers of the crisis as the pro – Amaechi Law Maker (the 26 at this time), made effort to go back to commence their Legislative duties. This effort was met with strong opposition by the other six Law makers loyal to the PDP and the Abuja Government. The 26 Law – makers and their supporters were tear - gassed and hindered from taken possession of the House by the Police.

Consequently, the 26 Law – maker on 6<sup>th</sup> January, 2014, vide a Motion by the Deputy House Leader met at the Old Auditorium, Government House and designated the building as its temporary Chamber. Part of the text of the motion reads thus:

*Mr. Speaker and my colleagues, history would not prove me wrong, as I remember with nostalgia; the crisis that engulfed the House on the 9<sup>th</sup> of July, 2013. The crisis left the Chamber of our House damaged. Furthermore, considering the fact, that the damage left the Chamber and indeed the Complex inhabitable till proper renovation work is done and in view of the fact, that the conduct of Legislative business in such a Chamber may put the lives of the Hon. Members and Staff in jeopardy, this Honourable House is invited to resolve as follows:*

- 1. That the old Auditorium of Government House, Port Harcourt be designated as the temporary Chamber of the House till such a time that the renovation work on the Chamber of Rivers State House of Assembly is concluded by the Executive.*
- 2. And any other order this august House may deem necessary (RVHA, 2014)*

This action was followed by a white paper released by the Rivers State Government, formally designating the Auditorium as the temporary chamber of the House. The Legislature had continued to function there till date.

### **Recommendations for Crisis Management in The Legislature**

It is essential to state that the Executive has always been a dominant player in crisis and conflict management. However, the role of the Legislature has most often been considered tangential and assumed to be incidental, often limited to enactment of legislations to give effect to negotiated agreements or curb the proliferation of conflicts and conflicts. This is assumed to be the case for both international and domestic conflicts. In international conflicts for instance, the Executive arm of government takes the lead in foreign policy, especially in Treaty making and implementation. Although in some jurisdictions like Nigeria, the Legislature is required to domesticate international Treaties before they come into effect, in reality, once Treaties have been

entered into, their domestication becomes almost a routine exercise (Egobueze, 2011). On the other hand, in domestic conflicts, it is assumed that the Executive and Judiciary take the lead. This is so for a number of reasons; first, it is principally in the process of implementing government policies that most domestic conflicts arise and the Executive arm, as the policy implementation arm of government, is at the fore of managing these conflicts. Secondly, as the arm of government which principally incarnates the capacity and authority of the state, the Executive arm has responsibility to manage crisis and conflicts, create political order and stability. Thirdly, the Judiciary is central to conflict management because of its role as the interpreter of policies and legislation. Finally, the role of the Legislative arm in crisis and conflict resolution is subdued because as a body, it incarnates the diversities of society and it is precisely such diversities that create the fault lines of conflicts in the first place. Some scholars however argue that:

*Recognizing the minimal role played by most legislatures in the lawmaking and policy processes, scholars increasingly have attempted to account for the prevalence, persistence, and apparent regenerative capacity of legislative institutions in terms of their putative contributions to political stability. The argument usually advanced is that by providing an institutional forum for the representation of societal diversity and the expression of dissent, legislatures contribute to the integration of society and the legitimating of both government and regime. In so doing, legislatures are credited with reducing levels of political conflict, rendering conflict more manageable, and mitigating the effects of conflict on government and regime (Mishler & Hildreth, 1984)*

In support of the above school of thought, Loewenberg and Patterson are careful to point out that:

*Legislatures are not the only or even the most important institutions that perform these functions. They also note that some legislatures perform these functions better than others and that in some circumstances legislatures may even exacerbate political conflict and undermine stability. Nevertheless, they conclude that when political leaders collectively deliberate on political issues in public, that they do so, how they do so, and to what effect they do so have profound consequences for the survival of political system (Loewenberg & Patterson, 1979)*

In countries divided by conflicts, and where the management of conflicts by the executive and judicial branches of government have been ineffective, there is an urgent need for reconciliation to enable all communities to work together towards a common vision of a peaceful future. The Legislature can exercise a leadership role in a broad reconciliation process by building relationships across party lines and by bringing to bear its oversight functions. Also, they can use their legislative role to promote reconciliation, for example by drafting laws that address grievances in representation (e.g. electoral or constitutional reforms), human rights legislation or minority rights legislation that lessens animosities between communities. By participating in the legislative process in a spirit of co-operation to produce such laws – and by strengthening judicial independence to support their implementation – parliaments can play a key role in supporting conflict prevention. In all, the role of the legislature in conflict management could be linked to the concept of Alternative Dispute Resolution (ADR).

While the full application of the Principle of Separation of Power is in breach in all democracies around the world, due to the increasing involvement of the arms of government in the maintenance of political order, there is therefore interpenetration of governmental powers for the guarantee of good governance, this underscores the relevance of the Legislature in crisis and conflict management, an arena believed to be the exclusive reserve of the Executive and the Judiciary. While, the Legislature has been successful in the management external crisis and conflicts, the Chambers have been epic centres of internal crisis and conflict.

### **Recommendations for Stability**

The following are recommended for crisis management in the Legislature.

- Independence of the Legislature
- Respect for the House rule and the rule of Law
- Transparency and accountability of Members and Staff of the Parliament
- Transparency of the House Leadership
- Training and retraining of Members and Staff of the Houses emerging trends in the Legislature
- Informal meetings
- Strengthening of the House Committee on ethics and privileges
- Individual and Party discipline
- Regular interface with the Civil Society Organizations and the Press
- Respect for due – process

### **Conclusion:**

The crisis that engulfed the Seventh Assembly of the Rivers State House of Assembly 2011 – 2015 was predicated on political adventurism for the economic exploitation of the people by the political gladiators. It was a crisis of interest, by the ruling elites, for the control of the political machinery of the State in readiness for the 2015 general election by some political actors. As observed, the pre, during and post election events in the State are indicative of the political cum economic underpinnings of the crisis. The crisis was majorly externally induced, which to all intents and purposes is an infraction on the independence of the legislature, thus, a threat to the principle of separation of power in particular and democracy at large. As noted by Alapiki, (2015,27), ‘the culture of impunity became the dominant political culture in military politics and government in Nigeria’ the events of 9<sup>th</sup>, July, 2015, was a reminiscence of that. The Legislature must stand firm in order to shed off the ill wind of adversity that are ready to subvert its cohesion. A house divided against itself, cannot stand, therefore, the aggregation of interest of Members by themselves is *conditio sini qua non* for stability.

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# *Capacity Building Strategies and Teachers' Job Effectiveness in Secondary Schools in Cross River State, Nigeria*

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**Victor Obule Ebuara**

*Department of Educational Administration and Planning*

*University of Calabar, Calabar*

**Maurice Ayodele Coker**

*Department of Political Science*

*University of Calabar, Calabar*

*Corresponding author Email: [coker\\_maurice@yahoo.com](mailto:coker_maurice@yahoo.com);*

*mauricecoker@unical.edu.ng*

## **Abstract**

This paper addresses the issue of capacity building strategies and the impact on teachers' job effectiveness. Capacity building is a *sine-qua-non* for progress and development of teachers in their teaching profession. Deriving from the above, the study adopted a descriptive survey research design. The population comprises all principal's teachers and students of public secondary schools in Cross River State. A total of 200 senior secondary school students randomly selected from different secondary schools were used as sample for the study. A reliability self-constructed questionnaire with the coefficient of 0.83 was employed to collect data for the study. Three research hypotheses were formulated for the study. Data were analyzed using independent t-test statistical tool. The results revealed that for teachers to deliver and make appreciable impact in their profession, teachers' competence performance and satisfaction should be given urgent attention by all stakeholders in the high education industry. This is likely to develop teachers' skills and encourage effective teaching and learning. Based on the findings the study recommended that: The state government should regularly organize capacity building seminars and workshops for teachers to build their skills in the teaching career for improved performance; instructional capacity and favorable policy environment should be put in place in the school system; and, instrument of manpower development should be identified and appropriate training methods used to develop needs of staff.

**Keywords:** Capacity building, strategies, teachers, job effectiveness, education reform.

## 1.0 Introduction

The concept of capacity building from the researchers' perspective can conveniently be defined as the capability to perform functions or work effectively, efficiently on a continuing basis by being equipped with the necessary skills to impart knowledge on others. According to Business Dictionary.com, capacity building is a "planned development of (or increase in) knowledge, output rate, management, skills, and other capabilities of an organization through acquisition, incentives, technology, and/or training." (Emphasis theirs). The Catholic Relief Services (CRS) posits that Capacity building is an ongoing process through which individuals, groups, organizations and societies enhance their ability to identify and meet development challenges ([http://www.crs.org/capacity-building/...](http://www.crs.org/capacity-building/)).

Indeed, *The CPRE Policy Briefs* (1995) has argued that the discussion of capacity (with particular reference to the education sector), apart from focusing on professional development for teachers should be broadened to cover the following resources: "relationships between individual, or teachers, capacity and abilities of schools, districts to accomplished standard-based, or systemic reform". Therefore, capacity strategy should encompass the way that systemic reform in education that could assist essentially

"the ability of the education system to help all students meet more challenging standards. If the capacity of the education system – or any system – is insufficient for accomplishing a desired goal, capacity may be increased by improving performance of workers (e.g., individual teachers; by adding such resources as personnel, materials, or technology; by restructuring how work is organized; and /or by restructuring how services are delivered (1995: 1).

O'Day et al., in their work (1995) identified four main dimensions of teacher capacity; namely: knowledge, skills, dispositions and views of self. They observed that teachers are expected to assess substantial "knowledge of subject matter, curriculum, students, and general and subject-specific pedagogy in order to help students learn" (citing Carpenter et al., 1989; Shulman, 1986; Wilson, & Wineberg, 1988).

On Skills, O'Day et al., argue that it interacts and develop together. However considerable gap "between teachers' beliefs about how they should be teaching to satisfy new reforms and their abilities to actually do so.

Formulating and implementing education reforms require such dispositions as teacher's attitude toward subject matter; attitudes toward students' achievement, and beliefs about sources of students' success, needed to meet new standards for students learning and to make necessary changes in practice ( O'Day et al., 1995; citing Katz & Raths, 1986; National Center for Research on Teacher Education, 1988).

Furthermore, the capacity to teach in different ways is connected to how the teachers' self-esteem, as well as "their role in classroom activity and the personas they adopt in the classroom" (O'Day et al., 1995).

They conclude that these four dimensions of capacity are interdependent and interactive. Teachers, in order to improve student learning would seek new knowledge, skills and dispositions thereby increasing their capacity.

Again, the Global Forum for Health Research (2000) espoused that capacity building is a process by which individuals, organizations and societies develop abilities (individually and collectively) to perform functions effectively, efficiently and in a sustainable manner to define problems, set objectives and priorities in order to proffer possible solutions to problems.

In educational institutions capacity building strategy is the effort to create and strengthen a critical mass of teachers who are capable of planning and implementing academic work that address student's needs and performance in the school system (See *en.wiki/Canadian\_Coalition\_for\_Glo..*). Teachers need appropriate training to enable them acquire the skills, knowledge and competence for service delivery in the education system. To this end, capacity building requires strategy and holistic thinking approaches if it is to respond successfully to motivational needs. This capacity building is a professional growth that has to do with the upgrading of the knowledge and skills of teachers and the modeling and reorientation of their attitude so that they can be more productive and efficient in the performance of their jobs (*en.wiki/Canadian\_Coalition\_for\_Glo...*). This strategic effort has become necessary because no employee like teachers is totally perfect or effective in the process of performance of the assigned job (s). It is therefore a performance of life-long process in the development of teachers.

Initiatives to encourage effective teachers in the educational system according to Chukwu (2010), should be based on the following capacity building strategies:

1. Regular organizations of national encouragement programme, and award of quality improvement for teachers.
2. Teachers' professionalization should be made mandatory by law so that employee in the teaching profession must possess qualifications in educational courses before being considered for any gainful employment.
3. Schools should organize excellence award for best teachers nationwide termly or yearly as this will motivate teachers to work harder.
4. Adequate funding of teachers would; improve their working conditions with innovations, inventions in teaching learning processes.

Years back, capacity building of teachers, emphasis was only on in-service training that consists of short-term courses that offers teachers new information on a particular aspect of their work. This effort benefited very few and privileged teachers in the profession. This situation had little impact on the teachers' job performance as negligible number of teachers had the opportunity to attend this professional development programmes. They were therefore in unable to exhibit the characteristics of effective teachers.

Educationist such as Ogunde (2004), Galabawa (2005), Dembele (2005) and Chukwu (2010) have, emphasized the importance of on-the-job professional development of teachers otherwise, known as capacity building strategy in order to keep them abreast with new techniques and the pedagogy for effective job performance. This strategic requirement such as workshop, seminars apart from the individual satisfaction or remuneration that teachers may benefit as a result of the opportunities offered to participate in the professional development programmes, the process has a significant positive implication for teachers' effectiveness in the school system.

In order for the objectives of an organization like the school system to be realized, effective capacity building for teachers is very imperative. Capacity building strategy provide the

skills in which instructional programmes of school is conducted, and the job satisfaction and performance effectiveness of teachers are measured.

One of the fundamental problems confronting the possible development of the Cross River State secondary school system is in the area of capacity building of staff. This has had its advert effect on the effectiveness of teachers. To this end, there is urgent need to address the issue.

## **2.0 Statement of problem**

In these days described as the “era of qualitative education,” human resources are the most important and active factor in the production process in the education sector. Inadequate and ineffective human capacity to achieve goals and objectives of the educational system has hindered the productive activities and progress of the system. In Cross River State educational system, human capacity building strategy is poorly conceived and developed towards teachers’ motivation for effective job performance.

Also, in the recent past years, capacity building strategy of teachers has been more or less focused on in-service training, which consisted of short-term courses that would offer teachers new information on a particular aspect of teaching. The scheme neglected emphasis on skill acquisition, knowledge and attitude to impact on human life (Chukwu, 2010). Consequently, teachers tend to be unable to contribute to quality teaching that is required for nation building possibly because reliable capacity building strategies seemed to have been put in place in the system.

Aside from the above, inadequacy of funds for research for teachers has tended to result in poor teachers’ performance. Based on these variables, the study is set out to examine the influence of capacity building strategy on teachers’ job effectiveness in the school system.

## **3.0 Purpose of the study**

The objective of this study was to examine the influence of capacity building strategy on job effectiveness of teachers in secondary school in Cross River, Nigeria.

Specifically, the research study is designed to:

1. Examine the influence of capacity building strategy in the area of funding research and teachers’ job effectiveness.
2. Examine the influence of capacity building strategy in the areas of regular Conferences attendance and teachers’ job effectiveness.
3. Examine the influence of capacity building strategy in the areas of professional growth and teachers’ job effectiveness.
4. Evaluate the influence of capacity building strategy in terms of provision and excessive award to best teachers and their job effectiveness.

## **4.0 Research questions**

To give direction to the research, the following questions were developed.

1. To what extent does capacity building strategy in the areas of funding research influenced teachers job effectiveness?
2. Does capacity building strategy in terms of regular Conferences attendance influenced teachers’ job effectiveness.

3. To what extent does capacity building in the areas of provision of the Excellence Award to the best teachers' influenced teachers' job performance.

### **5.0 Research hypotheses**

The following hypotheses were formulated for the study:

1. Capacity building strategy in the areas of funding research does not significantly influence teachers' job effectiveness.
2. Capacity building strategy in terms of regular Conferences attendance does not significantly influence teachers' job effectiveness.
3. Capacity building strategy in the areas of the provision of Excellence Award to the best **teachers does not significantly influenced their job effectiveness.**

### **6.0 Research methodology**

For the purpose of gathering requisite data for the study, a descriptive survey ex-post-facto method was adopted. This design is ideal for use in this study because the study involved collecting data from a sample of school principals and students regarding their position, age, and experience in the selected schools. The survey ex-post-facto design is also adopted because the variables being investigated cannot be controlled by the researchers as the event had occurred.

The population of the study was made up of all the Principals and Final Year (SS3) Students of only public secondary schools in Cross River State. Stratified random sampling technique was adopted for his study. Hence, the secondary schools were stratified on the basis of their location and operations.

A self-developed questionnaire made up two parts was used as instrument for data collection: Part one highlighted the biographic data of the respondents such as, school location, age, and job experience. Part two contained 36 items that were divided into 4 clusters. Cluster one consisted of nine items that focused on the strategies for funding Research. Cluster 2 had nine items on Conferences attendance by teachers. Cluster 3 contained nine items on Professional Development/Growth; while, Cluster 4 had nine items that focused on Excellence Award to best teachers.

The items in the questionnaire were structured on a 4 point Likert Scale that ranges from Frequent, Never frequent, Very frequent, Not frequent to Never 1 with the following scores: 4, 3, 2, and 1 points assigned to them respectively.

To ensure the validity of the research instrument, four experts in the Department of Measurement and Evaluation, Faculty of Education, University of Calabar, vetted the draft copies. They screened, modified and approved the instrument before being administered. To achieve the reliability of the instrument, the researchers adopted the of test-retest method which yielded a reliability co-efficient of 0.95.

The data collected for the study were analyzed using the independent t-test statistical tools.

## Result

### 6.1 Hypothesis 1

Capacity building strategies in terms of funding research programmes does not significantly influenced teachers' job effectiveness.

**TABLE 1**

t-test analysis of the influence of capacity building strategy in terms of funding research on teachers' job effectiveness

Variables	N	X	SD	t-cal	Cri-val	Df	P
Capacity building strategy in the area of funding research	123	23.83	2.47	18.83	1.96	198	0.05
Teachers' job effectiveness	77	16.43	2.37				

In the Table above, the calculated t-value of 18.83 is far greater than the critical value of 1.96 at 0.05 level of significance indicating that capacity building strategy in the area of funding research for teachers' academic work has on effect on teachers' job effectiveness in the school system. In other words, without provision of fund for more academic research towards enhancing the status of teachers in teaching profession, teachers will be dormant.

### 6.2 Hypothesis 2

Capacity building strategy in terms of regular Conferences attendance does not significantly influenced teachers' job effectiveness.

**TABLE 2**

t-test analysis of the influence of capacity building strategy in the areas of regular attendance of Conferences on teachers' job effectiveness

Variables	N	X	SD	t-cal	Cri-val	Df	P
Capacity building strategy in terms of regular attendance of conference	140	22.39	1.23	13.61	1.96	198	0.05
Teachers' job effectiveness	60	17.90	1.49				

The Table 2 above is used to test whether there is any influence of capacity building strategy in the area of regular attendance of Conferences on teachers' job effectiveness. From the values obtained in the table, the calculate t-value is greater than the critical at 0.05 level of significance. The differences observed in the values is very important indicating that when teachers are not professionally developed through regular attendance of conference to develop their knowledge and teaching pedagogy, they are likely to be ineffective in the teaching job.

### 6.3 Hypothesis 3

Capacity building strategy in terms of provision of Excellence Award to the best teacher does not significantly influenced teachers job effectiveness

**Table 3**

t-test analysis of the influence of building strategy in terms of provision of Excellence Award to the best teacher on their job effectiveness

Variables	N	X	SD	t-cal	Cri-val	Df	P
Capacity building strategy in terms of Excellence Award	134	22.35	1.96	14.72	1.96	198	0.05
Teachers' job effectiveness	66	17.64	1.55				

Values obtained in Table 3, revealed that the calculated t-value of 14.72 is greater than the critical value of 1.96 at 0.05 level of significance. This analysis revealed that when the best teachers are rewarded for their hard work, it will motivate them to perform effectively in the teaching career. In other words, teachers will deliver, become competent in the profession.

## 7.0 Discussion

The results from the data analysis showed that capacity building strategies are very imperative in teachers' job effectiveness. The observation from the analysis revealed that capacity building of teachers' is paramount as it will go a long way to enhance teaching effectiveness.

In consonance with the above contention, Villegas- Reiners (2003) in Chukwu (2010) acknowledged that teachers are the most significant change agents in educational growth. Therefore, teachers should be encouraged to possess the strategic analytical and management capacities as well as adequate and sustainable structures and the skills needed for formulation, development and implementation of effective education policies. By so doing, teachers will become competent in the basic skills of teaching in their professional role. In view of this, the researcher is of the opinion that for this development to succeed teachers' research need to be funded to equip them for the task of teaching to sustain the educational system.

In Table 2, the analysis showed that capacity building strategy in terms of teachers being given opportunities to attend conference regularly enhanced their performance of the teaching job more effectively. The data analysis revealed that the calculated t-value of 13.61 is by far greater than the critical value of 1.96 indicating that capacity building strategy is a motivating factor for effective teaching. Teacher's participation in professional development opportunity such as conference and workshops attendance has a significant positive impact on the teachers' job performance.

In support of this view, Mbakwen (2014) in Ivowi (2014) post that it enhances the teachers' beliefs and pedagogy towards students' learning achievement. She added that teacher effectiveness demands understanding of the nature of the job through training strategy to acquire skills of selecting learning experiences that will enable the students achieve the goals of education.

From the result of the findings in hypothesis three, table 3 above there exist a significant influence of capacity building strategies on teachers' job effectiveness. The result obtained showed that the calculated t-value of 14.72 is by far higher than the critical value of 1.96 at 0.05 alpha level. This implies that when the school authority organizes excellence award for the best

performing teachers, this will motivate them to work harder and contribute more effectively to teaching and learning in the education systems.

There is the tendency for motivated teachers to demonstrate ingenuity and wisdom in the utilization of acquired skills, by providing emotional support for his students, has compactly with them and select curriculum materials which are more appropriate to the students' ability in the learning process (Oladele, 1991). On this note Ukeje, B. O., Akabogu, G. C. & Ndu A. (2001) observed that Excellence Award used as intrinsic motivators often enhanced teachers' ability to achieve and through achievement experience psychological growth in the system. This is the hallmark of improved educational system for both students and students.

### **8.0 Conclusion**

Based on the findings, the study conclude that effective teaching can only be realized underutilization of human skills that are practically acquired through capacity building strategies or professional development of teachers. In the context of this study, capacity building strategies include amongst others, provision of fund for teachers to embark on research and up-date their knowledge, organized regular conference for teachers and recognition of achievement by awarding best teachers for their contribution or hard work when teachers are professionally equipped they are able to effectively teach, coordinate the children, the curriculum and the learning environment to achieve results.

### **9.0 Recommendations**

Based on the conclusion, the following recommendations are made.

1. Government policy on education should favour regular capacity building strategies through organization of conferences, workshops, seminars for teachers towards enhancing effective teaching and learning.
2. Adequate fund for research should be made available for teachers to up-date their knowledge and skills in the profession.
3. There is need for regular in-service or on-the-job training, appropriate methods to be conducted for teachers to make the desired impact, as no organization can survive without staff training for improved performance.
4. School managers should ensure that teachers are actively adapted to all forms of strategies especially on those issues that concerned professional development.
5. Annual Merit Awards presentation should be given to the Teachers for excellence job performance in order to motivate them put in their best.

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