CONFLICT AND SCIENCE: EXPLORING THE RELATIONSHIP FOR GLOBAL PEACE AND SECURITY

DR.RAJI SHITTU, CENTRE FOR PEACE AND STRATEGIC STUDIES, UNIVERSITY OF ILORIN

adraj2010@yahoo.com

ABSTRACT

This study explored the nexus between conflict and science, and the effects of the two variables on global peace and security. The work noted from the outset that In spite of the collaborative efforts amongst world leaders to bring about global peace and security through diverse means, devastating wars and other forms of subversive activities are still an acute reality all over the world. The ubiquity of violent conflict globally has led to frequent loss of lives and property. The research findings which relied on secondary source identified four major causes of conflict, whether national or global. These are conflicts over scarce resources, dispute over cherished values (worldview),conflict over psychological inclinations and conflict over mismanagement of information. The study reveals further that science is related to global conflicts in three major dimensions: Science produces the weapons of mass destruction that are used as instrument of engagement in global conflicts, military scientists practically manages and prosecutes wars across the globe while global warfare is de-escalated through scientist's involvement in peace conventions. In spite of the moderate contributions of science to global peace and security under the contemporary unipolar world order, the use of weapons of mass destruction by individuals and terrorist groups to settle primordial score remains the current most dangerous threat to global peace and security.

Key words: Conflict, Science,Global, Peace, Security.

INTRODUCTION

From strategic historical accounts, the primary stimulant to the study of International Relations or Strategic Studies as a course is to have a broader knowledge and understanding of the causes, consequences and possible avenues for controlling violent conflict globally (Joy, 2006).In spite of the collaborative efforts amongst conflict managers and world leaders, to bring about global peace and security through diverse means (through sub-regional, regional and global institutions), devastating wars and other forms of subversive activities are still an acute reality all over the world. A review of the current global conflict spots revealed about thirty cases of such conflict (Micah, 2014). Included in this infamous list is the gradual collapse of security and governance gains in Afghanistan after the initial political re-construction that culminated in the successful conduct of the 2004/2005 elections which pushed the country to the path of democratization process. Such initial democratic gain in Afghanistan is currently being eroded with serious intensification of political insurgency and terror attacks in the country. Venezuela is currently characterized by political turmoil over the October 2012 election. The Eastern Mediterranean zone is bedeviled by crisis between Turkey and Israel over competing navigational territorial claim and there is political instability in Syria, to mention just a few.

Of all the regions of the world, none seems to have witnessed intense and deadly conflicts as Africa. Currently, there are about six on-going violent conflicts in the continent which has transformed into full scale war or has taken the dimension of ethno-religious insurgency (Micah, 2014:2).Some of these conflicts Include the sectarian crisis in Central African Republic between Christians and Muslims which has led to the death of about 15,000 people and the displacement of more than 50,000 others (Ray, 2014). The political turmoil in South-Sudan between the President, Salva Kiir and his former Vice, Riek Machar over an allegation of coup attempt by the latter against the former has led to the death of about 3,000 people (Daniel, 2013).There is also unending waves of political turmoil in Egypt over the overthrow of President Mohammed Morsi by the Military in 2013. The attempt to unseat the government of Joseph Kabila by the March 23 (M.23) rebel over the allegation that the President has reneged on his March 23,2009 agreement to protect the interest of the Tutsi tribe in the country has brought about serious clash between forces loyal to the government and the rebel in the Democratic Republic of Congo. The Boko-Haram religious insurgency in Nigeria and the terrorist activities of the Al-shabab group in Somalia have led to the lost of many lives and properties in the two countries. Apart from the recent violence in Africa, other conflicts of various dimensions had earlier taken place in the continent, especially in the eighties and the nineties with various degrees of serious damages to the socio- economic development of the region. Thus there had been civil wars in Angola, Liberia, Sierra Leone, Ethiopia and Eritrea, Burundi and Rwanda leading to the loss of many lives and property. As noted by Egwu (2000:1), the

ubiquity of violent conflict in Africa is attested to by sheer overwhelming rise in the loss of lives and property in these chains of violent encounters. Conflicts have also resulted in physical displacement of many Africans into refugee camps within and outside the continent. Apart from exposing Africa as gradually becoming a continent of endless wars, frightening poverty and sorrow, the perennial conflicts in the continent has led to frequent diversion of a large chunk of resources meant for the development of the continent for post war reconstruction and rehabilitation while some African leaders have actually been raiding state coffers to buy arms and ammunitions to finance the wars or curtail insurgency.

For example, not less than twenty-six inter- state armed conflicts erupted in Africa between 1966 and 2006 killing more than two million people and living three million people as refugees while about $2billion was used for peacekeeping operation in Africa as of 2006 (Maryse,2006:8). As a radical departure from the previous inter-state conflicts of the pre- cold and cold war era, current global conflict is characterized more by internal conflicts, especially between different geo-political zones, different socio-ethnic groups and between ethno-religious divides within a particular country. There are also intra state conflicts between aggrieved groups and the Government, such as the rift between the Nigerian state and the Niger Delta people who felt and still feels marginalized in the sharing of Nigeria's economic resources. Some of the global crises were characterized by genocide, near ethnic cleansing and state collapse as exemplified in Bosnia, Rwanda and Somalia respectively. There are great indicators that the civilians, especially women and children constituted about 90 percent of casualties of war (Joy, 2006). By implication, conflict across the globe has destroyed many current and future productive forces. Major characteristics of most conflict or post conflict countries globally include weak national government, fragile development institutions, tenure (emergency) laws, disoriented economies and enormous social needs which are often difficult to satisfy because most conflict state lack adequate resources and the needed infrastructural support; electricity, hospitals, educational institutions, water dispensing agencies, amongst others, to take care of their populace due to the destruction of many of these infrastructures during the war.

The deprivations from these enormous needs have further aggravated the sufferings of many of those who were not directly killed during the crisis leading to post war casualties and more deaths. Regardless of the fact that there was the need to design a programme for the disarmament, demobilization, resettlement, and re-integration of former combatants as essential part of post war reconstruction and rehabilitation, these programmes often become difficult to accomplish in many war torn countries, especially in the developing countries due to the devastation of the financial resource base of the countries concerned during the war. Under this difficult circumstance, many of such war combatants with free access to arms and ammunitions eventually turned out to be armed robbers and cross border terrorists, thereby

posing more security threats to the adjoining countries. For example, the war in Sierra Leone, Liberia, Angola and Sudan produced about 100,000 child ex-combatant soldiers, who operated freely with arms (Dokubo, 2003). Lack of adequate capacity to construct a neutral and loyal army who are sometimes constructed from the ex-rebels to operate within the law also constitute major problem to post conflict countries globally.

The primary focus of this paper is to; explore the contributions of science to the above global catastrophes. Though literature abounds on conflict and science as independent fields of studies, there is scanty literature on the nexus between the two variables and their impacts on global peace and security. This study seeks to fill this gap by examining the nature and dimension of global conflict and the contributions of science to the escalation and de-escalation of such conflicts. Four major questions suffice for answer in this paper:

i. What is the nature and dimension of global conflicts?
ii. What are the factors responsible for global conflicts?
iii. What are the effects of these conflicts on global development efforts and the sustenance of global peace and security?
iv. What has being the role and contributions of science to global conflicts?
v. What is the relationship between conflict and science and what are the contributions of the two variables to global peace and security?

In an attempt to answer the above research questions, the paper adopts secondary source of data collection. Through this source, data in already existing materials from text, journals, Newspapers, magazines, amongst others, were distilled and subjected to further re-analysis to generate new findings from the study through logical deductions from the data.

CONCEPTUAL CLARIFICATIONS

There are different conceptual understandings of Science and Conflict as advanced by different scholars. Daniel (2013) defined science as the concerted human efforts to understand the natural world through systematic observation and experimentation in order to learn more about how nature works. Such scientific investigation reveals a specific pattern of behaviour in natural phenomenon under controlled conditions. Micah (2014) defines science as the systematic pursuit and application of knowledge and understanding of the natural, physical and social environment to improve people's standard of living. While former definition limited the understanding of science essentially to natural phenomenon in the physical environment, the latter's covers the natural phenomenon in both physical and social environments. The key point of observation here is that while the former limited his understanding of science to the study of

natural environment alone, the latter opined that any form of investigation is scientific in as much as the process of arriving at the result is systematic and procedure based. Best (2006) defines conflict as the pursuance of incompatible goals, interest and idea between two people or amongst different groups. Conflict could also be defined as unresolved disagreement, struggle or confrontation over incompatible goals leading to clash of interest.

Though conflict is a natural existence in human relations, Albert (2001) distinguishes between positive and negative conflict. While positive conflict denotes constructive criticism and disagreement to bring about the best for the promotion of societal objectives and goals, negative conflict is destructive and tends towards confrontation rather than collaboration as a result of irreconcilable differences. There are three key conditions before a situation is considered conflicting (Best, 2006). These are goal incompatibility which represents a clash of interest where at least two people seeks same interest which only one of the two could have at a particular point in time within the same interest framework. The second condition is an interfering variable in which the two contending parties sees each other as representing an obstruction and blockade to the group's aspiration to achieving their goals.

Thirdly, there is a perception variation of conflict, in which different perception of a particular situation by different people makes an issue conflictual or not conflictual. For instance, a person who relies on good music to sleep may not pick offence when music is being played while trying to sleep while those who need quiet environment to sleep may easily pick quarrels with music. How an issue is perceived is in turn determined by different personality backgrounds; different exposure, training, experiences and different historical backgrounds. Other issues that aid conflicting perceptions include cultural and religious world view of individual, his psychological state of mind or his mood at a particular point in time (Joy, 2006). There are about eight main stages of conflicts (Mark, 2004). These are the latent, emergence, escalation and crisis stages. Other stages are the de-escalation, negotiation, settlement and conflict transformation stages. Latent stage represents low level and largely unnoticed state of disagreement. The emergence stage represents a point at which disagreement amongst conflicting parties became noticeable to the public. Such stage is often characterized by accusation and counter accusation, blackmail, hot argument, insulting languages between conflicting parties. However, the disagreement at this stage has not snowballed into open confrontation and intense fighting. The escalated stage of conflict is characterized by open confrontation, regular and high intensity physical combat. Such escalating stage is also bedeviled by the use of dangerous and deadly weapons to settle scores leading to loss of lives and properties. The escalating stage could be said to be the highest level of confrontational conflict as it is characterized by crisis and war.

The de-escalation stage of conflict refers to a level at which concerted efforts are made to tone down the level and devastating effect of conflict through peace keeping and peace enforcement operations .The conflict resolution stage represents a stage of addressing the core conflict issues to the satisfaction of the parties involved while the conflict transformation stage represents a stage of transformation of conflict issues from confrontation to collaboration by first transforming human thoughts and mindsets towards greater positive understanding, especially amongst the warring parties. Such transformational strategy is also tilted towards building the culture of permanent peace in the minds of the conflicting parties. The conflict transformation state is thus a process of changing incompatibility to compatibility, hatred to love, disharmony to harmony, amongst others. There are about five stages of conflict transformation processes to achieve peace (Mark,2004:3).These are actor, issue, institutional, legal and structural transformation stages. The transformation strategy for conflict actors focuses on the positive changes in the behaviour and the attitude of such actors in order to drop their confrontational attitudes for collaboration to bring about peace in a troubled community. Issue transformation processes focus on the transformation of conflict issues from their point of disagreement to compromise by changing their hard-line positions on conflict issues and interest for softer and consensus bargaining processes.

The institutional transformational stage of conflict represents positive alteration of the performances of social institutional structures that provides services to the public from their previous poor performance ratings for better and optimal performance. The legal transformation process refers to rules transformation which removes the obnoxious laws that made people to rebel. For example, the removal of apartheid policies overwhelmingly toned down the level of political conflict in South Africa. The structural transformation of conflict represents credible transformation of each of the transformational stages earlier discussed but with special interest in their inter stage collaboration for effective conflict transformation owing to the observation that conflict might not be adequately mitigated even where a particular stage had been successfully transformed while neglecting other stages.

Albert (2001), identified four major sources of conflict whether national or global. One of these sources revolves around competition for inadequate resources leading to aggressive struggle amongst competing groups. Such competition assumes a more destructive dimension when the needed resource cannot go round or when it relatively goes round but not equitably distributed. Contradicting value system is another source of conflict. Such cherished values include religious beliefs, ideological leanings and cultural values. The above mentioned valued system represents people's sensitive inclinations, doctrinal loyalty, ethical values and creed that cannot be compromised and could lead to conflict when threatened. A psychological induced conflict represents disagreement over personal and group self actualizations which include respect for personal dignity, meeting personal and group development aspirations and

endogenous development (development without external domination), amongst others. The way an information is managed in speech, writing or in circulation could cause, escalate or de-escalate conflict. Thus bad information management often stirs up conflict.

THEORETICAL FRAMEWORK

Within the theoretical framework of analysis, there are many theories which explain why social conflict happens in the society (Stephen, 2006). One of such theories as posited by Brenda and Singer is the structural theory of conflict. Structuralisms linked conflict to structural defects in the distribution of global resources. Structuralism posits that conflict could be built into a particular way in which a society is structured and organized. In this regard, issues like political and economic exclusion, injustices unfairness, denial of fundamental rights and inequities, amongst others, are primary sources of conflict. The Realist school of thought sees conflict as a fact of life that cannot be wished away. It traces the instincts to fight to natural flow of instincts of selfishness in man who naturally engages in the pursuit of selfish interest defined as Power; military, economic and political powers, which countries use as a domineering strength to attempt to conquer the world in the course of her aggressive pursuit of scarce global resources. The Realist school as championed by Hans Morgenthau (1986) believed that nations should prepare for war always rather than wish it away. What can stop war is the attainment of balance of power which could easily be achieved through parity in the acquisition of Mutually Assured Destructive capability (MAD).Such parity serves as deterrence for one country to attempt to attack the other because of their equal destructive capability.

The biological theory of conflict as propounded by Darwin summarily posits that conflict arises as a result of genetic defect in the composition of the genes that makes up the person leading to natural flow of hatred, irrationality, annoyance or anger (Stephen, 2006). Such defective tendency makes man behave irrationally a time. The scholar posits that human beings are evil by nature. What reduces this irrationality and evil tendencies in man include proper counseling, religious guidance, cultural value orientation, legal consequences of destructive actions, to mention a few. The frustration-aggression theory of conflict as popularized by Dollard (2005) traced conflict to the inability of the people to fulfill their primary and secondary needs which could lead to frustration. Such frustrated people could direct their aggression (right or wrong) to those whom they considered as being responsible for their plight for not achieving personal or group development aspirations. According to Daniel (2013), economically induced conflict is inspired by poverty which are caused by weak economic backgrounds of many people, either as a result of insufficient or inequity in the distribution of collective resources. Conversely, there are conflict entrepreneur who promote all forms of conflict; political, economic or social conflicts for personal economic gains (profits). Politicians and fire-arm manufacturers who sponsor conflict for personal political and economic gains fall into the

category of economically induced conflicts. What has been distilled from the above highlighted theoretical understanding is that causes of conflicts are multidimensional. Some are linked to the lopsided structure of the society which promotes the prosperity of the privilege few in contrast to the poverty of greater majority. Conflict is also linked to the denial of basic needs, socio-political exclusion, natural wickedness of man, frustration leading to aggression, amongst others. Conflict managers need to have a proper analysis of conflict from these diverse theoretical understanding in order to successfully transforms such conflict from confrontation to collaboration for peaceful co-existence amongst global citizens. Since no single theory can explain social science phenomenon adequately and since the study of conflict is multi-disciplinary in approach, this work considers all the above highlighted theories as central to this study.

THE CONTRIBUTIONS OF SCIENCE TO GLOBAL CONFLICT, PEACE AND SECURITY

Science, just like many other academic sub-disciplines has contributed to the escalation and de-escalation of global conflict. This paper identifies three main roles of science to global conflict, peace and security. These roles include the contribution of scientific research to the development of warfare technologies, the contribution of military scientists to the practical prosecution of global warfare and the contributory role of science to the de-escalation of global conflict. In relation to the research role of Science to global warfare, the discipline has made immense contributions through research to the production of technologies of war and scientific weapons of mass destruction (Elaigwu, 1995). Included in the warfare technology discovery of science are Dane and Machine gun, gun boats, and war delivery mobile technology devices such as operational artilleries and armoury cars. Science has also discovered missile technologies which include guided ammunitions that are fired from a distance to destroy the enemy and its territories. Such missiles comes in form of explosive (shells) or could be fired from gun (projectiles).Some missiles are also projected in form of water mines (missiles that travels in water) as against land mine (missiles that transverse the land). Included in the global missile pile-up are the Intercontinental Ballistic Missiles (ICBM), the Anti- Ballistic Missiles (ABM), Multiple Interdependent Targetable Re-entry Vehicles (MIRV), Cruise Missiles, amongst other warfare technologies. Science has also developed the Geographical Information Technology (GIT) which focuses on the interactive use of the Geographical Information System (GIS), Remote Sensing (RS) and Geo-positioning system (GPS) as a positioning strategy to win war (Daniel, 2013).

These “senses” serve as a “precise decision” support system for military fighters to know their bearing, especially in strange environment during war time. The above mentioned geographical information technologies are characterized by adequate information on relevance tactical bearings for correct and prompt operational decisions during war. Such geographical

devices correctly measures, adequately mapped and monitors from a distance, war equipments of the opposing parties. The geographical information system also monitors the model and relative levels of the destructive carrying-capacity of such enemy's warfare equipment. However the existing images through (GIS) have limited military applications because their coverage capacity is limited mainly to their areas of installation rather than the whole areas of military operations. Thus lots of subversive activities can still take place outside the scope of the GIS.

Science has contributed to the production of scientific weapons of mass destruction. Such weapons included the chemical, nuclear and biological weapons of war. The chemical warfare involves the use of toxic properties of chemical substances as weapons of war. Unlike the nuclear weapon, chemical weapon does not depend on explosive to achieve its destructive target but rather, can cause death even by mere sniffing (Ray, 2014). Chemical agents once "weaponized" as agents of mass destruction could also be used to deny the enemies of vegetation cover as chemical defoliants are often used to kill vegetation areas that are used as concealment for the enemies. Defoliant chemical also serves as a credible destroyer of agriculture farmland and livestock in order to promote hunger and starvation in the enemy camp. Chemical weapons are made out of non-living toxic products produced by living organisms such as toxin; Botulium toxin, Ricin and Sax-toxin. Though there are about seventy varieties of toxic chemicals for use in warfare, there are four major types of these chemical weapons (Daniel, 2013).There is the chocking or pulmonary agents. The chemical agents in this category include phosgene or chlorine gas which attacks the lung tissue thereby causing respiratory distress and suffocation to death. The blister agents or Vesicants falls in the second type of toxic chemicals and such agents include mustard gas and Lewisite which causes blisters on the skin and respiratory tract while also causing severe burnt on the skin. Effects from the agents can lead to death or long term debilitating injuries including blindness. There are also blood toxic agents which are characterized by cyanide or cyanogens chloride which kills living things by interfering with the body's oxygen supply. Nerve agents are other destructive chemical agents which include Tabun, soman and sarin which are lethal and can cause rapid death by incapacitating the body's central nervous system. However, with proper protective equipments, such as chemical mask and protective training, the primary effects of chemical weapons can be overcome.

The Nuclear weapon is another mass casualty weapon of destruction produced by core scientific research. About 30, 000 different types of nuclear weapons are in the national stock piles of about eight countries in the world (Micah,2014).The countries include Britain, China, France, India, Israel (assumed) North Korea (self acclaimed), Pakistan, Russia and USA. Iran is being investigated over the suspicion of trying to build nuclear weapons. Some other countries including Syria, Libya and Yemen are believed to have chemical or biological weapon though

without any formal proof. Depending on the yield and atmospheric conditions, a large thermo nuclear weapon dropped on a densely populated city could kill millions of people while more people could die overtime due to the lethal effects of its radiation (Micah, 2014:3). Currently USA and Russia maintain several thousands of different nuclear weapons "on stand-by" or "warning" as a show of military strength. There are two main types of nuclear weapons; these are Fission and fusion bomb. The fission bomb is made of both plutonium and highly enriched uranium. The two substances when assembled together achieve a devastating powerful bang through self- sustaining chain reactions when released. The fusion weapon which is colloquially known as hydrogen bomb consists of two sets of hydrogen; tritium and deuterium which are fussed together to create heavier atoms which explodes under extremely high temperature and pressure. Thus fusion atoms are ten to one hundred times more explosive powerful than the fission bomb dropped on Hiroshima and Nagasaki during the Second World War (Mark, 2004). The radioactive effects of atomic bomb could also cause defective gene which can be passed on from generation to generation. It could also cause, lung, breast and bone cancer. Atomic bomb also has a little prospect of defense from its effects. However the weapon is largely being controlled through outright ban as a weapon of engagement in warfare while achieving a Mutually Assured Destruction (MAD) capacity can also deter the use of the weapon since there cannot be winner in a nuclear war due to their lethality and indiscriminate negative effects on the people including the person who deployed the deadly weapon.

The development of biological weapon of mass destruction is another contribution of science to global warfare. Conceptually, biological weapon encompasses any deliberate means to spread diseases to human, animals or plant (Henry, 2013). The weapon consists of deadly pathogens, toxins and anthrax that can be delivered in a variety of ways including intentional poisoning of food through salmonella. Biological weapon could also be developed through aerial dispersal of a genetically- engineered strain of highly infectious diseases such as small pox and the malicious use of deadly germs to cause destruction. There are more than 300,000 species of bacteria and 5,000 kinds of viruses that could be used as weapon of mass destruction to cause damages to human body (Laura, 2012). Biological weapons comes in two major forms; liquid and dry powder. The liquid form is easier to produce but have limited application to specific area through spraying which affects only the sprayed areas, but the dry biological virus is dispersed through the air and could cover longer range. The biological weapons can be used to cause damages in three dimensional ways (Laura, 2012:9): One, through direct contamination of food and water that the targeted enemies eat and drink respectively with viruses. Two, biological damages could be caused through deliberate release of infected vector (Mosquitoes) which then bite the victims. Anthrax could also be released into the air to be inhaled by the victims. Unlike the nuclear weapons which have immediate destructive effect, the effect of biological weapon takes a while before its manifest while incubation period ranges between 24 hours to a few weeks depending on the type of biological weapons used. Biological

weapons could be controlled through large scale vaccinations against polio, small pox and other virulent diseases.

Some of the scientists who have made meaningful contributions to the development of weapons of mass destructions include Oppenheimer, J.R, who led the USA Manhattan project that produced the first atomic bomb used in Japan in the Second World War. David Kelly, a British scientist was a specialist in biological warfare who led the UNO weapon inspection in Iraq in 2001. Allen Myles and Richard Alley are climatic scientists who predicted accurately, the appropriate earth temperature for the release of weapons of mass destruction. The power space amour used by space marine to fight enemy was discovered by a space trooper called Robert Heinlein. John Brunner developed cyber warfare through which war is fought within the structure of communication system using web virus to destroy vital information, amongst host of other scientists who made contribution to the discovery of weapons of mass destruction.

THE CONTRIBUTION OF SCIENTISTS TO THE PROSECUTION OF GLOBAL WARFARE

Apart from contributing to the researches that provided the weapons of warfare, the scientists were equally the primary drivers of these war artilleries as weapon of engagement in global warfare. Weapons of mass destruction have thus been used as practical instruments of engagement in global warfare. The military scientists controlled most of the tactical operations and the manipulation of the warfare delivery vehicles having served as armoury car operator and the pilots of most of the fighter jets. Having earlier developed these weapons of warfare, the potency of those weapons were practically tested on the battle field by military scientists who physically directed the operation of these warfare technologies, most especially during the first and the second world war.

Though the use of dane gun and machine guns were largely used in local and European warfare in the early centuries, the 19th century witnessed the introduction of weapon of mass destruction in the First World War which took place between 1914 and 1919. The chemical agents were the first weapon of mass destruction to be used by the French soldiers (Micah, 2014). Such chemical warfare was characterized by the release of poisonous gas by the French troops using gas cylinders through which German troops were blinded by the French tear gas at the battle of Estarres in 1918. The chemical weapons were primarily used to demoralize, injure, and kill entrenched German soldiers. Other brand of chemicals used during the First World War apart from the tear gas included mustard gas and other lethal chemical agents like phosgene and chlorine. However, the earlier use of chemical weapons was largely restricted to the use of tear gas-inducing irritants rather than the current fatal or disabling poisonous chemicals. The killing capacity of chemical weapon in the First World War was limited to only 4 percent causality because many targeted troops quickly developed effective counter protective measure including gas masks. It is in this regard that the First World War is often referred to as

Chemist war and by extension “science enhanced war:. However the use of poisonous gas by all nations in the First World War against enemy soldiers constituted war crime as it violated the 1989 Hague declaration concerning the prohibitive use of Asphyxiating gases and the 1907 Hague convention on land warfare which prohibited the use of poisoned or poisoned weapons in warfare (Arianna, 2013).

In relation to the use of nuclear weapons as a medium of scientific engagement in global warfare, military scientists from the United States of America dropped the first atomic bomb on Hiroshima, Japan on August 6, 1945 towards the end of the Second World War while the second atomic bomb exploded on August 9th, 1945 in the Japanese city of Nagasaki (Elaigwu, 1995) . The bomb blast which took place during the regime of Harry Truman killed over 250,000 people in Japan (Elaigwu, 1995:4). The cold war tension in the early fifties and sixties contributed to a series of confrontations that repeatedly raised the possibility of nuclear war. One often cited confrontation came up in 1962, which brought the United States of America and the defunct Union of Soviet Socialist Republic (USSR) to the brink of nuclear war during the missile crisis over Cuban’s acceptance to host Russian ballistic missiles close to the territories of the USA. Though biological weapon is one of the weapons of mass destruction and scientific weapon of engagement in global warfare, there are relatively few historical examples of large scale biological warfare deployment. However, it is on record that Japan used it in 20th Century when the country experimented her research on the effectiveness of biological weapons on prisoners from the World War II, killing at least 1,000 people (Mark, 2004).

Aside from the practical engagement of military scientist in the battle field, there was also the need for the soldiers to know their engagement environment, the terrain conditions and the topography of such environment, Geologists were largely used during the war to identify the topography of the conflict environment in order to take important and tactical decisions. It was equally important to consider the atmospheric conditions that were favorable for the release of much of the weapons of mass destructions. The metrologies were on hand to provide this information. In fact the neglect of meteorologist advice by the German soldiers of the presence of dangerous emission in their camps led to more casualties before precautionary measure was devised. In spite of seeming exhaustive discourse of the roles of science in conflict much of the discourse are largely focused on land and air engagement while leaving out the contributions of science to navigational or marine warfare. Scientific role in the area of agricultural bio-warfare and bio-terrorism which attacks the food supplies in the enemy camp was also sparsely covered. Thus, indicating that science has contributed to the escalation of global warfare in many diverse areas.

CONTRIBUTION OF SCIENCE TO THE DE-ESCALATION OF GLOBAL CONFLICT

As a result of the devastating effect of global warfare leading to loss of several lives and properties, lots of efforts have been made to de-escalate the conflict globally through many conventions and memorandum of understanding. Such conventions agrees on the elimination of the toxic that could be used as weapon of destruction or the chemicals that can be use to manufacture such destructive toxic. The United States of America (USA) has dramatically increased bio defense funding from $6billion to $10 billion to destroy a large chunk of biological weapons to prevent it from being acquired by criminals (Micah, 2014). The chemical weapons convention (CWC) was entered into in April 1997 and now has 175 members. There is equally the organization for the Prohibition of Chemical Weapons (OPCW) which consists of about 200 members. There is the Arms Control Association (ACA), a nonprofit making association based in Washington D.C which consists of scientists who are involved in non-proliferation studies. The National Libraries of War Medicine (NLWM) is another scientific forum that gives information and links on classes of chemical weapons, their effects on the environment and the best strategies for emergency responses to weapons of mass destruction. One key point of observation with all the conventions and associations borders on the fact that about 98 percent of the members of these associations are scientists who are involved in the international verification of the destruction of weapons of mass destruction and prompt investigation of attempts to build new ones thus making it possible for the scientists to contribute to the de-escalation of weapons of mass destruction that could escalate global conflicts.

Industrial and chemical scientists increasingly direct much of their current researches to providing protective devices from the chemical effects of warfare through mass production of chemical mask, bullet proof vest, gas mask apart from researching more into the provision of drugs that could aid quick recovery of world victims. Industrial scientists have also embarked on mass production of artificial body parts such as artificial legs and arms for war amputees while medical doctors and other health scientists regularly treat war victims during and after the war. Scientists have also developed chemical disinfectants to disinfect war trenches of gas poisons. Engineers have been engaged to reconstruct damaged infrastructure during the war, while many agricultural scientists have de-focused their attention from bio- terror research to developing bio- technology which has led to the mass production of genetically inspired fruits and root crops in order to increase food availability. The main point of observation here is that science has provided the “kill” and the cure for victims of global conflicts.

THE RELATIONSHIP BETWEEN CONFLICT AND SCIENCE FOR GLOBAL PEACE AND SECURITY

As earlier examined, the contribution of science to global conflict has been noticed in three major areas, especially in respect of the roles of scientific research in the development of

warfare technologies, the practical contributions of military scientists to the prosecution of global warfare and the contributory role of science to the de-escalation of global conflict. The above highlighted three core roles and contributions of science to global conflict directly or indirectly answers the questions on the relationship between conflict and science for global peace and security. Such relationship could therefore be said to be complementary and supplementary. Complementary in the sense that scientific investigation has provided the technologies and weapons of mass destruction which serves as instrument of engagement in global conflict. Without the scientific technology therefore, global warfare is virtually flat. The two variables; "conflict" and "science" also have a complementary role in that it has been favourably argued that conflict management as a course of study is part of science. Thus strategic studies which focus on the systematic study of conflict management and the tactical skills to win war has a scientific approach to its study. The core course components of strategic studies include the knowledge of map reading, mathematics, meteorology, information technology, amongst others. Many scientists are now competent conflict managers having attended conflict training programmes to manage industrial dispute in their places of work. Biology, which is a core science subject has equally contributed to our knowledge of conflict having explained theoretically that conflict is inherent in human as a result of defective gene which makes man to be angry and wicked a time.

In exploring the relationship between conflict and science for global peace and security, findings from this study shows that the contemporary international system has witnessed relative peace from inter-state conflict as a result of the contribution of science to global war de-escalation programme through disarmament policies and regular inspections of instrument of mass destruction by scientists, much of which have been out rightly prohibited. The scientific contributions to the de-escalation of global warfare was helped further with the end of the cold war. The post cold war era is thus characterized more by global inter-state collaboration than the previous confrontation leading to reduction of active inter-state war globally. For instance, the North Atlantic Treaty Organization (NATO) and the Russian army have been conducting joint military exercise to promote global peace and security. The focus of most nations currently is on economic issues unlike their previous preoccupations with military conquest. Virtually all the countries of the world have attained independence while apartheid has been dismantled in South Africa. The relative resolution of the above highlighted global issues which had earlier polarized the world has brought about relative peace and harmony globally. However, in spite of considerable de-escalation of inter-state conflict globally, a new form of intra-state conflict which was largely suppressed during the cold war era has re-surfaced. Much of these internal conflicts were largely indecisive during the cold war era because neither the parties involved in the conflict possessed nor was allowed a decisive superior advantage over the other due to foreign backing during the cold war era to secure support for capitalist or socialist ideological leanings. Many opposition groups are also fighting undemocratic regimes and non-responsive

democratic governments. All the above internal wrangling coupled with global economic insecurity; social injustice and high rate of poverty have created a new line of global tension and general state of insecurity.

Of all the current security problems, religious conflict appears to be the most current challenge confronting the world. Thus religious insurgency has led to loss of many lives and properties. Many of the local religious crises have also escalated beyond domestic control with dangerous international linkages. Such subversive international connection makes religious war not just a threat to national government but a veritable threat to the international peace and security. Our findings confirmed Best (2006) opinion that conflict anywhere is a threat to peace, security and prosperity everywhere. To buttress this observation, the Boko-Haram group attacked the United Nations Organization (UNO) building in Abuja in 2011 where 25 international workers and several others who were nationals of other countries across the globe were killed. The most dangerous dimension of the activities of local ethnic militias, rebel groups and militant religious organizations is their seeming un-hindered access to weapons of mass destruction. For example, the use of sophisticated weapons and improvised explosive and the adoption of suicide bombing to attack target makes the al-Qaida insurgency the most current worrisome phenomenon globally. The organization was reported to have used anthrax in USA during the 2001 terrorist attack. There is the proliferation of sulphuric acid, Machine gun and dynamite which many private citizens use to settle primordial scores. Therefore, the use of weapons of mass destruction by individuals and terrorist group is the current most serious threat to global peace and security.

The use of these weapons of mass destruction by non-state actors is much more worrisome than their usage in the conventional war owing to the fact that while the activities of state actors are regulated in the use of weapons of mass destruction by conventions, treaties and agreement, the use of such weapons are not regulated by non-state actors. The amount of explosive pile up by the state actors including the extent of their devastating capacity is largely known while those of the terrorists are sparsely known. The official use of weapon of mass destruction is guided by rules and regulation in relation to when and where to use it; non-governmental extremists have no respect for rules of engagement as many innocent people often die from their attack. The enemies in conventional war are often identified by their uniform, extremists non-state actors are not known and can attack anywhere, any minute with destructive surprises. State actors trains scientists to produce and control weapons of mass destruction, terrorist largely concentrates on how to manufacture and use these weapons of mass destruction and focus less on how to control the weapons from getting to unintended target. The high level of un-hindered access to weapons of mass destruction coupled with unhindered access to subversive information (which is largely unknown to the state security

agencies) due to the liberalization of the telecommunication sector made it difficult to fight with overwhelming success the war on terrorism from conventional military engagement.

FINDINGS AND CONCLUSIONS

Having explored the nexus between conflict and science, and the effects of the two variables on global peace and security, findings from the study shows that, In spite of the collaborative efforts amongst world leaders to bring about global peace and security through diverse means, devastating wars and other forms of subversive activities are still an acute reality all over the world. The ubiquity of violent conflict globally has led to frequent loss of lives and properties. The research findings equally identified four major causes of global conflict and these are conflicts over scarce resources, dispute over cherished values (worldview), unresolved disagreement over psychological inclinations and conflict over mismanagement of information. The study reveals further that science has contributed to the escalation of global conflicts in two major dimensions having produced the weapons of mass destruction that are being use as instrument of engagement in global conflicts. Military scientists have equally been deployed on the battle field to practically manage and prosecute wars across the globe. However, science has also contributed to the de-escalation of global warfare through scientist's involvement in peace conventions and their inclusion on the panel of fact finding missions across the globe to investigate new cases of nuclear acquisitions. In spite of the moderate contributions of science to global peace and security under the contemporary unipolar world order, findings from the study reveals that the use of weapons of mass destruction by individuals and terrorist groups to settle primordial score remains the current most dangerous threat to global peace and security. Therefore, preventing weapon of mass destruction from falling into the hands of terrorists is one of the top contemporary global priorities which scientists must lead. Since scientists produce these weapons of mass destruction, they need to study how to reduce their destructive tendencies. There is the need also for Government across the globe to urgently address the issues of structural defects in the society by paying more attention to issues of social justice, inclusive political participation, respect for fundamental human right, poverty reduction programme, amongst others, because these issues serve as the key problems overheating the global political and security space. Though science does not recognize divine intervention, it is high time scientists began to explore the relationship between science and religion because for now, God's intervention appears to be the only saving grace from the contemporary global war of terror.

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