

A Comparative Analysis Of Air Power Application For Operational Effectiveness In The Russia-Ukraine And Second Gulf Wars

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Abstract – The study presents a synthesis of research that analyses air power and operational effectiveness in the second Gulf War and the Russia-Ukraine wars. The paper identified factors that were used to compare the utilisation of air power in both wars, especially by the coalition of air forces in Operation IRAQI FREEDOM and counter-offensive strategies utilised by the Ukrainian Air Force (UkrAF) to destroy the modern air assets of the Russian Air Force (RuAF). The methodology used is qualitative, utilizing a literature review approach. Researchers investigated and discussed formulating journal articles and online books. This study will employ comparative analysis as its technique for analyzing data. The collected data will be analyzed by comparing the operational effectiveness of air power during the Russia-Ukraine War and the Second Gulf War. The results find include psychological operation, aerial combat engagement, financial cost implications, the employment of ISR, and combat employment of hypersonic weapons. The authors introduce a new terminology in air power/public diplomacy known as '*aggressor burden*', which denotes a need in the use of air power to seek alliances or acceptance from the international community for mission effectiveness. The paper also posits that joint coordination could enhance operational effectiveness. Air power planners/operators are encouraged to consider these in their application of air power. This study concluded that air power application provides a better opportunity for effective operations using management functions.

Keywords – Air Power; Operational, Effectiveness; Russia-Ukraine War; Second Gulf War

I. INTRODUCTION

Since the end of the Cold War, conflicts have emanated less from inter-state actions and increasingly from internal destabilisations by non-state actors. Operation Iraqi Freedom and the Russian Invasion of Ukraine have however been *volte-faces* for this trend. One feature of the current global reality is the preponderance of conflicts, insurgency and the corresponding need for nations to defend their territories through active military operations including the use of air power to advance national interests and enhance state security. State security involves the engagement of all elements of national power to ensure the protection of state territories, interests and well-being of its people.

The role of aircraft in warfare has been a source of debate since its inception. The debate is complex, since it involves not only the many arts and sciences that have contributed to the development of aircraft, but also entails an evaluation of the other notable agencies of war. Considering that aircraft is the most modern and maneuverable of all instruments of war, a clearly articulated framework of understanding is essential for its successful utilisation in military operations.

In the past, wars were confined to land and later the seas. However, the advent of powered flight introduced the third dimension in warfare. Air power was first utilised in warfare by Italians against the Turks in 1911 (Buckley & Buckley, 1999).

The advent of air power has remarkably changed warfare by compressing the line between strategic and tactical level. The decisive use of air power in the Gulf War of 1991 revolutionised warfare in ways that made all prior experiences seem obsolete.

Although the history of air power is short when compared to navies and armies, air power has already become the dominant form of military power projection in the contemporary world. At present, it is considered pointless for any nation's armed forces to go to war without an assurance of air superiority. Long before the first Gulf War, the potency of air power and its wider implications were displayed in the Arab - Israeli War of 1967 (UNEF, 1967). Similarly, Operation ALLIED FORCE in Kosovo was the first conflict where the sole effects of NATO airpower made the Serbian forces give up their will to fight without the employment of ground forces. The war was unique in the display of air power and provides a good case study for better understanding of air power and its strategic importance to warfare.

Air power is the ability of a nation to assert its will via the air medium. It includes a nation's ability to deliver cargo, people, destructive missiles, and war making potentials through the air to a desired destination to accomplish a desired task. The military instrument by which a nation applies its air power is its air force. In peace time, air power could be used to implement a nation's national policy. In time of hostilities, air power is used for the establishment of command of the air, which according to Giulio Douhet, "is the only means to victory, and without it, military and naval operations are doomed, along with the nation" (Giulio, 2011).

Conflicts that decisive employment of aerial/air power has played significant role in towards enhancing operational effectiveness include the World War II, Cold War conflicts like the Korean War, Indo-Pakistani War, Vietnam War amongst other as well as post-Cold War conflicts like the Gulf War, Kargil War and contemporary Russian-Ukraine war. The decisive use of air power took a center stage during some of these wars which enhance operational effectiveness. However, in contrast, the use of air power has devastating impact such as humanitarian and environmental implications. These implications and factors are inherent due to the absence of international law or treaty of employment on aerial warfare.

The absence of positive law, in this case treaty law, certainly does not mean complete freedom in the use of means and methods, tactics and technology. Natural law on the one hand, customary law on the other, and the rules concerning air-to-ground attacks contained in 1977 Protocol I additional to the 1949 Geneva Conventions impose restrictions in this regard. It is worth recalling that during the Gulf war, although such key nations as the United States, Iraq, Iran, Israel, the United Kingdom and France had not ratified the 1977 Protocols, the degree of compliance with the law of war throughout the operations could be described as acceptable. Against this background, the study intends to analyse the Second Gulf and Russian-Ukraine wars to analyse identified factors in the employment of air power for operational effectiveness. The study will cover definitions of concepts, comparative analysis of air power and operational effectiveness in the Second Gulf War and Russian-Ukrainian Wars. Thereafter, finding and lessons from the 2 Wars will be highlighted. The study aims to comparatively analyse the employment of air power in the Second Gulf and Russia-Ukraine wars with a view to drawing lessons.

II. METHODS

Study Design

This study is qualitative. This study will utilise a literature review approach. This technique will be used to collect data and information regarding the application of air power for operational effectiveness during the Russia-Ukraine War and the Second Gulf War.

Study Setting

This study was carried out in both Nigeria and Jakarta, Indonesia. This study was carried out between August 2022 and March 2023. Researchers investigated by scouring the Internet for journal articles and online books. They then discussed formulating the written criteria and considering the concept's proper definition.

Data Collection Technique

This study's data collection method will consist of searching for and analysing relevant literature sources. Literature sources include books, journals, articles, and other documents of a similar nature.

Data Analysis

This study will employ comparative analysis as its technique for analysing data. The collected data will be analysed by comparing the operational effectiveness of air power during the Second Gulf and Russia-Ukraine Wars. Identifying differences and similarities in the application of air power in terms of operational effectiveness during the Russia-Ukraine War and the Second Gulf War; the effectiveness of the application of air power in the two wars is evaluated. Explanation of the factors that impacted the effectiveness of air power in the two wars. The ramifications of research findings on the use of air power in future military conflicts are discussed.

Concept Definition

Air Power: Singh (1985) stated that "air power denotes the ability to project military force by or from a platform through the air above the surface of the earth." He also noted that in its totality, air power involves manned aircraft, missiles, electronic warfare, remotely piloted vehicles and terminally guided weapons (Singh, 1985). Although Singh's definition is comprehensive, the essence of the space medium is conspicuously absent. Hence, the British Air Power Doctrine defines *air power* as "the ability to project military force in the air or space from platforms, such as aircraft, launch pads, rockets and satellites or missiles operating above the surface of the earth". This definition captures the total essence of air power ranging from military power projection to platforms and their media of operations.

Operational Effectiveness: Ngubane (2011) defines *operational effectiveness* as "the capacity of a military unit to perform its role with the equipment and material at its disposal. It incorporates both equipment and personnel readiness...to perform their assigned mission or function" (Ngubane, 2011). The United States (US) Department of Defense (DoD) defines operational effectiveness as the overall degree of mission accomplishment of a system when used by representative personnel in the expected or planned environment (US DoD, 2011). The US DoD adds that it depends on system capabilities, organisation, training, doctrine, tactics, equipment and the combat readiness of personnel. The US DoD's view ties operational effectiveness in the military to system factors such as the planned environment, doctrine and the combat readiness of personnel.

III. RESULTS AND DISCUSSION

Air Power and Operational Effectiveness in the Second Gulf War

The Second Gulf War started around March 2003 with a coalition of 35 countries spearheaded by United States of America (USA) and Great Britain to invade Iraq in contention that Iraqi government had developed or was in the process of developing chemical Weapons of Mass Destruction (WMD) (Ohio History Connection, 2015). Operation (Op) IRAQI FREEDOM is a joint military operation which also involved the employment of air power by the Air Force Command and Control element of the operation. The primary political goal of Op IRAQI FREEDOM is to stabilise Iraq, with its territorial integrity intact and a broad-based government that renounces WMD development and use, and no longer supports terrorism or threatens its neighbors (Gregory, 2016). Employment of air power for Op IRAQI FREEDOM commenced with a psychological operation leaflet drop on 9 March 2003. The leaflets urged non-interference and stressed coalition support for the Iraqi people (Gregory, 2016) at the onset of the combat operations, which commenced with limited night time bombing of Baghdad by F-117 stealth fighters. About 14,000 sorties of 800 Tomahawk cruise missiles were launched against Iraq which cost about US\$1 million each and totaling US\$14 billion (Boyd-Barrett, 2004). During the first 6 weeks of the operations, 68 per cent of weapons launched were precision guided munitions. The C-130 and C-17 aircraft was used as airlift to drop nearly 1,000 paratroopers of the 173d Airborne Brigade onto Bashur airfield near Erbil in Northern Iraq (Max, 2003).

Coalition Air Forces flew nearly 1,000 Intelligence, Surveillance, and Reconnaissance (ISR) sorties during the initial weeks of Operation IRAQI FREEDOM, collecting 42,000 battlefield images and more than 3,000 hours of full motion video (Gregory, 2016). As of 30 April 2003, coalition air forces numbered 1,801 aircraft, 863 of which were US Air Force fighters, bombers, tankers, special operations and rescue aircraft, transport aircraft, and ISR and command and control aircraft. In the first six weeks, coalition air forces flew more than 41,000 sorties and the United State Air Force (USAF) accounted for more than 24,000 which is about 60 per cent of the sorties. Likewise, Air Force C-130 aircraft transported over 12,000 short tons of materiel during the initial stages of the operation, while Air Force tankers flew more than 6,000 sorties and disbursed more than 376 million pounds of fuel. This enabled the air forces logistic in meeting its logistics requirement which enhanced operational effectiveness.

Iraqi anti-aircraft weapons were unable to open fire on high-altitude US bombers such as the B-52 or stealth aircraft such as the B-2 bomber and the F-117A (Radomyski & Bernat, 2019). US and British aircraft used radar-detecting devices and aerial reconnaissance to locate Iraqi anti-aircraft weapons. Bunker buster bombs, designed to penetrate and destroy underground bunkers, were dropped on Iraqi command and control centers. Iraqi ground forces could not seriously challenge the American ground forces because of their air supremacy. By mid-April 2003, US-British forces controlled Iraq's major cities and oil fields. Therefore, elements of air power in combat and psychological operation, ISR and logistics support all played a significant role in the success of second Gulf war and enhanced operational effectiveness

Air Power and Operational Effectiveness in the Russian-Ukrainian War

The 2022 Russian invasion of Ukraine began on the morning of 24 February 2022 following an announcement by President Putin on special military operations to demilitarise Ukraine. This was followed by airstrikes and missiles using unmanned aerial vehicle (UAV) that hit across Ukraine. The use of drones proved more effective as conventional Russian aircraft fail to penetrate Ukrainian air defense. The Russian air power has vast air assets including 1,200 fighter jets among them was sophisticated latest-generation machines like Sukhoi Su-34, Su-35 and Su-37 and Su-34 amongst others (Segura, 2022). On 10 October 2022, the RuAF fired more than 80 missiles and launched at least 24 kamikaze drones at civilian targets across Ukraine. The latest reports suggest that 19 Ukrainians were killed in the attacks with more than 100 injured (Razom Advocacy Team, 2022). The strikes left large swathes of the country without electricity, water, and internet access. The following day, Russian airstrikes continued with around 30 missiles and 15 drones targeting civilian infrastructure.

The Ukrainian Forces employed a counter-offensive attack using air denial strategy in August 2022. This led to shooting down of Russian aircraft. Russia's aerial capability is superior when compared to Ukraine's combat air fleet that was around a hundred aircraft, the vast majority of which are Soviet-era MiG-29 and Su-25 planes. However, despite its huge superiority, Russia's air campaign has failed to make much of an impact on the war in Ukraine. According to the Armed Forces of Ukraine, 208 Russian aircraft were shot down between March and May 2022. Russian aircraft resorted to firing at Ukrainian targets from a safe distance, hundreds of miles away and over Russian territory due to the adoption of an air denial strategy by Ukrainian forces.

The adoption of an air denial strategy is a Ground Based Air Defence (GBAD) counter-offensive to keep Russia's manned aircraft at bay. Quite simply, air denial and not the traditional concept of air superiority was a prerequisite for Ukraine's battlefield success (Bremer & Grieco, 2022). This was achieved through the use of military deception to pin down Russian forces; this limited the operation of manned ISR aircraft, which hamper the ability to track Ukrainian movements, over the battlefield. The Russians attempt at employing unmanned aircraft (drones) and other air-based assets in (Aljazeera, 2022) ISR roles, were futile. Ukraine's air denial strategy in combination with insufficient quantities of attritable Russian drones, were critical enablers of Ukraine's counter-offensive success. Air power's contribution to victory was perhaps more subtle and indirect but no less vital than the role it played in recent U.S.-waged wars.

Comparative Analysis of Air Power Employment in the Second Gulf War and Russian-Ukrainian War and the Resultant Effects

There are similarities and contrast in the employment of air power for operational effectiveness between the conduct of the second gulf war and Russian-Ukrainian war. The contrast and the similarities will be discussed under psychological operation, aerial combat engagement, financial cost implications, employment of ISR as well as combat employment of hypersonic weapon. These will be expounded accordingly in the succeeding paragraphs.

Table 1. Comparative Analysis of Air Power Employment in the Second Gulf War and Russian-Ukrainian War

No	Elements	The Second Gulf War	The Russian-Ukrainian War
1.	Psychological Operation	✓	✓
2.	Aerial Combat Engagements	✓	✓
3.	Financial Cost Implications	✓	✓
4.	Intelligence Surveillance and Reconnaissance (ISR)	✓	✓
5.	Combat Employment of Hypersonic Weapon	✗	✓

Psychological Operation. Psychological operations (Psyops) are aimed at communicating an intention or information to audiences to influence their emotions, motives and objective reasoning and, ultimately, the behavior of governments or organisations. The military often uses psyops to enlighten the public about any lethal operations in order to keep them safe and ultimately to ensure public safety. Both Second Gulf and Russian-Ukrainian wars utilise psyops to ensure public safety. For instance, in the Second Gulf War, psyops was conducted by air forces command of Op IRAQI FREEDOM in attempt to employ of air with the air drop of several leaflets. The resultant effect of psyops led to minimal casualties from the air strikes, thereby ensuring public safety. Similarly, Russia utilised psyops in evacuating civilians from Kherson against a planned air offensive attack by UkrAFs. About 50,000 to 60,000 people were evacuated while Ukrainian government denied and called it fake information calling the evacuation a propaganda show (Euronews, 2022). Furthermore, Ukraine harnessed social media as part of its counter strategy to persecute the war thereby endearing them with many allies from over 70 countries who engaged in coordinated online disinformation campaigns (Abrams, 2022). Therefore, psychological operation played a significant role in the employment of air power for operational effectiveness in both Wars.

Aerial Combat Engagements. The Second Gulf war and Russian-Ukrainian war engaged in aerial combats. For instance, in Op IRAQI FREEDOM, the coalition of air forces utilises several BGM-109 Tomahawks and F-117A and F-16 amongst other combat aircraft to deliver air strikes in over 300 missiles in number (Radomyski & Bernat, 2019). Similarly, there were several aerial combats in the Russian-Ukrainian war. The Russian Defense Ministry has claimed that over 100 air defense systems and over 90 Ukrainian aircraft have been disabled or destroyed. Most UkrAF losses were on the ground. A few have been shot in the air. Most Russian aircraft losses have been to ground-based AD Systems. Many well-known top-notch Russian and Ukrainian pilots lost their lives in aerial engagements (Roblin, 2022).

Financial Cost Implications. Waging war is expensive and costly. Utilisation of air power often comes with a considerable cost in the military budget. Destruction of air assets during air combat operations also leads to the wastage of such costly resources. For instances, the Russian-Ukrainian war took a heavy toll on the Russian economy as its military assault on Ukraine. Russian spends an estimated amount to the tune of US\$900 million per day on Ukraine war (Staten, 2022). This sum covers personnel welfare, munitions, bullets and air asset employment as well as the cost of repair or damaged military equipment. Russia also must pay for the thousands of critical weapons and cruise missiles that have been used during the war, which run about US\$1.5 million per piece (Staten, 2022). On the other hand, the financial cost of Second Gulf war is estimated just over US\$1.1 trillion with USA contributing over US\$757.8 billion translating 68.9 per cent of cost (Mount Holyoke College, 2008). The implication of substantial financial cost of war will certainly take a toll on any economy that participates in it.

Intelligence Surveillance and Reconnaissance. Intelligence Surveillance and Reconnaissance (ISR), as an essential element of air power, was utilised in both wars to ensure precision in air strikes and prosecution of the war. The coalition of air forces on Op IRAQI FREEDOM utilised radar-detecting devices and aerial reconnaissance to locate and destroy the Iraqi anti-aircraft weapons. The RuAF utilises ISR and electronic intelligence components as close air support to support its air strikes. The ISR was however important to the air operations of the RuAF. In retrospect, the air denial strategy of UkrAF however, limited the operation of ISR aircraft which in turn limited the battlespace for air strikes by Russian.

Combat Employment of Hypersonic Weapon. In the Second Gulf war, traditional missiles were use in air interdictions and no hypersonic weapons was use in air operation. On the other hand, Russia claimed to have launched their Kinzhal (Dagger) hypersonic missile at, among other targets, a weapons depot in western Ukraine, making it the first country to ever to test this type of missile in combat (Chopra, 2022). From a military point of view using a hypersonic missile to hit a stationary target made little sense. Why use a weapon this expensive when a traditional ballistic missile could do the job just as easily with less risk of failure. Maybe it was mostly to send a message to the West. Russia has also faced significant cases of precision-guided munitions failures.

Findings and Lessons Learnt

It is imperative to highlight some insights from the literature with a view to drawing some lessons. These are subtly discussed in the succeeding paragraphs. The findings and lessons learned during the Gulf conflict are at the core of American doctrine, tactics, and military planning today, but the impact of that war is also a two-edged sword. The war taught Americans little or nothing about forced entry, airfield operability, fighting in a biological or chemical environment, and a dozen other disciplines that may be needed the next time Americans go to war (Dorr, 2011). Fortunately, military thinkers are at work in these

areas, but the mindset from the Gulf War may make their job more difficult. The United States may once again be preparing to fight the last war. Fortunately, Op IRAQI FREEDOM taught many invaluable lessons and these are being implemented today. It is no accident that most of the lessons are positive. The high-tech, all-volunteer force that began deploying to the Middle East in 1990 about one-third larger than the U. S. military of today was probably the most formidable fighting force the world has ever known. In the decade since, times have changed, retention of skilled people has become a far more serious challenge, and the armed forces are in danger of becoming a hollow likeness of what they once were.

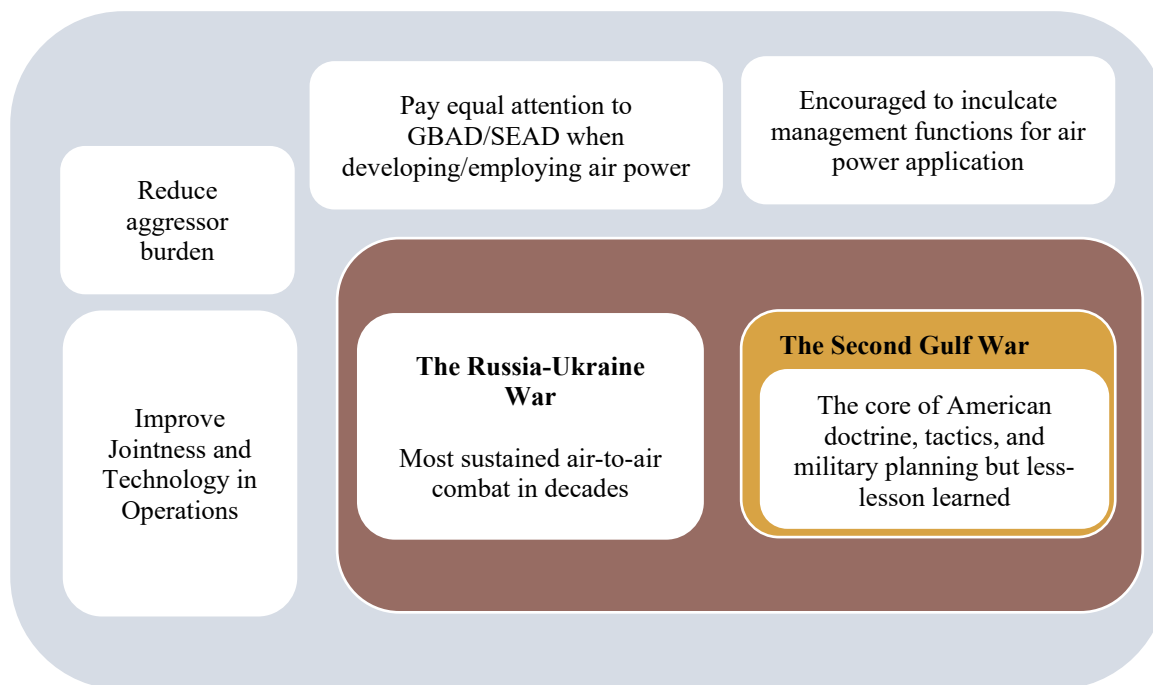


Figure 1. The findings and lessons from the Second Gulf War and Russian Ukrainian War

The findings and lessons from Russian Ukrainian War show that Russia's invasion of Ukraine has resulted in the most sustained air-to-air combat in decades (Roblin, 2022). Comparing the UkrAF air assets of roughly 110 operational Soviet-era warplanes to the roughly 1,200 fixed-wing eleventh generation Russian combat aircraft, many relatively new and the rest extensively modernised (Roblin, 2022), one could deduce that Russia had better air power over the UkrAF. This was confirmed by many observers who believed this power imbalance would result in a one-sided and short-lived contest when Russia invaded Ukraine on 24 February 2022. Nevertheless, that is not entirely the case, as the UkrAF wisely dispersed prior to the war (Roblin, 2022). The UkrAF sustained only modest losses from Russia's initial airbase attacks. Meanwhile, Ukrainian warplanes were visibly fighting on day one. So far, Ukrainian and Russian fighters continue to joust, mostly with long-range missiles, while both sides' ground-attack aviation remains active at low altitudes near the frontline. After heavy losses early in the war, neither side is willing to penetrate deep into enemy airspace. Here are other the key lessons:

Aggressor Burden and Alliances. As air power is a devastating and decisive tool of warfare, legality (*jus ad belum*, *jus in Belo*, *jus pos belum*) is necessary for the unrestrained and decisive use of air power. *Aggressor burden* is a term introduced in an airpower context as depicting the extent of public diplomacy efforts an initiator of offensive air operations should make before commencement in order to reduce or eliminate public outcry and condemnation of such operations. In both wars, there was a clear breach of international laws on sovereignty. In such instances, there is a greater aggressor burden on air power operators to seek approvals/alliances. The USA invested more efforts in easing aggressor burden before the invasion of Iraq. This was in the claims of weapons of mass destruction (WMD) in Iraq and courting NATO. This led to alliances with several countries and a reduced outcry over the coalition's devastating use of airpower in Iraq. Neglect of aggressor burden by Russia caused attempts at decisive use of air power in Ukraine to result in massive outcries and accusations of war crimes against Russia (Human Rights Watch, 2023). In a highly interconnected world, a reasonable concern by technologically advanced operators of air power should be reducing aggressor burden to enhance operational effectiveness in combat airpower application.

Jointness and Technology in Operations. Jointness in operations has been evolving since the World War I. Joint coordination could enhance operational effectiveness. The immediate occupation of Iraq by ground forces following a successful air campaign during Op IRAQI FREEDOM buttresses this point. Utilisation of high-tech aircraft in the joint operational environment demands jointness in order to hold on to the gains of war. The highly dispersed air efforts by both Russia and Ukraine have however not yielded tangible results as the air efforts seem detached from the ground offensive. Considering the cost of air power due to its high technology nature, it is desirable that gains in war are preserved as much as possible. Air power planners/operators should put this into consideration in its application. Joint coordination could enhance operational effectiveness.

The GBAD/SEAD Debacle. The Russian Federation though perceived as a notable air power was effectively tamed by the Ukrainians using Ground Based Air Defenses (GBAD) (Choudhury, 2022). This points to the fact that the Suppression of Enemy Air Defenses (SEAD) capability of the Russians needed improvement. This was not the case in Gulf War II. Adequate attention was paid to SEAD which rendered the Iraqi GBAD, though sophisticated at that time, ineffective. This enabled the F-117 "Black Jet" to reign supreme in the night skies over Baghdad (Gregory, 2016). The Second Gulf war also proved the importance of dominating the electromagnetic spectrum, with everything from intelligence-gathering platforms like the U-2 aircraft to the F-4G Advanced Wild Weasel designed to engage and attack enemy missile sites. Planners should pay equal attention to GBAD/SEAD when developing/employing air power.

Air Power as an Opportunity for Better Operations Management. Air power provides an opportunity for better management of operations. The air power characteristic of reach enables targets to be earmarked for a strike before operations ever begin. This reduces uncertainties due to the evolving nature of combat. The key functions of management are consequently easier utilised in air operations. POAC (planning, organising, actuating, controlling) functions are usually accomplished at the strategic level for producing a Joint target list. The Second Gulf War air battle showed a thorough implementation of management functions as targets were designated, sorties planned and control effected before commencement of operations. The same cannot be said for the air warfare of the Russian-Ukraine war. Targets seem to be picked as situations unfold, and no publicly known pre-planned target lists exist. Air power enthusiasts are encouraged to inculcate management functions in their application of air power. It ensures better coordination, better economy of efforts and by implication improved operational effectiveness.

IV. CONCLUSION

The paper assessed the application of air power for operational effectiveness in the Second Gulf and Russian-Ukrainian wars. The paper carried an assessment of employment of air power in Second Gulf war and ascertained that use of air power in Op IRAQI FREEDOM to a great extent enhance operational effectiveness. Its major applications in this war are in areas of air combat operations, logistics support, psyops and ISR. This was jointly done by a coalition of air forces in Op IRAQI FREEDOM. Similarly, the employment of air power for operational effectiveness in the Russian-Ukrainian war shows that the RuAF carried out offensive attacks and was dominant due to its vast and high-tech air assets. However, UkrAF, on the other hand, with limited air assets as against the RuAF, employed a counter-offensive strategy to hold ground, which led to the shooting down of aircraft belonging to the RuAF. This strategy aided in keeping the Russians at bay.

A comparative analysis of both wars was carried out under some elements of air power such as psychological operation, aerial combat engagements, financial cost implications, ISR and combat employment of hypersonic weapon. Thereafter findings and lessons from the study were highlighted. The paper was concluded on the grounds that in a highly interconnected world, a reasonable concern by technologically advanced operators of air power should be about reducing aggressor burden in order to enhance operational effectiveness in combat airpower application. Air power planners/operators should put this into consideration. Joint coordination could enhance operational effectiveness. Furthermore, planners should pay equal attention to GBAD/SEAD when developing/employing air power. Air power enthusiasts are encouraged to inculcate management functions in their application of air power. It ensures better coordination, better economy of efforts and by implication improved operational effectiveness.

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