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İÇİNDEKİLER / CONTENTS

Araştırma Makaleleri / Research Articles

Derleme Makaleler / Review Articles

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Air Warfare Over Europe: An Exploration of The Luftwaffe Experience

Burak ÇINAR[1]

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Abstract

The First World War was characterized by trench warfare, rendering infantry charges ineffective against integrated defence systems comprising barbed wires, rifles, machine guns, and howitzers. The introduction of new war machines, such as tanks and chemical weapons on the ground and aircraft in the air, reshaped the nature of warfare. Aircraft became imperative swiftly, and in the Second World War, it began to dominate warfare. In this article, the air war in the Second World War was discussed according to the rise and fall of the German air power after the theoretical developments mentioned in the first part. In the second part, the German air activities in early operations were explained. The third part was particularized to how the change in the air war on the extension and expansion of the war affected the German air power. The fourth part was on the strategic outcomes of the German attitude toward aviation technology. There are not strong claims made in this article; however, the interpretation of the subject aims to form the basis for further research.

Key Words: Second World War, Air War in Europe, Luftwaffe, Jet Fighters, Aviation Technology.

JEL Classification: M10, L93, L94.

Avrupa Üzerinde Hava Savaşı: Luftwaffe Deneyiminin Keşfi

Öz

Birinci Dünya Savaşı'na dikenli teller, tüfekler, makineli tüfekler ve obüslerden oluşan entegre savunma sistemini piyade hücumlarının delme şansı bulamadığı siper savaşı hâkim olmuştu. Onları destek amacıyla karada tanklar ve kimyasal silahlar, havada ise uçaklar gibi yeni savaş makineleri devreye sokuldu. Uçak hızla zorunluluk haline geldi ve İkinci Dünya Savaşı'nda savaşa hâkim olacak şekilde yükselmeye başladı. Bu makalede, birinci bölümde teorik gelişmelerden bahsedildikten sonra, İkinci Dünya Savaşı'ndaki hava savaşı, Alman hava gücünün yükseliş ve düşüşüne göre ele alınmıştır. İkinci bölümde erken harekâtlarda Alman hava faaliyetleri anlatılmıştır. Üçüncü bölümde hava savaşındaki değişimin savaşın uzaması ve yayılmasının Alman hava gücünü nasıl etkilediğine değinilmiştir. Dördüncü bölümde Almanya'nın havacılık teknolojisindeki tutumunun stratejik sonuçları ele alınmıştır. Bu makalede güçlü bir iddiada bulunulmamaktadır; ancak konunun yorumlanması daha sonraki araştırmalara zemin oluşturmayı amaçlamaktadır.

Anahtar Kelimeler: İkinci Dünya Savaşı, Avrupa Hava Savaşı, Luftwaffe, Jet Avcı Uçakları, Havacılık Teknolojisi.

JEL Sınıflandırma: M10, L93, L94.

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INTRODUCTION

In the First World War, traditional infantry-based operations proved ineffective against technological advancements. Infantry battalions seemed to disintegrate when faced with the formidable defence systems comprising integrated barbed wires, rifles, machine guns, and howitzers. The introduction of newborn tanks, though promising, was akin to infants attempting to fulfil tactical obligations.

The emergence of air forces as a new branch of armies just before the Great War marked a significant shift. Primitive aircraft showcased the dynamic potential for development, outpacing progress in other branches during the early stages of the conflict. These aircraft swiftly replaced balloons in reconnaissance missions and demonstrated versatility in bombing or strafing ground targets.

Throughout the Great War, aircraft played multifaceted roles, serving in reconnaissance, bombing, strafing, maritime patrol, and interception missions. Primitive bomber aircraft conducted both tactical bombings and strategic operations, often in conjunction with zeppelins. The widespread use of aircraft led to their evolution, prompting warring parties to develop and produce thousands of diverse aircraft types during the war.

The First World War was the most exhaustive war up to that time. The restoration of Europe restricted military development in the early interwar period, which hampered all army branches. The development of aviation narrowed and largely shifted to civilian use, for postal services, passenger transportation, air racing, or aerial acrobatics. Many adventurers tried breaking records in the interwar period, making aviation popular in people's eyes.

Late in the interwar period, the political situation got hot, and the development of military aviation gained speed. In the latter part of the interwar period, the political climate intensified, and military aviation witnessed a rapid acceleration in development. As the Second World War approached, biplane technology came to an end, and modern monoplane types emerged. On the eve of the war, the Germans achieved maiden flights with both rocket and jet planes. Those developments in aviation indicated that the forthcoming war would be beyond the First World War's dynamism.

This research is based on analyzing some events in World War II aviation, focusing on the German air power. It is divided into four parts. In the first, the effects of theories on the air battles of the Second World War were explained. Second, the role of the air forces in the first half of the war is expressed. This is to differentiate aerial struggles between two world wars. Therefore, some cases in the Second World War are emphasised. The third part includes how the air war changed during the extended war. The fourth is on technological issues in the same period.

1. FLOATING THEORIES

Air Warfare was initially concentrated on the tactical targets supporting the ground units. Initiating with preliminary considerations, it is contended that early perspectives suggest the potential for utilizing air power in a strategic capacity, wherein its capabilities could propel a nation towards achieving total victory. Strategic bombings began in the First World War, when a German zeppelin dropped bombs on the east coast of England, killing or injuring

twenty people in January 1915. On May 25, 1917, long-range German Gotha bombers began to bomb Britain, stepping in as the first strategic bombers (Neillands, 2003: 12). However, the volume and effect of early strategic bombings were not enough to win the war. Therefore, many aviation experts believed coercive bombings could have ended the war by destroying the enemy's industries and breaking morale.

Italian General Giulio Douhet, stemming from an artillery background, stands as a pioneering figure in the theoretical advancements of aerial warfare. He observed early actions in aviation between 1908 and 1930 (Meilinger, 2020: 1), the period when the aircraft were primitive to conduct decisive operations; nonetheless, he was capable of creating the first universal claims on the strategic importance of owning an air power. In the Tripolitanian War between Italy and the Ottoman Empire, Italian pilots began dropping small bombs by hand. During the war in Tripolitania, Italian aircraft were also used for artillery spotting, transportation of supplies and personnel, and bombing troops, supplies, and facilities, both day and night (Meilinger, 2020: 3). Douhet focused on the bombing role of the aircraft much more. In the early days of the First World War, he emphasised massive bombing and claimed the importance of possessing a 500-bomber armada that could drop 125 tons of bombs daily over enemy targets (Meilinger, 2020: 3-4). His first strategic claim was the bombing of Istanbul with a bomber force that could drop 100 tons daily and force the Ottoman government to open the Dardanelles to Allied shipping (Meilinger, 2020: 5). Alexander de Seversky later remarked that such a type of attack, aiming at the heart of the octopus, effectively paralyzes its tentacles (Seversky, 1978: 240). This strategic approach was proposed by Seversky against Japan during the latter stages of the Second World War.

On the other hand, in Britain, Marshal of the R.A.F. Hugh Trenchard, was one of the early defendants as well as an operator of strategic bombing in late World War II. He successfully directed his Royal Flying Corps and later R.A.F. bombers to the targets in Western Germany about at 320 km from the bases in France. One of his trainees was Arthur Tedder, a prominent military air leader in the Second World War (Grant, 2004: 79-80).

In the interwar period, air forces mutually owned strategic bombing aircraft, notwithstanding, tactical bomber production got the most shares. Major General Walther Wever, Chief of Staff of the *Luftwaffe* (German Air Forces, 1933-1946) in 1935-1936, pointed out that the objective of an air force was to defeat enemy armed forces and outlined its operational tasks in five clauses. The fifth clause, "to paralyze the enemy armed forces by stopping production in the armaments factories" (Corum, 1977: 138), indicates the significance of strategic bombing in Douhet's way. Wever saw *Luftwaffe* as not a supportive branch; conversely, he offered air forces as a strategic arm that could prevent enemy reserves from reaching the front (Corum, 1977: 138). It is noteworthy that a primary factor contributing to Germany's defeat on the Eastern Front was the Red Army's adept management of strategic reserves.

In 1932, British politician Stanley Baldwin underlined the importance of strategic bombing, telling the British House of Common that "there is no greater cause of that fear than the fear of the air" and pointing out the appalling speed of an air attack. He also marked the dual role of a transport aircraft in both civilian and military contexts (Lord President of the Council

Stanley Baldwin's speech, 1932). Five years after Baldwin's speech, the air wing of the German Legion *Kondor* put it into practice with a small-scale test in Guernica, Spain, in 1937, followed by medium-scale bombings of Rotterdam in 1940 and Belgrade in 1941, and a large-scale bombing of London in 1940. The temporality and limitation of these bombings stemmed from the fact that they were carried out by medium bombers, as the Luftwaffe had not yet deployed a considerable number of strategic bombers. In contrast, the RAF and the USAAF spearheaded the extensive production of strategic bombers.

Germans' dealing with bombers' roles restrained the evolution of the German air power. Wever's sudden death in 1936 and lack of strategic resources (Overy, 1981: 132) in Germany formed the *Luftwaffe*'s near-future tendency to use tactical means rather than strategic ones based on the production of smaller aircraft (Corum, 1977: 138; Macksey, 1978: 46-47). *Luftwaffe* possessed strategic bombers, but they were never produced in a wide range. Focused on the *Blitzkrieg*, the Germans tended to use air power to support the panzer units as a part of their new method of combined arms operation. Nevertheless, if the war was not out in 1939, Göring's aim was to create a force of 2.400 medium and 800 heavy bombers in 1942 (Overy, 1981: 132).

The Germans displayed a reluctance to employ strategic bombing extensively, as they prioritized the formation of large air units for tactical accomplishments. Nevertheless, they intended to use air power for offensive purposes. *Luftwaffe* Major-General Helmuth Wilberg prepared "*Luftwaffe* Regulation 16" in 1935; the primarily offensive nature of air power was stressed: "From the start of the conflict, the air forces bring the war to the enemy" (Corum, 1977: 140). It rejected Douhet's theory, as stated: "Attacks against cities made for the purpose of inducing terror in the civilian populace are to be avoided on principle" (Corum, 1977: 143-144). Instead, the Germans made air power the second pillar of their new-born theory, the *Blitzkrieg*, developed by General Heinz Guderian who announced in his 1937-published book "*Achtung Panzer*!" It was based on a concentrated panzer assault on the weakest point of the enemy's defence, to penetrate it, fall back to the enemy concentration, cut the enemy communication, and surround massive enemy units. This became the Third Reich's main instrument for expansion. To ease ground forces' duties, panzer forces needed immediate aerial close support; and the *Sturzkampfgeschwader*[2] units dominated the skies by the beginning of the operation. This introduced the first efficient direct air-ground collaboration at the tactical level, and it gave air power an important role. The interaction between panzer platoons and Junkers Ju-87 *Stuka* dive-bombers was facilitated through UHF antennas, and that resulted in heightened successes across tactical, operational, and strategic levels. Assault aircraft underwent significant advancements in both armour and armaments, enhancing their protection, firepower, and utilization of guns and rockets. The Germans specifically developed the Hs-129 for anti-tank missions, and it entered into service in 1942.

The Superiority of air power means many things on a tactical level, but it is hard to say it is the only winner. This thought was created by American military thinkers, like Harry A.

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[2] German dive-bomber squadron. According to the *Luftwaffe*'s organization, a *Geschwader* had 94 aircraft including a *Stab* (staff) with four aircraft and three *Gruppen*. A Gruppe had 30 aircraft including a Stab (staff) with three aircraft and three *Staffeln* each with nine aircraft. From the mid-war period several fighters *Gruppen* operated a fourth *Staffel* and, if all four had strengths of 16 aircraft; with three aircraft of *Gruppe Stab*, each of those *Gruppen* were established at 67 aircraft (Price, 1997*:* 16-17).

Sachaklian, William L. Mitchell, and Alexander P. de Seversky, who carried air dominance to a geopolitical theory. The Wright Brothers before them, with their technical view, saw their new machine make future wars impossible; they estimated the effects of the air war in the future better than all other soldiers. Aviation technologies went far during the Second World War, and the inauguration of early jets heralded the war in the near future as hard enough that in a new total war, the belligerents could never ask for World War I-type attrition in the air. Nevertheless, it has not been tested because the retaliatory effects of conventional weapons were all shadowed by the rapid development of nuclear weapons. At least, the geopolitical aspect of the world's dominance via air power faded. The qualification of air power is strategically more defensive than offensive, as the Wright Brothers said before.[3] The inauguration of jets legitimated the Wright Brothers for the next war. Aircraft carrying atomic bombs and ALBMs (Air-Launch Ballistic Missiles) equipped with nuclear warheads make us think the aircraft can be more offensive. Having the most deterrence makes nuclear weapons most defensive on a strategic level. Nevertheless, we should distinguish the terms into two categories, the era of conventional weapons and the era of nuclear weapons. In 1962, during the Missile Crisis in Cuba, both sides proved they were not courageous enough to put the military procedures into effect, even after mutual ultimatums.

The successes of all theories on aerial warfare in the Second World War can be subject to arguable validity. The effectiveness, weighed against moral values and the impact on humanity, becomes two questionable criteria. The debatable nature arises when considering whether the strategic bombings were deemed fruitful, even if they came at the cost of tens of thousands of civilian lives. As a part of the combined force, the air forces had their own duties for one side; otherwise, it is hard to say for the losers. The Germans' exertion in the field and in R&D was not less than that of their enemies, and they had the same theoretical approaches. However, the problem of losing the air war was not everything in Germany; the country succeeded in the most production effort in 1944, while the massive bombings increased its effect. The problem for Germany was basically two-front warfare between the Soviet Union, which had the most powerful ground forces, and the United States, which had the most powerful air force.

Beginning with Douhet, early aviators believed air power was properly used to lead armies and navies to organise on a new basis, but that did not mean air power would replace them (Overy, 1981: 15). The effect of air power on the sea was demonstrated during an exercise in 1919 by William Mitchell, bombing the obsolete German battleship SMS *Ostfriesland* (Correll, 2021). During the interwar period, the American, Japanese, and British aircraft carriers were active. The Germans were aware of those developments, and they also planned to build aircraft carriers, but they had to cancel. Nevertheless, the Germans could control the

[3] Wright Brothers noted to history in 1917: When my brother and I built and flew the first man-carrying flying machine, we thought that we were introducing into the world an invention which would make further wars practically impossible. That we were not alone in this thought is evidenced by the fact that the French Peace Society presented us with medals on account of our invention. We thought governments would realize the impossibility of winning by surprise attacks, and that no country would enter into war with another of equal size when it knew that it would have to win by simply wearing out its enemy.
Nevertheless, the world finds itself in the greatest war in history. Neither side has been able to win on account of the part the aeroplane has played. Both sides know exactly what the other is doing. The two sides are apparently nearly equal in aerial equipment, and it seems to me that unless present conditions can be changed, the war will continue for years. *Orville to C. M. Hitchcock, June 21, 1917,* http://www.smithsonianeducation.org/educators/lesson_plans/wright/flights_future.html (19.10.2020).

eastern side of the North Atlantic efficiently. However, by political means, the Germans lacked air-sea coordination. *Reichsmarshall*[4] Hermann Göring, the owner of all German air power, was very reluctant to give any air support to another branch of the armed forces. Lacking substantial air power, the *Kriegsmarine* (German Navy, 1935-1945) found itself unable to execute swift responses to incidents. This inefficiency significantly impacted the effectiveness of sea battles involving the *Kriegsmarine*, leading to operational challenges for both German U-boats and the High Seas fleet during the latter half of the war.

2. EARLY AIR OPERATIONS

Conditions of the First World War made the air war conventional. Air power displayed her new-born capabilities with primitive machines; nevertheless, many military and political leaders saw its importance and the bright future ahead. Countries without air power have not had a chance to resist yet. However, development in aerial technologies in the interwar period made the air force a leading branch of the armed forces.

German air power was a modern organisation that played a major role in the German expansion in Europe. Germany's anti-clockwise invasion of Austria, Czechoslovakia, Poland, Denmark, Norway, the Benelux, France, Britain, North Africa, the Balkans, and Russia was hampered only by the British efforts in the Battle of Britain. The scenario resembled an extended air duel, wherein the Luftwaffe struggled to overpower the RAF, hindering the preparation for a German invasion of Britain. This development highlighted the constraints of German air power, suggesting that the efficiency of the Luftwaffe could diminish with the prolonged duration of the war.

The extended war divided *Luftwaffe*'s power barely in three, among the east, the west, and the south. However, the *Luftwaffe* had to send squadrons to Norway, Sicily, Sardinia, and the Balkans due to security reasons, because it was responsible for the protection of all European skies in 1941, a very large area compared to the end of the Battle of Britain. German allies also had indigenous aircraft types, but they could not be matched with modern German fighters and bombers as well as their opponents had. Germany's factories transferred some aircraft to strengthen her allies' air power.

Before the USA entered the war, Germany and her allies had enough aircraft production to overcome the British and Soviet aviation technologies. Even U.S. involvement in the war could not break the German resistance in the air until February 1944.

2.1. Modern Air War Becomes Imperative

Blitzkrieg gave leading role to the panzer forces, as it made the head assistant of the panzers, close-support aircraft. The conduct of operations with combined arms made the system a little more complex; the actions of both panzers and air forces were prominent. Hence, the Second World War changed the character of air warfare and made it imperative. Both in Poland, Norway, and France, the *Luftwaffe*'s warplanes swept the skies and made it possible to support the ground forces effectively. In Poland and France, the *Luftwaffe* conducted its operations as part of the system integrated with the ground units. In Norway, the *Luftwaffe*'s

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[4] *Reichsführer* is a unique rank for Herman Göring who was in charge after Hitler as well as the chief of the *Luftwaffe*.

duty was expanded to actualize the landings along with the *Kriegsmarine*. After the landings, the *Luftwaffe* would go back to the main role in which the German aircraft conducted operations to support the ground units. However, the *Luftwaffe*'s role was expanded again in the Battle of Britain by two steps. First, the *Luftwaffe* units were laid a burden on preparing the preconditions for landings. Second, it had to support the *German High Seas Fleet*. After the landings, *Luftwaffe*'s role would be back to support the ground forces. The Battle of Britain came after three campaigns in Poland, Norway, and France. Following a period of wear and tear, the *Luftwaffe*'s role experienced a resurgence. However, this miscalculation marked the Germans' initial aerial delusion at the operational level, leading to strategic consequences.

2.2. Differentiated Air Warfare

Due to light casualties, the campaign in Poland was successfully completed by the *Luftwaffe*. After Poland, the *Wehrmacht* (German Armed Forces, 1935-1945) continuously forced its limit during the first half of the war. The first high-risk operation was directed to Norway, which required an overseas operation, while the German offensive to the Benelux and France was very close. This brought a high-risk, strange air operation to Norway.

In Norway, the Germans had disadvantages in the beginning. Due to restricted capabilities, the German plan was based on deception, surprise, and attack at once on key objectives such as ports and airfields. *Luftwaffe* aimed to capture airfields in the hinterland to provide immediate air support to both sea and ground units, secure Norwegian coasts, and provide close support for further inland operations by April 9, 1940. There was a great problem: *Luftwaffe*'s fighters could not have enough fuel to get back to Germany. The first fighter waves, including Messerschmitt Bf-110s, were long-range fighters with two propellers and two engines that would have landed on enemy airfields if the paratroopers had not captured them so quickly. In fact, paratroopers and out-of-fuel German fighters captured those airfields simultaneously in some cases (Bekker, 1975: 120-127).

Leveraging their initiative and geographical advantage, the Germans successfully occupied Norwegian airfields. This strategic move facilitated easier operations in Norway, a region not in close proximity to the British coasts. Possible urgent support from England by air and sea would have taken time, which offered the Anglo-French landings disarray. The Allies were not able to defeat the German forces in Norway, but they had some local successes that could not clear the way to victory. When the Germans attacked France and the Benelux on May 10, 1940, the Allies were in trouble on the main front. *Luftwaffe* was able to overcome its missions in France and led the panzer troops hastily forward. German aircraft proved their worth in the system.

The Battle of Britain in 1940 and the Invasion of the Balkans were large-scale operations in which the *Luftwaffe* played major roles. *Luftwaffe* conducted all of the operations during the Battle of Britain; however, its failure concluded with the cancellation of the invasion of Britain. In Yugoslavia and Greece, the *Luftwaffe* was able to sweep the skies after France. Like Norway, Crete was a small-scale campaign for the *Luftwaffe*; however, the course of events forced the whole operation to take place on its own. Probably, Crete left unfinished another small-scale campaign in Malta.

2.2.1. Battle of Britain

By Fall of France, Hitler aimed the British motherland, the second overseas activity after Norway. It seems to have similarities to Norway, but nevertheless, it was all different. In Norway, the *Luftwaffe* aimed just at tactical targets. In Britain, the morale of the British people in defence was higher than that of the Norwegians. Britain had a powerful and some experienced army, while the British defence industry was active and extensive. Consequently, both strategic and tactical targets in Britain must have been targeted. The *Luftwaffe* proved sufficient for conducting operations aimed at tactical targets; however, it had never attempted operations against both strategic and tactical targets, particularly against a major power.

Herein, operations in France were probably illusive for further offensive operations by the *Luftwaffe*. France looked stronger than Germany on paper and had the second-largest army after the Soviet Union in Europe. In France, the *Blitzkrieg* swept the Allied armies in one and a half months, so the Germans did not need to overcome strategic targets. This provided *Luftwaffe*'s squadrons with a unique opportunity to focus on tactical targets, efficiently supporting the ground vanguards. Within a mere three weeks, France succumbed, and the subsequent three weeks marked the decisive blow. Despite fighting along with the British and Belgians, France gave up because there were not effective French politicians or military seniors in office, most were not long-sighted enough to catch the necessities of modern warfare, both on land and in the air. However, in the First World War, France was the first to own over 34,000 military aircraft (Gilmour, 2012: 24). The problem was those seniors' views of the air force as a part of the army, instead of an independent branch, in the interwar period. The role of the military aircraft was restricted to reconnaissance and ground support, inherited from the First World War (Gilmour, 2012: 25-26). Production efforts in aviation also remained limited. France reacted to the Germans when *L'Armee de l'Air* was far from prepared. The Air Force was not able to encounter the *Luftwaffe* with a lack of modern organization and tactical view, so the result was that the French ground forces were exposed to a three-dimensional combined-arms assault that paralyzed operational and tactical commanders (Higham & Harris, 2006: 43). However, *L'Armee de l'Air* had owned 4,360 combat aircraft, including 790 new ones, on May 10, 1940, against the *Luftwaffe*'s 3,634. The French aviation industry also delivered 1,131 aircraft, including 668 fighters, between 10 May and 12 June (Sutherland & Canwell, 2011: 5, 14).

Similar to the strategy in France, Hitler aimed to blitz the British mainland swiftly. The occupation of Britain held greater significance than the fall of France, as it represented the last formidable democracy in Europe, potentially serving as a crucial beachhead for future endeavours. The British Royal Navy also had a strong fleet to defend the island, but at the same time, it was disincentive in the Mediterranean. If Britain had fallen, the Royal Navy counteracted that Germany secured its back to the North Atlantic for her further operations to the east.

The German air campaign over Britain was immediately started after the French campaign. The *Luftwaffe* carried the war to the British mainland; however, it gained nothing but casualties. Britain was close to France. Nevertheless, the German fighters' dogfight

capability was limited over the southern British coasts, where they were rigged out by radar installations that provided vital early airborne warning to the British squadrons. These were exclusive targets for the German bombers, were less important in France. While the German squadrons were on air, the British were aware of them, so they could easily estimate their target zone, where they concentrated. When the British fighters went into a dogfight, their German counterparts had a short time to deal with them because of their limited fuel. Inevitably, the German Messerschmitt Bf-109 escorts were to go back home, leaving the bomber formations alone, which were vulnerable to the British fighter squadrons. The Luftwaffe had to fight slow medium bombers under the cover of fast short-range fighters during the Battle of Britain (Overy, 1981: 43). On the other hand, the bulk of the British fighter squadrons on the mainland were *Spitfires* and *Hurricanes*, which overrode the might of Bf-110 long-range fighters.[5] The Battle of Britain was the first fierce campaign for the Germans.

The bombing of London was initiated in retaliation for the British nocturnal bombing of Berlin, triggered by an incident where a German medium bomber mistakenly dropped its bomb over London. Ironically, this shift in German strategy unintentionally altered the fate of the operation. Because the Germans had not started landings, the *Luftwaffe* continued its task on a strategic level alone. In other words, the *Luftwaffe* had a prior role in which, for the first time, warplanes got ahead of panzers. Although the bombing of London diminished the morale of London citizens and forced many of them to leave the city, that strategy did not work and led Hitler to postpone landings.

The exaggeration of enemy casualties in the air led to misperceptions of strategy on the right track. The Germans did wrong with the numbers during the Battle of Britain because they failed to estimate their enemies' numbers of production, pilot numbers, and operational fighters. This was, perhaps, one of the reasons they lost the campaign. Even now, wrong statistics can hamper a country's material and spiritual outputs, dragging its economic, social, military, or political areas into inefficiency. The British Bomber Command was also victim to the same mistake in the late war, while they were bombing the German cities to make the German people feel like giving up. Neither the Germans gave up, nor did the German industry collapse. There again, the British bomber losses increased. Thus, wrong statistics could lead to wrong tactics or strategies, which is an indispensable part of military intelligence.

During the campaign, the *Luftwaffe* was the only branch responsible for preparing conditions for both the *Kriegsmarine* and the *Heeres* (German Ground Forces). This campaign clearly indicated the *Luftwaffe*'s limits. By the Battle of Britain, both sides attached more importance to their aircraft production. Now, the *Luftwaffe* had to be organized for a two-front war.

[5] Destruction and damage percentage of the Bf-110 was the highest by far amongst all types of the German aircrafts during the Battle of Britain (Murray, 1989: 57-58, tables IX-X)

2.2.2. Meaning of Belgrade

Early in 1941, the Germans had to secure the Balkans, which threatened as a new front when the Italians attacked Greece but failed. An Albanian-based Italian offensive into Greece was repulsed. At the same time, the British pushed the Italian assault in Egypt back to Libya and annihilated most of the Italian army in North Africa. This paved the way for some British units to transfer to the Balkans to help Greece. Outcomes in the Balkans brought the German response, who felt her nearer operations against Russia.

Air bombing was like carrying the horror strategy of ancient and medieval times into aerial warfare. Strategic bombing primarily targeted industry and civilian morale. *Luftwaffe* had also used horror bombings on Warsaw, Rotterdam, Paris, and London in 1940. The first three had great effects because those attempts took part in the Polish, French, and Dutch army's collapse. Those bombings were used in parallel with ground movements to skip a stage and reach total victory. The *Luftwaffe*'s role in this early strategy worked well, and three countries surrendered after those bombings.

The bombing of Belgrade was mainly political; it was Hitler's punishment and intimidation operation that broke Yugoslavian morale; however, it did not have a direct effect on Greece's decision to surrender and put Turkey out of the war. It had a possible political effect on the Turkish government, which preferred getting relations with Germany closer, which could prevent Turkish collaboration with the Allies. A few days after the fall of Crete, Halder noted concluding a nonaggression pact with Turkey on June 3, 1940 (Burdick & Jacobsen, 1988: 397), which came true on June 18.

The Germans were to account for the air forces of minor neutral countries, could have been involved in the war. Switzerland and Sweden were inland countries in the Third Reich's Europe, so they were ineffective. Therefore, Turkey, Spain, and Portugal had importance if they joined war on the Allied side. Among them, Turkey was the most important one, with its geopolitical location as well as its good relations with the Allies. Turkey was so close to Polesti Oilfields and South Russia as an airbase. Hitler knew that and wanted the British to stay far from the Balkans, out of the bomber range of Romanian petroleum in 1940. His all-time fears were the British bases in Thrace, nearby Ploesti Oil Refineries. In his secret letter to Mussolini, Hitler had written Turkey's special importance to be a trump for having Bulgaria, on November 20, 1940. He added that they would try to come to an agreement with Turkey (Öndeş, 1976: 747)**.** The Western Allies gradually increased military support for Turkey during the war. Even Hitler prevented Ribbentrop's further actions to press Turkey to join the Axis in early 1941.

Germany swept the Balkans in half a month. On April 17, the *Luftwaffe* bombed Belgrade without hesitation. This was like the Mongolian horror strategy in the 13th century adapted to aerial warfare. One intimidation address was Turkey, to take her on the Axis side, or at least to hinder Anglo-Turkish collaboration. Turkey got anxious; however, the German horror strategy did not directly take Turkey into action. Nevertheless, Turkey became more cautious about supporting the British. This, perhaps, caused a postponement of Turkish involvement in the war against Germany until February 1945. In other words, the

punishment of the Belgrade people helped the decisiveness of the Turkish administrators to be out of war.

2.2.3. Norway, Crete, and Malta

There were smaller overseas operations; two were to Norway and Crete, where the *Luftwaffe* led to the victory, and one more to Malta, which was unfulfilled. All the highly risky air-landing operations to Crete were close to disaster and achieved at a high cost, which made Hitler reluctant to undertake similar further operations, which probably affected the launch of combined arms operations against Malta.

In April 1940, Norway was the earliest operation that forced the *Luftwaffe*'s limits. The long-range and potential of British naval aviation were two main obstacles to the tasks of the *Luftwaffe*. In the early stages, German air units shared maximum responsibility for the operation with the *Kriegsmarine*. After the capture of key airfields, air operations in later stages were off the ground. Hardly, Messerschmitt Bf-110s, German fighters with the longest range, were very close to being out of fuel in the first hours. In one case, some Me-110s were compelled to land before the German paratroopers captured Fornebu Airfield near Oslo with losses (Bekker, 1975: 120-127). However, the Allies were a bit surprised to react at the time. This eased the continuation of further operations in Norway.

In April 1941, the Germans invaded Yugoslavia and Greece simultaneously. However, the capitulation of the Balkans and the evacuation of the British units that arrived in Greece were not enough for Hitler, who desired to secure Germany's back in Europe for the forthcoming Operation *Barbarossa*.[6] Crete acted as a rallying area during the evacuation of Greece, like a furuncle. Hitler ordered an invasion of Crete, as it was the last place to threaten European soil. Operation *Merkur*[7] was expedited and brought the Germans into such a condition that it was the second highest risky air operation after Norway. Thousands of troops had to be transported by air, while airborne operations would have been supported by seaborne landings. However, seaborne landings were all hindered by the British supremacy in the East Mediterranean, which laid the burden on the airborne troops. The Germans won both high-risk operations in Norway and Crete against the British lack of sufficient naval support. The occupation of Crete was very costly. Later, the US Army used the German experience in Crete, adding its military doctrine to the revised FM 100-5 (Ross, 1992: 3).

At the beginning of June, there were not any beachheads or rallying areas around Europe. Now Turkey, where the British tried to persuade them to procure a new stronghold, was intimidated enough from the west that she could never be in a formation against Germany, while the German air power in Greece and Bulgaria was nearby and strong. After the Germans settled in those areas along with Turkey's western coasts, they kept some air power as a menace here. This went on until the accelerated evacuation of the German forces in autumn 1944.

Malta meant more than Crete, with the most strategic point being the middle of the Mediterranean. It was the closest island to both Europe and North Africa and historically

[6] Codename of the German invasion of Russia.
[7] Codename of the German invasion of Crete.

served as a naval base, a strong checkpoint, and a focal point for the invaders, e.g., the Arabs, Normans, Turks, Spanish, French, and British. By 1814, the island had been under British possession and had contributed to British interests in the Mediterranean for 150 years.

Demands from the Governor of Malta for defensive weapons began in the 1930s, dating back to the Abyssinian Crisis in 1935. Then the island was defenceless and the possibility of the threat of the *Regia Aeronautica* (Italian Air Forces) had emerged. The British Mediterranean Fleet temporarily left Malta for Alexandria, Egypt, for about one year (Budden, 1996: 447).

The air battle over Malta in the Second World War was a strange action. The British, thanks to their ability to possess Malta during the war, cleared the main shipping route between Gibraltar and Alexandria and stressed the enemy supply route between Italy and Libya. This determined the major problem of Axis logistics during the campaigns in North Africa. Malta became an issue among Field Marshals Kesselring, Rommel, Italian military seniors, and Hitler, who never trusted the Italian military. The British strengthened the air defence of Malta during the first half of the war, and Malta-based air attacks hampered further Axis movement in the Mediterranean theatre.

The air battle around the island was also like an extension of the Battle of Britain in a tight region. For example, in the first week of October 1942, 114 Axis aircraft were shot down for the loss of 27 *Spitfires*, and the trend continued (Budden, 1996: 465). In May 1943, the surrender of the Axis forces in Tunisia signalled the end of the Air Battle of Malta. During the battle, 2,700 Axis aircraft were shot down, resulting in the loss of 707 British aircraft and damage to 735 (Budden, 1996: 466). The most dangerous period for the island was October 11-19, 1942; the intensity of the Axis attacks at the top could check the Malta-based attacks to the Axis shipping (Budden, 1996: 466). On the other hand, in August 1942, when the Pedestal Convoy arrived, the island had just a 10-day supply (Budden, 1996: 447).

Those show that such an air struggle for Malta could prove Douhet's claims of air power could bring the opponents on her knees and have possibility at the operational level instead of on a strategic level. On the other hand, at the strategic level, the Gulf War in 1990-1991 validated Douhet's claims if there is an asymmetrical strength between the opposite sides. Struggle between equal powers: it is hard to believe Douhet's type was won by air power, especially after Germany's resistance during the late war.

3. CHANGING AIR BATTLES IN THE EYE OF THE WAR

The opening of the Eastern Front on June 22, 1941, brought Germany a historical fate in which it divided resources across multiple fronts. Now, beside its offensive obligations in Russia and North Africa, the *Luftwaffe* was also responsible for defending Norway, France, and southern Italy. By the time in the North African Front closed in May 1943, the disposition of the *Luftwaffe* was 50.7 % in the East Front, 16.5 % in the West Front, 14.9 % in Germany, 13.5 % in Italy, and 4.4% in the Balkans. The Air Battle of Germany decisively changed those ratios in five months; in October, the disposition of the *Luftwaffe* was 37.6 % in the East Front, 18.8 % in the West Front, 24.8 % in Germany, 9.3 % in Italy, and 9.5 % in the Balkans (Mandel, 1986: 136). This dramatic change clearly shows how costly air battles over the German skies helped the Allied ground units battling on all other fronts.

Different geographies, different climates, extended borders, and increasing depth depend on evolving operations; all were prognostications for the near future. By late 1941, the emergence of critical situations had damaged the German air power more, such as in Demyansk, Stalingrad, Malta, and Tunisia. The Germans were not able to close any fronts after 1941, but the Allies did it in North Africa in 1943, continued with Italy getting out of the war, and laid the burden of defending the South European coasts to the Germans alone. On the other hand, the Air Battle of Germany escalated in 1943.[8] As the war extended, the *Luftwaffe* became unable to defend the indefensible.

3.1. Renewing Air Operations According to Changing Conditions

When the Germans attacked Russia, the greatest front in history opened and demanded the most expanded military branches be operational. Campaigns in Russia were not similar to previous ones in which the *Blitzkrieg* improved it as a suitable doctrine for the Germans. Russian land was enormously wide and deep, which prevented the success of deep penetration. Paris was about 350 km from the border, while Moscow was about 1.000 km, nearly three times. The German High Command strategy was based on the annihilation of the Soviet armies in huge pockets that could change the strategic depth in favour of their own. This was done by four panzer groups well supported by the *Luftwaffe*'s squadrons. German squadrons succeeded in making a surprise all over the front. According to the Russians who accepted the *Luftwaffe*'s role in the early successes of the Barbarossa, the Germans destroyed 1,200 Soviet aircraft, including 800 on the ground with many modern ones, and raided over 66 airfields until noon on June 22, 1941 (Bekker, 1975: 341-342). Until November 1941, the Germans seemed victorious. In late November, the battery of the German machine alerted.

The fact is that; in history, the depth of the Russian geography compelled all army branches of the invaders to exhaustion. Neither Karl XII of Sweden nor Napoleon could overcome this situation. Although the broad plains in Russia were highly suitable for the *Blitzkrieg* method, geographic depth maintained its advantage in favour of the Soviet armies, which swarmed the re-established defence lines. After the Germans penetrated the first Soviet defence line near the border in late June 1941, the Russians managed to establish it on the road to Moscow three times in three and a half months. The Red Army strategy was clearly to retard the German advance at all costs, to deal with the invincible German Army when it was exhausted in early winter, and it worked.

The Germans achieved air superiority in the first hours and broke the Soviet air resistance along with the border. During their advance deep into the Russian ground, the *Luftwaffe* went on mauling the rest of the VVS's (*Voyenno-Vozdushnye Sily*, Soviet Air Forces) air strength. However, the *Luftwaffe*'s sorties had rarefied by October and sharply decreased next month. Extended logistic lines, primitive conditions on the roads, and a lack of railway conveyance hampered all logistic efforts that badly affected the *Luftwaffe*.

In 1941, air superiority and close-support missions were not enough for the armoured thrust, and the German spearhead, Second Panzer Group, was first checked at Yelnya in early

[8] Note that; Germany had to keep some squadrons against a surprise attack from Turkey, even in 1944.

August. When mud and snow in autumn restrained most of the aircraft sorties, air support diminished both in the central and northern regions. Lack of air support made gaining ground difficult, and the ground units began to stall. By late 1941, less than 30 % of the *Luftwaffe* units were operational (Higham & Harris, 2006: 210). On December 5, the Soviet counter-offensive overran many of the Germans exhausted in the line of battle and threw the Germans back along the East Front. On the East Front, German air power was limited to tactical targets. There were not enough strategic bombers like the He-177 *Greif*, the Fw-200 *Kondor*, and the Ju-290. All were produced in limited numbers; He-177 and Ju-290 entered the service in the middle of the war because of restricted materials and production capacity in the first half of the war. Many of those bombers were allocated different roles other than bombing, e.g., maritime patrol and transportation. Then *Luftwaffe* never conducted massive air raids targeting dense production facilities beyond the Urals, as the same happened over Britain.

After their first clear defeat, the Germans reorganized their divisions, and this paved the way for the 1942 Summer Offensive, Operation *Blau*. The first objective was to capture petroleum reserves in the Caucasus, which was very important for both panzers and aircraft. The strategic demand of the German war machine was unveiled, and the German armour columns with a two-prong attack advanced in the south third of the East Front. Three main objectives were in the south; Maykop was 305 km from the frontline near Taganrog at the start of the offensive, while Grozny was 685 and Baku was 1.160. In the north, Stalingrad was 425 km east, and Voronej was 435 km north of Taganrog. However, the Germans had not yet understood that the extensive lines of logistics were a second enemy. In early autumn 1942, the *Luftwaffe* units and panzer divisions were alerting in supply. The German advance deep into the Caucasus totally failed when they were checked by the Russians at the west of Grozny. In the north, the bulk of the German army was entrapped.

VVS squadrons were strong on the Eastern Black Sea coasts to protect the Soviet Black Sea Fleet, so the *Luftwaffe*'s support for the German ground units fighting in the Caucasus was on a vulnerable line to the front. Direct bomber flights from Crimea were not very possible due to the Soviet air resistance as the frontline extended. This situation brought the Germans back to the same condition as the year before, and the German war machine was exhausted again. Mud and snow hampered the German advanced operations both in the Caucasus and Stalingrad regions, giving way to the Soviet counter-offensive. The Soviet operational plan was well-prepared and aimed for the same strategic result as the destruction of whole German units in the south, possessing more than one third of the East Front. German air losses in Stalingrad were also appalling and irreplaceable in a short time. The German retreat was also quick and long, which increased material losses. Nevertheless, thanks to Field Marshal Erich von Manstein's efforts, the Germans withdrew, correspondingly decreasing additional aircraft losses on the ground.

Heavy losses in the Battle of Stalingrad, which nearly wiped out the German reserves, were an occasion for the excess *Luftwaffe* ground crew to transfer to land warfare.[9] The concept of the *Luftwaffe* Field Division, comprised of 200.000-250.000 men, barely stood on this development. Until the end of the war, 21 *Luftwaffe* field divisions were activated (Ellis, 1993: 135).

Russian air resistance was ineffective in the first year of the war in Russia, and the Germans maintained their air superiority until 1944. This does not mean the Russian pilots were not able to defeat their German counterparts. Lack of training and a couple of modern aircraft compelled the Russians to a desperate counteraction. Beginning in late 1942, modern Soviet aircraft and experienced crews raised the resistance. On the eve of the German offensive to seal the Kursk pocket, Operation *Zitadelle*, in early July 1943, the VVS had the power to attempt a pre-emptive raid on the German airfields, even if it was a failure. In 1944, Russian air power made its presence felt all over the front. During all the Soviet operations during the last year of the war, VVS was able to rule the skies.

3.1.1. Airlift Operations

In the Second World War, airlifts became imperative depending on the same circumstances. It was first tried in the First World War, when the German Zeppelin Z.59 departed from Bulgaria on November 21, 1917. It crossed Western Anatolia to the south and navigated to German East Africa via Egypt. Its mission was to supply the German forces manoeuvring as they were surrounded by the Allied forces in Sudan. That expedition was a failure (Banks, 1998: 285).

Successful German airlift experience dates back to the Spanish Civil War, in which the *Luftwaffe*'s Junkers Ju-52 transports, escorted by six Heinkel He-51 biplane fighters, along with *Regia Aeronautica*'s aircraft, transported General Francisco Franco's troops from Morocco to Spain in July-August of 1936. They carried 13.523 men and 258.548 kg of stores in less than two weeks (Macksey, 1978: 49). In the Second World War, transports and bombers were able to achieve longer range, endurance, and payload capacity, and their production was now in higher numbers to make large-scale airlift operations possible. During the war, airlift was a useful strategy on different levels. In Norway, North Africa, the East Front, and the West Front, the belligerents applied to the airlift when there were nonviable circumstances in logistics on the ground. This occurred at tactical, operational, or strategic levels.

In the early Second World War, as the largest air transport force, the *Luftwaffe* could field 500 transports (Higham & Harris, 2006: 203). However, airborne operations were conducted over the enemy air zone; if the resistance was high, directly proportional casualties were on the rise. German planning was initially tactical and strategic surprise being attackers, as in the Crete example. However, in Crete, some 350 German aircraft were lost or damaged, more than half were transporters, while Colonel General Franz Halder indicated in his diary on May 28, 1940, that 170 unserviceable out of 600 transporters were totally lost. Halder

[9] *Luftwaffe Field Division* concept was also backed by Göring, who claimed all about the air in Germany was his possession with political reasons. However, because the *Luftwaffe* officers of those divisions could not comprehend the ground warfare, command of those divisions were transferred to the *Heeres* in late 1943.

noted, “Transport considerably depleted.” (The German Campaign in the Balkans, 2006: 141, Burdick & Jacobsen, 1988: 395). Other airlift operations were to surround units at different levels; a division in Narvik, a corps in Demyansk, or an army in Stalingrad. In those cases, urgent retreats brought some units into a situation that needed supply to endure.

The first airlift was at operational level to Narvik, north of Norway. Here, the German 3rd *Gebirgsjäger* Division (equivalent to the mountain division), which had to leave the city, hampered its logistic process. German transport aircraft supplied the division, which it could resist until the British evacuated Norway.

The airlift actions of the *Luftwaffe* spilled over with high casualties and chaos. The reasons behind major airlifts were Hitler’s unawareness in the conduct of military operations; he forbade any tactical or strategic withdrawals when the Germans were exposed to the Soviet counterattack after a deep penetration. Because the German area of operations in the east was larger than other fronts, both tactical and operational levels also contained strategic issues. For example, the retreat from Stalingrad to the Dnepr, losing the east of Ukraine, was an important political and economic issue. Hitler was such a person that he never comprehended the distinctness of the East Front, and stubbornly refused the withdrawal in spite of the risk of destruction of all Army Group South, including the Seventeenth and First Panzer armies retreating from the Caucasus.

On the East Front, large plains were very suitable for deep penetration that often ended up with massive encirclements, reciprocally. One prominent example was the airlift to Demyansk pocket, where the Soviet armies surrounded about 100.000 Germans, started on February 20, 1942; the transporters carried 24.303 tons of stores for three months. It was a successful large-scale airlift; the Russians failed to break the German resistance. However, it was at a loss of 265 aircraft. A small-scale airlift to Kholm also followed Demyansk in the same region (Bekker, 1975: 409-410).

Supplying about 100.000 Germans in Demyansk overshadowed the logical calculations of 250.000 surrounded men in Stalingrad. Soviet armies surrounded the bulk of the Germans and her allies in Stalingrad in late November 1942, which required the largest-scale airlift at that time. Stalingrad was the deepest territory in the Russian soil, and the Soviet leaders prepared well against the pocket, which was populated by the Axis 2½ or 3 times in comparison with Demyansk (Hayward, 1997: 24). Göring told Hitler the *Luftwaffe* could overcome to supply the encircled Axis units. His miscalculated statement dragged the German Sixth Army in the pocket to a bad fate and capped it off in 2½ months. The depth of the battlefield was in favour of the Russian fighter squadrons’ resistance, and the Russian ground units raised it, advancing. By this way, the *Luftwaffe*’s losses rose to 488 transports and bomber aircraft (Bekker, 1975: 450). However, it was far to supply 250.000 men in the pocket. Some confusion on expended words among Hitler, Göring, and Colonel General Hans Jeshonneck, *Luftwaffe*’s Chief of the General Staff, airlift capability to Stalingrad pocket became an illusion. Other seniors of the *Luftwaffe*’s grand units supporting the Army Gorup South were aware of the situation and attempted warnings to military leaders, both local and GHQ. Hitler was a philodox and preferred to believe Göring’s assurance and Jeshonneck’s unstudied first accounts. He continued to be a slave to his own emotions and

insisted on maintaining airlift to the pocket instead of the Sixth Army's breakthrough back (Hayward, 1997: 22-24, 30-31, 35).

In the same month when the Battle of Stalingrad began, the last phase of the North African campaign was also started by Operation Torch, the Allied invasion of Morocco, Algeria, and Tunisia under the Vichy French. The Germans quickly reacted and occupied Tunisia before the Allies, and all Axis forces in North Africa were withdrawn here. This brought an overseas logistics issue as large as in Stalingrad within the same month. Tunisia was the last foothold of the Axis armies in North Africa, so that level of supply was strategic. Unlike Stalingrad, the Axis forces were defending a larger area using geographical conditions efficiently; by this means, a large part of the hinterland made the airfields useful. German and Italian air units replenished the ground forces in Tunisia and extended the campaign in North Africa for about six months. *Luftwaffe* losses were heavy again, including casualties during the Battle of Malta.

3.1.2. Effects of Geographical Expansion

On the East Front, long distances required the development of aircraft types to a certain extent. Especially long-range fighters were necessary in Russia. While the Bf-109s lacked range; their domestic rivals, the FW-190s, could go far. Nevertheless, both were not able to overcome the needs of the *Blitzkrieg* as in the early times. Nevertheless, the German pilots felt comfortable because their enemies' aircraft was not able to counterbalance. However, German air power in the centre of gravity was exhausted in the first winter.

While the opponents on the East Front had been focused on tactical targets, the situation on the West Front made air campaigns in the region utterly different. The West Front opened on September 3, 1939, when the Allies declared war on Germany. There were not any serious actions until May 10, 1940, the day the Germans launched "Case Yellow".[10] During the campaign, the *Luftwaffe* barely focused on the tactical targets to clear way for the armour thrust and successfully supported the panzers. The plains at close distances here were gifted with close air support. However, during the Battle of Britain, the *Luftwaffe* went on targeting the points with dual functions, both tactical and strategic, like radar stations, shipping, and airfields at a distance. In France, the German aircraft fought over the land, which was hastily occupied. However, this was not the same in Britain. During the course of the campaign, a German bombing misdirected to London, a strategic target, spelled the RAF (Royal Air Force) squadrons to resist. So that air campaign in Britain was a failure, and landing on the island was postponed.

After the Battle of Britain, the Germans focused on the east, and especially the invasion of Russia yielded no result. On the other hand, it gave the British armament enough time to build-up. RAF bombers followed Douhet under the influence of Air-Vice Marshal Sir Arthur Harris, C-in-C Bomber Command, and began bombing the German cities at night in the middle of the war; however, this attempt was far from obtaining a strategic result. The British were not able to conduct daylight bombings because their fighters were insufficient both in numbers and in range. They were not superior to their German counterparts, either. Air

[10] Codename of the first phase of invasion of France and the Benelux.

warfare on the West Front effectively started after the USAAF (United States Army Air Force) fighter and bomber squadrons deployed in Britain in large numbers. Americans undertook daylight bombings with their more capable fighters and bombers, while the British maintained their ability to attack German cities by night.

Aerial defence is vital if a country has dense industry-directed war output. This is the strategic defence that could neutralize the outcomes of Douhet's theory of strategic bombing. The Germans prepared the air defence of Europe with radar webs and fighter squadrons. Strategic bombing was conducted through continuous and long-term attacks on non-military targets. Supporters saw it as a war-winning weapon through starving economic resources and undermining national morale (Overy, 1981: 15). Allies gave priority to the strategic bombing to hamper German arms production heavily as well as to break the psychological power of the people. None of them were coercive enough because of two means; German resistance in the air was strong despite heavy losses, and the German people endured the war under the strength of a fearful organization of the Nazi regime. The Germans had also transferred some of their military output to underground factories. Later, the American reckoning on coercive bombing would also not work in North Vietnam, either. As in Germany in 1945, occupation of the region was necessary in the Vietnam War, too.

Allied tactical bombings were limited to the campaign in North Africa and increased slowly. After the Axis surrendered in Tunisia on May 13, 1943, the Allies launched a quick deployment to land on the Italian coasts. On the Italian Front, the Allied air forces mostly focused on the tactical targets, while strategic bombings to South Germany, Romania, and Hungary were also arranged. The advance in Italy, easily checked by the Germans, obliged the opening of the West Front. To actualize the Overlord,[11] the Allies had to break the *Luftwaffe*'s resistance in Western Europe. This led to the Allies arranging a one-week costly operation in the middle of February 1944, which drew the *Luftwaffe* fighter power on their own, and mutual heavy losses ended the *Luftwaffe* threat to upcoming landings. By this means, the Allies began to concentrate on the tactical targets in France. When the Allies overwhelmed the *Luftwaffe* in the air, they could also concentrate both strategic and tactical targets together easier until the end of the war.

4. MILITARY TECHNOLOGY

The technical abilities of air machines are the prerequisites for tactics, strategies, and theories of air war. Basically, planes fly and attack from altitude. Therefore, in the Tripolitanian War, Italian pilots began to drop small bombs by hand. The Ottomans, who did not have any airplanes at that time, developed primitive anti-aircraft tactics, which caused aircraft upgrades. Italian aircraft were short-range machines, were not durable, and could not carry many bombs because of the limited power of their engines. Early planes had only limited roles as reconnaissance, strafing, and very light bombing.

Thirty years after the Tripolitanian War, a bomber was an aircraft obligated to particularly bomb, along with its abilities in shape, size, and devices attached for its task. Bombers in the Second World War were generally categorized as light, medium, and heavy according to

[11] Codename of the Allied invasion of France.

their weight, which was a result of their large wingspan and fuselage, engines, armed equipment, and payload capacity. A medium bomber could deliver about 2,000 kilograms of bombs to the target. This increase occurred in 25-30 years and enabled dense and more efficient bombing methods. The development of well-protected heavy bombers with a payload between 5.000-10.000 kilograms brought major cities as primitive targets for massive raids. USAAF (United States Army Air Force) commissioned two main strategic bombers to carry the weight of daylight bombing against Germany; the B-17 *Flying Fortress* could deliver 2.724-5.800 kg of bombs to targets in various ranges, while the B-24 *Liberator* did 3.629-5.443 kg (Gunston, 1990: 200, 204).

Galland offered the characteristics of a good fighter in order: speed, manoeuvrability, acceleration, climbing, and a stable platform of weapons (Cunningham, 1978: 17). Fighters' qualities involved manoeuvrability, speed, acceleration, firepower, amount of ammunition, and range; all could be developed for the contest with rivals. The Germans developed the Bf-109, a qualitative fighter, in the early war, which had been approved in the Spanish Civil War by 1937. Its advanced types continued their successes in the campaigns in Poland, Benelux, and France. However, the Bf-109 technically failed during the Battle of Britain because its operational range was so short that Bf-109 groups were not able to escort the bombers deep into England. Both sides learned from the Bf-109s' deficiencies. The Germans produced new fighters like the Focke Wulf FW-190 with extended range and increased later Bf-109 types of operational range continually. On the other side, the USAAF requested long-range fighters to escort heavy bombers, and it was concluded with the delivery of P-51 fighters with external fuel tanks. The range issue of the German fighters became apparent after Germany invaded Russia. Thus, the German fighters suffered from the range both in the west and in the east while they were in offensive positions. This clearly shows that the *Luftwaffe* was not ready for deep offensive actions against major powers.

The combat radius of the American heavy bomber B-17 *Flying Fortress*, which was the most difficult one for the German fighters to shoot down, had a range of approximately 800 km in late 1941, and the combat radius of the Army Air Corps' best fighter was around 320 km. The best American fighter could stay aloft for 70-90 minutes at most, while the B-17 could endure more than five hours (Hammel, 1994: 2). Hence, the USAAF could not support the British bombers over Germany effectively; it also could not overwhelm the Japanese expansion because the American fighter pilots had the same problem as their German counterparts experienced in the Battle of Britain. Offensive plans by both tactical and strategic bombers required long-range escort fighters. So, both the Americans and the Germans experienced the question of long-range fighters in a year after they entered the war.

In 1942, the US bombers could eventually reach targets nearly 1.750 km from their bases in England, but the fighters could still fly only 400 km in one direction and no farther (Hammel, 1994: 9). Thus, those bombers could raid Berlin just on paper, daring that this could be fatal. The British Bomber Command resumed bombing Berlin at night. On the night of February 15-16, 1944, they dispatched 891 bombers and dropped 2.642 tons of bombs; however, at a cost of 43 bombers, only 320 Berliners died (Neillands, 2003: 12). Allied air supremacy provided a broad area to escort medium and heavy bomber formations with P-51s in 1944. The P-51D's maximum range was 2.093 km with external tanks (Gunston, 1990: 242). Later,

Göring attributed, he understood the fact that they lost the war to the occurrence of the American fighters over Berlin after the first daylight raid on Berlin, on March 4, 1944 (Astor, 1998: 255-256).[12] The combat range of the FW-190 A-8 was about 400-500 km, introduced in 1944, while the Bf-109 G-6 was the same introduced in early 1943. Messerschmitt Me-262 *Schwalbe*, the first jet fighter to enter the *Luftwaffe*'s service with a one-year delay in late 1944, had a far greater operational range than the FW-190 and Bf-109 variants. Me-262's range gave their own shelters built deep into Germany against increasing airfield raids.

4.1. Effects of Technological Expansion

There were two revolutionary achievements in aviation technologies during the Second World War. The first was the delivery of the aircraft with jet propulsion. The second was the use of rocket propulsion in several subfields of aviation. Both were mainly addressed to the successes of the German scientists, which accelerated the acquisition of both technologies into the battle. German jets Me-262 and Arado Ar-234 *Blitz* and the rocket-powered aircraft Messerschmitt Me-163 *Komet* entered service in late war, while serial production of another jet, Heinkel He-162 *Salamander*, was started but never used. Allies also ended the war partly with the use of similar weapons; the British Gloster *Meteor*s were commissioned only for hunting the V-1 cruise missiles, and the American P-80 *Shooting Star* was delivered too late for the dogfights. The Germans were the only ones to standardized jet and rocket aircraft and create tactical and strategic perspectives. Those jets were the first fruits of the new-born aerial technology and brought along initial problems like overheating short-lived engines, however, among them, Me-262 went into serial production and delivered service in higher numbers.

4.1.1. Strategic Failure of Technological Success in Rocketry

As the first rocket engine aircraft in the service, the Me-163 *Komet* was the outcome of a revolutionary step; however, it was far from carrying the air power to the strategic result. It improved a rocket-propelled engine was not very suitable for the air war. It was not useful because of very short time of endurance, just eight minutes, and also suffered high attrition through accidents; nevertheless 370 were in the service. This aircraft could only climb very fast to the ceiling, observe the bomber formations, and attack them only twice in a nosedive. *Komets* could use air-to-air rockets or cannons. It seems impossible to shoot down because of their high velocity; they reached at a top speed of 960 km/h. Me-163 had some psychological effect on the US bomber crew (Gunston, 1990: 72-73). About 300 *Komets* entered the service. However, Me-163s credited only nine victories at a cost of 14 in action, and 80 % were lost during takeoffs and landings (Hess, 1996: 19). *Luftwaffe* also used rocket technology on heavily loaded air transports to carry out their takeoff with heavy loads.

Rocket engines are more efficient in use with delivery vehicles against strategic targets. As a part of aerial warfare, Second World War rocketry had three aspects: "on air", "to the

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[12] "When did you know that the *Luftwaffe* was losing control of the air?" General asked after the war Goering told Spaatz. "When the American long-range fighters were able to escort the bombers as far as Hanover," Goering replied, "it was not long before they got to Berlin." Goering said he could not believe his eyes when he saw them over his capital. Goering then observed: "The reason for the failure of the *Luftwaffe* against the Allied Air Forces was the success of the American Air Forces in putting out a long-range escort fighter airplane which enabled the bombers to penetrate deep into Reich territory and still have a constant and strong fighter cover. Without this escort the air offensive would never have succeeded." From: "Mustang", *Air Force Magazine*, March 1964, 80-86, p. 85.

ground", and "out of the atmosphere". The Germans developed air-to-air, air-to-ground, and anti-shipping versions of the aircraft for tactical use. They also developed the V-1 cruise and the V-2 ballistic missiles and used them in thousands by 1944. V-1 was introduced in strategic bombing by June 13, one week after D-Day, where the *Luftwaffe* resistance in Western Europe was softening up. In one sense it was good timing because the German propelled fighter force could not stop the Allied daily bombing after the Big Week[13] in February. Those missiles did not require any pilots, which the *Luftwaffe* suffered both in training and numbers, so that the V-1s may have been perceived as a saver weapon. However, it was just a terror weapon with a high CEP (circular error probability); the V-1 was not efficient enough to create an effect on the British industry. The US industry, which dominated the Allied production, was already out of range. V-2 was more developed as the first ballistic missile operating out of the atmosphere, but it was also far from saving the condition. Although it was the most revolutionary and effective weapon after the atomic bomb, the V-2 was an expensive solution for bombing cities, with a great CEP and each missile worth about $50.000 (Peterson, 1995b: 666).

In the first half of the war, the Germans focused on tactical objectives so that they did not need those expensive weapons. However, they continued investment in the missile research, which could give an opportunity to retaliate the Allied bombings of the German cities without any casualties. When a B-17 was shot down over enemy territory, all ten of its crew members became KIAs, MIAs, or POWs. V-1 and V-2 missiles were unpiloted, provided that their operational use was without any human casualty. On the other hand, targeting equipment helped navigators of a B-17 had a chance to find primary targets over a large area, while those missiles at that time were making blind strokes. V-missiles' effects were limited as much as the British night bombings on the opponents' psychology.

However, history shows a powerful air force is not an only weapon for a major power give up. Its winning effect is remained limited with only minor powers. Nevertheless, advances in rocket technology earned the Germans an advantage not wasting more pilots on terror bombing in 1944. If the V-missiles were used in the early stages of the war, the Germans could use them for strategic bombings in the area where the Germans were absolutely lack of, thus the *Luftwaffe* could direct all the frontier squadrons to the tactical targets. In 1944, it was too late. Major General Dr. Walter Dornberger, responsible for development of the V-2 missiles, revealed to Hitler that the military value of those missiles very limited (Overy, 1981: 105). On the other hand, the V-2 missiles alone were at a cost of production of over 24,000 fighters (Murray, 1989: 287). All information on the V-missiles shows the effective role of those weapons in the Second World War remains limited; however, under those circumstances, it was also exciting.

4.1.2. Jet Relations

Production and use of rocket technology in the late war were completely a waste. On the contrary, jet technology had the potential to be a turning point. The most revolutionary

[13] Big Week was between 20 and 25 February 1944, in which the Allied air forces undertook the *Luftwaffe* at all costs. Allies succeeded in breaking the German air resistance in the air what the Germans could not do in the Battle of Britain and skies in the West Europe cleared for the Overlord.

advance in the air during the war was clearly jet-engine aircraft. During the Second World War, German scientists were able to carry military technology beyond their age. Just a few days before the outbreak of the Second World War, the Heinkel He-178, the first jet-propelled aircraft in history, made its maiden flight. Despite its impracticability, this symbolized the German aviation advanced in leap, could provide the *Luftwaffe* a rapid aircraft for both offensive and defensive means in the short term. This way, the *Luftwaffe* could have three main advantages. First, jet fighter squadrons could react quickly to bombing raids. They could catch them even over the English Channel because this type of interception would keep bombers away from targets. Second, jet fighters had a great superiority in both level run and climbing speed, which made them able to thrust into bomber formations, escalating the Allied fighter escorts. This was the only solution to stop the American daylight bombing, which was causing major damage to the German heavy industry. Third, jet fighter squadrons were tending to be hastily directed to another point by their overwhelming speed and long-range capability. This could restrict Allied deceptions by blunting the German radars. Thus, the Germans had caught the opportunity of range for developing strategic air defence.

In late 1944, some Me-262 and Ar-234 jet units were operational. Me-262 was the only weapon that could have won the war in the air on behalf of the Germans. Owning the Me-262 means that a decisive attack straight to the bombers with a short arrival time and outrunning the escorts became possible. The time the jets entered the service in numbers, their strategic usage was stonewalled by tightened space by the Allied advances from the east, west and south as well as shortages of both fuel and trained pilots.

The Germans could not take advantage of the jet fighters until 1944, when it was too late. By the time Heinkel He-280 production phase had been abandoned, the Me-262 was the only jet fighter to deal with massive American daylight bombing. Although the Me-262 was ready for service, Hitler's decision to convert it to the blitz-bomber (Heaton, 1997: 51) postponed its production as a high-speed interceptor, and the Me-262 began to rise not before the end of 1944, when the German aviation fuel was very limited in stock. On November 2, 1943, Hitler directly involved the production of the aircraft, to be fitted out as bombers (Ziegler, 2004: 50). The worse, he did not forget it and asked it of Field Marshall Erhard Milch, Chief of German Aircraft Production, in a meeting on May 23, 1944, and after he had not hear what he had wanted, he gave full responsibility to produce the so-called *bomber-blitz* to Göring (Price, 1997: 349-350). This postponed the Me-262 entering the service in massive numbers, and the Germans could deploy only 220 (Vat, 1997: 198) out of 1.433 produced (Gunston, 1990: 74). Me-262 production had been planned to reach 1.250 aircraft per month by April 1945 (Wright, 1968: 91); this number could also finish Allied daylight bombings, even in early 1945, if there was enough fuel and experienced pilots. If half of those produced were operational in late 1943 or about 18 jet fighter wings in full strength. This statistic doubles General Adolf Galland, a famous German ace and Inspector General of Fighters, laid down as a condition that a 300 operational Me-262 could stop the daylight bombing (Cunningham, 1978: 19). According to Galland and Milch, to stop massive daylight bombings, they needed four times more piston-engine fighters against the bombers (Bekker, 1975: 512-513). In his book "The First and the Last", Galland saw the development of the

Me-262 as a leap in aviation technology, and he wrote that he would rather have one Me-262 than five Bf-109s (Galland, 1990: 261).

Under 1943 conditions, a Me-262 operator airfield could defend more area with a large radius, had the shortest arrival time that a propeller aircraft could never do. The Americans tightly packed the formation of bombers with the well-defended B-17s was the best solution until the long-range fighters' escort. However, statistics on casualties in 1943 show it was not a war winning solution. While the Me-262 was not operational in numbers in 1943, the German pistol-engine fighters engaged them, and the American casualties were not low.

Hitler did not pay attention to the *Luftwaffe* experts and Albert Speer, the Minister of Armaments and War Production, and his wrong decision caused a considerable loss of time. Me-262's postponement dragged its mass production to a period of lack of jet fuel and trained pilots. The reality was that the *Luftwaffe* had just 30.000 tons of petroleum in March 1945, and it could not receive further supplies until autumn (Lucas, 1987: 100). In 1945, very few could operate together. Nevertheless, they showed their ability to penetrate the defence of massive fighter escorts to the bombers, due to their superior speed and acceleration.

4.1.3. Production Efficiency

Governments set the production balance during wartime. They decided the production priorities considering the volume of the economy, raw materials, manpower, research and development level, and capabilities of the armed forces, as well as the situation of the country in wartime. During the Second World War, the *Luftwaffe*'s power was a good example of the inefficient use of a qualitative force. Two factors led to this. First, the Germans were not prepared for the all-out-war when the Allies declared war on September 3, 1939. Mismanagement of the German economy until late 1942 constrained efficient output, which limited arms production. Second, the German government was all influenced by Hitler, resulting in all settings of his mind in military doctrines. As per usual, the arrangement of wartime output is related to the military demands, which were submitted by the military authorities who witnessed the facts on the front. The "Hitler effect" broke it and output was set to Hitler's desire. This dragged the *Luftwaffe* to overcome impracticable duty when Germany was overwhelmingly defensive on the ground by July 1943. Hitler persisted in offensive actions that affected aircraft output. On the other hand, there was also a debate among the *Luftwaffe* seniors on the production of tactical and strategic bombers until 1942, which was solved when the V-missiles became operational.

In the German aviation industry, the main problem was reflecting the governmental view of the industry in general based on the short-term German economic development, which was barely corrupt. This put off the aviation industry an efficient mobilization to realize qualitative-quantitative balance in aircraft production. When the war broke out, the German industry was nearly in full capacity. However, the Germans failed to expand their industrial complexes, so that the construction of facilities declined for three years after a peak of 1938-1939, while their British enemies succeeded it between 1940 and 1942 (Overy, 1981: 161). On the eve of the war, Fritz Todt, former Reich Minister of Armaments and War Production, also cut funds for the German industry, just after the first expansion of the aviation industry

between 1935 and 1938 (Overy, 1981: 165). A second expansion was planned by 1941; however, it was not fast enough under conditions of war (Overy, 1981: 166).

The largest producer in Germany was Junkers, which had only two factories in 1944 and over 10.000 employees; one had 14.000 and the other had 12.000. In Britain, 12 factories had over 10.000 employees, including two firms with 25.000 each, while in the majority of the aviation factories in the United States had 20.000-40.000 employees. Both in Germany and Britain, small firms were adopted in aircraft production. Governmental contracts with British firms were 12.000, while they were 17.000 in Germany (Overy, 1981: 168). Some components were produced at small workshops; thus, production sometimes could be slowed due to component shortages (Overy, 1981: 170). The rise in air raids over the German cities by 1943 caused some temporary interruptions in aircraft production. The United States was the only country with an industry far from the frontlines and was out of hazard. This shows that American economic mobilization was more efficient than all the European countries. Besides, Williamson Murray's determination is so important that he said the Germans lost the air war over Europe in 1943 and 1944, between July 1940 and December 1941, due to aircraft output, aircraft losses, and aircrew replacement (Murray, 1989: 92).

CONCLUSION

The organization of the *Luftwaffe* and high numbers of aircraft production in the Interwar, show that the Germans exercised due care for the air power. With the availability of modern combat aircraft, the Germans, ahead of their three major opponents in Europe, built two-thirds more aircraft than the British between 1937 and 1939. German aircraft production doubled that of the British, tripled that of the French, and was nearly equal to that of the Soviets between 1933 and 1939 (Hooton, 1999: 279, Appendix 5). Investment in the air force was a strong reason for quick German dominance in Europe. However, in 1939, Germany was ready for only a limited war, not an all-out war, which necessitated the expansion of the war over time. A second reason that terribly affected the course of war on a strategic level was political; the ghost of the two-front war strategy brought the *Luftwaffe*, in particular, into division after the attrition of the early campaigns. German production capacity was far from meeting *Luftwaffe*'s demands. In 1942, the Russians were able to produce 25.000 aircraft for one main front; while the Germans only produced 15.000 for three major fronts, including a growing number of defence aircraft, for the Reich itself (Overy, 1981: 71).

When the Germans had enough power to rule the skies, they occupied the heart of Europe. The first phase of their supremacy was invasion, based on ground forces engaged with air support. However, occupations brought expansion, and protecting much area with ground forces was not easy. Here, air power was an important factor for the defence as much as it was very important for the offense. However, the Germans failed to stabilize their strategies on air after early conquests. First, the Battle of Britain proved the limits of the German air power, led by geography and production capabilities. After the Battle of Britain, they needed defensive doctrine for the western risks, but they ignored it. This caused them to fall off balance in 1943, when simultaneous and incessant attacks on the ground from the east and on the air from the west occurred. Even in late 1943, the *Luftwaffe* was relying on *Zerstörer*

units with slow fighters carrying heavy armament, which were vulnerable to fighter escorts, to stop the USAAF's daily bombings.

Geographical expansion also imposed new obligations on the Luftwaffe. Risky deep operations sometimes created new demands by the ground units, which ended up in such airlifts as in Demyansk, Kholm, and Stalingrad. Failure or success, all airlift operations were costly.

The Germans had prioritised tactical bombing. They went on ignoring strategic bombing and used air power for its prior goals as reconnaissance and close support. Development and serial production of the German ill-developed strategic bomber He-177 *Greif* was late and produced in limited numbers. Although Göring decided its wide production in mid 1944, it was cancelled in two months. Germans saw strategic bombing as punitive rather than long exhaustive campaign, like the Assyrian or the Mongolian horror strategy in the Ancient or Medieval times. On the other hand, production of strategic bombers in high numbers could suspend the German military output to affect productions of panzers, U-boats, fighters and tactical bombers. The fact is that the German industry was not ready for war in 1939; it grew in expected maturity in 1943.

Luftwaffe was also the air force using technology ahead of their opponents. German propelled aircrafts were qualitative served the purpose, and their upgrades maintained during the war. German jets entered the service as the fastest aircraft of the war, ironically, the Germans failed to make them instruments of taking strategic results. This shows the most criteria lying behind the German ineffectualness were not production statistics or R&D, but mismanagement and doctrinal short-sightedness. In the early war, strategic bombings were unrecognized and limited to a few punishment attacks like London and Belgrade. By this way, the Germans ignored the destruction of the British industry, which they engaged its output in the fronts, in North Africa and Malta as well as in the East Front, owing to lend-lease. V-missiles could be a solution, but they were introduced to the war very late. V-2s were fired at targets for the last eight months of the war. On the other hand, the Allies carried the German rehearsal with 40-ton bombing in Guernica, to the 2.000-3.000-ton bombing of the German cities in a few years. The Germans were not able to eliminate the issue of unbalanced strategic bombing.

Efficiency necessitates meeting the requirements at the right time. *Luftwaffe* was expected to be a well-managed branch, if Hitler and Göring were not the decision-makers. There were also dualities influential over the aircraft production and doctrine rooted back to the late interwar years. Perhaps it was a time that everybody had taken up to find a way of victory being offensive, nobody exercised due care to the possibility of the air force being defensive. This thought was placed by Hitler's attitudes, hard to replace even in early 1945.

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