# Engineering and Logistics: Powering the Third Generation RSAF

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**Abstract:**

To achieve mission success, the Republic of Singapore Air Force (RSAF) must not only possess a sharp front line fighting force but also capable backend logistics support. Neglecting logistics in a military is foolish, because without a strong bow to provide energy for propulsion, an arrow would only be a glorified dart. The logistics support system thus needs to be sufficiently resilient and able to withstand surges in operational demand at a single point. This essay will examine the role of logistics in military capability and airpower, the demands and challenges of a strong logistics system for the Third Generation RSAF, and the RSAF's approach in overcoming the challenges to sustaining its Third Generation capability.

*Keywords: Airpower; Military Logistics; RSAF*

## INTRODUCTION

Airpower has been described as the decisive factor in war.[1] Its speed, range and flexibility give it the *asymmetric* advantage of being able to shape wars and achieve objectives swiftly and decisively. Airpower may not win a war alone, but without it, no modern war can be won. The existence of the Republic of Singapore Air Force (RSAF) and its mission thus forms a key component in the Singapore Armed Forces (SAF) repertoire of combat capabilities. The RSAF's journey towards providing the SAF with airpower has gone through several evolutions, each time reinventing itself to deliver new capabilities and mission sets. The journey began with the establishment of the Singapore Air Defense Command (SADC) in 1968, with the inheritance of basic air defense missiles and systems from the British Royal Air Force and a couple of Cessna trainers, providing rudimentary air defense capabilities for Singapore. Within a short span of 45 years, the RSAF has progressed to a third generation air force with a wide range of technologically advanced capabilities, capable of delivering airpower for full spectrum operations during both peace and wartime.

The Third Generation RSAF operates cutting edge equipment such as modern multirole fighters, sensors and sophisticated air defense systems, integrated together with a robust command and control network. Forming the backbone of the entire system is a group of well-trained professionals, capable of not only defending the skies of Singapore, but delivering airpower to influence both land and sea campaigns for the SAF. To achieve mission success, the RSAF must not only possess a sharp front line fighting force but also capable backend logistics support. A fighter jet is only useful if it gets airborne with its required fuel and munitions, an air force is only as capable as the strength of its logistics system. Hence, the Third Generation RSAF requires a strong logistics network that is able to shoulder the heavy responsibility of coordinating and organizing equipment, materiel and personnel across a wide spectrum of operations. As such, logistics forms a key component of an air force's capability. While logistics is integral to the mounting and sustaining of operations, it can also limit what is operationally possible. This paper will examine the role of logistics in military capability and airpower, the demands and challenges of a strong logistics


*RSAF technicians arming an F-16 during an aircraft arming demonstration at the RSAF Open House 2008.*

system for the Third Generation RSAF, and the RSAF's approach in overcoming the challenges to sustaining its Third Generation capability.

## LOGISTICS AND AIRPOWER

Logistics is often seen as less glamorous in contrast to the sophisticated aircraft systems and explosive firepower. What many do not realize is that in projecting strategic airpower and capability, an agile and robust logistics tail is essential. Without a sound acquisition model, strong supply chain, and robust engineering and maintenance capability, it would be impossible to raise and sustain a military capable of delivering airpower effectively. Using the bow and arrow as an analogy, aircraft and weapon systems are akin to the arrows that bring about destruction to targets. Most people would be interested in the design of the arrow, in particular the sharp tip, which determines the type and extent of damage that the arrow inflicts on the target. However, without the bow, the arrow itself is ineffective as a weapon. The design and capability of the bow has a great impact on the overall performance of the bow and arrow as a system as it helps determine how fast and far the arrow can fly. Using an improved crossbow would allow the arrow to go further, while a multiple-launch crossbow would allow more arrows to rain destruction on a target. Logistics, in this sense, is the bow that imparts propulsive energy to an arrow and powers it towards the target to achieve its intended objective. Hence, logistics can be likened to the engine that provides the energy to drive airpower, forming an essential and integral component of military capability.

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History shows that every successful war was largely determined by logistics. The US Pacific campaign during the Second World War was an example of a successful logistics strategy combined with an operational strategy to secure victory. In the Pacific War, United States (US) forces planned a long-range logistics and operational strategy which utilized amphibious warfare to secure and establish a string of island bases spanning from California to Australia that allowed supplies to continually be pushed to the frontline to fuel the offensive campaign.[2] In contrast, the conflict in Vietnam, although dubbed as one where the rules of conventional warfare did not apply,[3] was a sobering lesson on the importance of logistics. Under the strategy of a protracted war, the Communists developed a series of trails—most notably the Ho Chi Minh Trail—that allowed troops and supplies to be sent from North to South constantly over a long period. The Communists also integrated local logistical support, where through a "well-organized system of taxation, commerce, forced labor, local transportation networks and clandestine industries" in the South,[4] the needs of the Communist fighters continued to be met when foreign forces disrupted the usual supply lines. The combination of extensive networks and local supply that powered the Communist forces eventually wore the foreign forces

out. Logistics is a critical capability of any military campaign and it governs the tempo and power of operations.

The mentioned examples have been illustrative of the considerations—a logistics network with extended reach and the utilization of local resources for strategic intent—in delivering capabilities in the sea and land domains. While the above fundamental principles are important, delivering airpower in the air campaign, however, has other considerations. Airpower is manifested in aircraft that are airborne and are able to deliver their mission objectives—air strikes, air-to-air warfare or airdrops, to name a few. It is flexible and can be easily maneuvered to achieve strategic objectives in a quick and timely manner. To support the demands of airpower, the logistics support system has to be similarly responsive and nimble. As most air systems are technologically advanced and complex, technical capabilities are equally important in delivering airpower effectively. Furthermore, by virtue of the need for aircraft to launch from an air base, airpower requires concentrated logistics support at a single location. The logistics support system thus needs to be sufficiently resilient and able to withstand surges in operational demand at a single point.

## DEMANDS AND CHALLENGES OF THIRD GENERATION RSAF LOGISTICS

Given the importance of logistics in military operations and its unique characteristics in the projection of airpower, logistical demands for the Third Generation RSAF are not as straightforward as merely managing and organizing the flow of supplies. Today, the Third Generation RSAF operates state-of-the-art weapon systems, integrated to form a potent force, not only to win the war in the air, but also to influence and dominate the land and maritime campaign from the air. The modus operandi of the Third Generation RSAF demands system level integration, and deep system and


*The first of four G550-AEW jets arriving at Tengah Air Base in February 2009.*

equipment engineering expertise. Instead of relying on the aggregate of individual weapon capabilities, integrating the broader capabilities of the whole system allows the RSAF to harness the strength of each weapon to enhance both the effectiveness and efficiency of its war machines.

To achieve this, the entire Air Force must work together as a well-integrated system of systems. Individuals will need to think and work as a system. They must not only be the best in their own professional area, but also understand how they can better contribute towards the overall capability of the system, even if it means sub-optimizing at the individual level at times. Returning to the illustration of the bow and arrow: by the laws of physics, higher tension in the string of the bow translates to greater propulsion energy for the arrow. However, just because the string can be stretched beyond what the bow can withstand, does not mean it should be done. If the bow is not strong enough to withstand the maximum tension of the string, the string should only be tensioned to the bow's limit so as to avoid breaking it and rendering the arrow ineffective. The string cannot maximize its inherent potential without due concern for the capabilities of the other parts of the system. Hence, just like the bow and arrow, the various parts of the air force, logistics and operations, must work in unison for it to be an effective fighting system.

The RSAF is one of the most modern and advanced air forces in the region. To deliver airpower effectively, the Third Generation RSAF capitalizes on high tech aircraft and weapon systems, as well as complex command and control networks. The operation of such advanced equipment creates a need for deep engineering expertise. The RSAF is no longer simply inducting proven capabilities but is also becoming a pioneer adopter of some of the latest technologies being developed and fielded, for example the Gulfstream 550-Airborne Early Warning aircraft and M346 next-generation fighter trainer. As pioneer users of such sophisticated equipment, it is imperative that the RSAF's logistics community possesses the engineering knowledge to be able to exploit and maintain the equipment, and the expertise to troubleshoot complications that no other user may have encountered.

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This capability is particularly important to a small air force like the RSAF.

The Third Generation RSAF leverages on key technologies as force multipliers. Integrating advanced technologies into weapon systems enhances their operability, thereby making better use of available resources. As such, engineers and technicians in the RSAF must develop deep engineering knowledge to exploit the full potential and capabilities latent in these new technologies. In so doing, the RSAF engineers and technicians can help improve the way the RSAF operates in all kinds of environments.

In addition to the operational demands on logistics, demographic and societal changes also challenge the


*RSAF ground crew loading an AIM-9X Sidewinder onto the F-15SG during an arming demonstration.*

ability to deliver complete logistics support for the Third Generation RSAF. The low fertility rate among Singaporeans makes recruiting sufficient numbers of engineers challenging. The RSAF also has to compete with the local aviation industry to recruit the best and brightest engineering minds in Singapore.

Amidst the new operational demands and the external challenges, the RSAF has to find new and creative ways to organize its logistics functions and improve work processes in order to power the Third Generation RSAF to greater heights. We will now examine how the RSAF can achieve this through the three areas of Concept, People and Technology.

## POWERING THE THIRD GENERATION RSAF: CONCEPT – MAXIMIZING FULL POTENTIAL

With the limited weapons and capabilities available, the primary focus of the first generation RSAF was simply to defend the skies of Singapore. Today, the Third Generation RSAF is a full spectrum air force with increased mission sets and a wide plethora of capabilities. In peacetime, the RSAF must carry out the daily activities to safeguard our airspace. It must also be ready to serve the nation when called upon for peacetime contingency operations such as Humanitarian Assistance and Disaster Relief (HADR) and Peace Support Operations (PSO). In war, the RSAF must not only deliver in the air campaign by securing Singapore's skies, it must also contribute to the land and maritime campaigns by dominating from the air. With the manpower challenges highlighted above, the RSAF must look for innovative ways to maximize its potential to fulfill its expanded scope of mission demands.

To achieve this, the key concept to maximize the full potential of the Third Generation RSAF is to increase its "teeth-to-tail ratio." The basic idea is to reduce the "tail" or the support functions, so that more resources can be channeled to the "teeth" or the core capabilities. Returning to the crossbow analogy, rather than using several crossbows to launching one arrow each, one can launch the same number of arrows with a single multiple-launch crossbow. With multiple-launch crossbow technology, resources can be saved on crossbows and invested in more arrows.

Faced with the demand for deep engineering expertise and the challenge of a shrinking workforce, the concept of logistics for the Third Generation RSAF must be organized and operated in a way that achieves the highest "teeth-to-tail ratio," requiring the lowest amount of resources (the "tail") to effectively support and supply each combat soldier (the "teeth"). Through organizational restructuring and training, the RSAF retains its required core capabilities and strengthens them to build depth in engineering expertise. Concurrently, by partnering with members of the wider SAF and the larger defense ecosystem, the RSAF is able to tap on their potential and expand its network of logistics capability and create breadth in engineering support for its systems.

Core logistics capabilities, broadly classified into engineering and maintenance support, are "frontline" capabilities that enable the RSAF to respond swiftly across the entire range of operational demands. Engineering support is the aspect that assures the operational performance of aircraft, weapons and systems. It includes airworthiness, capability integration and systems engineering. On the other hand, maintenance support focuses on the routine maintenance and general health of equipment for daily operations. In other words, engineering support is the backroom support that handles capability development and complex system integration which requires a longer lead time, while maintenance support is the front-end support that deals with the daily grind of maintaining equipment serviceability and resolving minor maintenance issues that have a short turn-round time.

For the RSAF, deep engineering expertise is required to provide support for advanced technologies like multi-role fighters, precision-guided munitions and data-linked networks. In peacetime, highly skilled engineering support develops and sharpens the RSAF's airpower capabilities through engineering improvements that improve performance and increase reliability. To develop depth in engineering expertise, a structural reorganization of the Air Logistics Organization (ALO) into the Air Engineering Logistics Organization (AELO) was carried out in late 2012.[5] The reorganization introduced a dedicated engineering group that housed specialist branches and systems engineering in a "matrix" organization. Such a structure allows air force engineers to delve deeper into their respective areas of specialization, thus providing engineering support for the complex platforms and equipment that the air force operates, while still remaining available for cross-functional collaboration.

Maintenance support keeps equipment fit and ready to perform their intended functions. Well-maintained aircraft and equipment are readily deployable and capable of delivering designed functions. Such responsiveness requires the capacity to deal with surges in demand. Under the previous logistics organizational structure, first line tasks (aircraft launch and recovery) and second line tasks (aircraft maintenance) were accomplished by separate groups of personnel trained in their specific tasks in different units. This was necessary to ensure dedicated focus on their roles and responsibilities, and to allow better operational-logistical integration at the first line. Given the limited number of manpower in the first line of each unit, the previous organization structure only allowed the generation of a fixed amount of daily aircraft sorties. To address the surge in demand, the RSAF recently amalgamated the first and second line tasks under the Integrated Maintenance Flight (IMF), which consolidates manpower and improves personnel availability. This allows manpower to swing from launch and recovery tasks to maintenance work depending on the immediate need. Although the previous structure was less efficient in terms of manpower employment, the impetus for better integration between operations and maintenance crew was important in the 1990s when it was first implemented. Over many years, the operational-logistical relationship between the operational and maintenance communities has matured and is expected to remain strong, allowing the RSAF is to transit to the IMF structure, where first and second line tasks are consolidated under a single unit and every crew is trained to perform both first and second line tasks competently, thus improving their versatility and increasing the RSAF's capacity to respond to high tempo operations swiftly and seamlessly.

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To achieve even higher "teeth-to-tail ratio," the RSAF has also explored working with partners in the other services in the SAF, organizations in the larger defense ecosystem, and government-linked and private contractors to capitalize on their competitive advantage. Inter-service cooperation is evident in the management of ammunition by the RSAF and the SAF Ammunition Command (SAFAC), and ground transportation support by the Combat Service Support Command (CSSCOM). Such collaboration across the entire SAF creates capacity for the individual services to concentrate on developing their own core capabilities. The RSAF also works closely with organizations such as the Defense Science Organization (DSO) and Defense Science and Technology Agency (DSTA) in the larger defense ecosystem to further increase its depth of engineering expertise in the

areas of aircraft systems, network and IT systems, and in engineering support for building and infrastructure.[6]

The RSAF has also capitalized on the capabilities of government-linked and private contractors, to provide required services at a more cost-effective rate via commercial agreements. Such commercial contracts range from aircraft maintenance and upgrades, to training, to services such as catering which are not core RSAF's functions. The most prominent contract is the RSAF's strategic partnership with local contractor, Singapore Technologies Aerospace (STAe). STAe provides a range of services for the RSAF, including aircraft maintenance,[7] aircraft upgrading,[8] and the provision of aircraft for aircrew training.[9] By leveraging on commercial partners to perform routine maintenance and upgrades in areas where in-house RSAF capability will not offer much value-add potential or enjoy economies of scale, the RSAF's engineering force remains lean and its engineers can focus on more critical operational requirements, which include capability developments in peacetime or battle damage repairs during war.

In recent years, the RSAF has been exploring new models of outsourcing contracts like the Public-Private Partnership (PPP) and Performance-Based Logistics (PBL) which allow the air force to leverage on the experience, expertise and networks of private contracts to assimilate and operationalize new capabilities quickly into the RSAF. The RSAF's PPP with Lockheed Martin was to provide a training |package for the RSAF using the PC-21 trainer aircraft.[10] Under the contract, the private contractor would manage and provide an agreed level of serviceable aircraft for the RSAF to conduct pilot training, and would also provide and manage the suite of training simulators, software and systems. Such an arrangement allowed the RSAF to focus its resources on training (the RSAF's value-add), while also leveraging on Lockheed's ability to keep up with the latest developments in training technology.

Another type of contract, the PBL, is a long-term agreement with the system supplier to deliver performance outcomes to an agreed performance metric over the entire life-cycle of the system. As new technologies are integrated into the latest advanced platforms, the cost to maintain these technologies also increases. Hence, complete life-cycle support service is becoming an increasingly attractive option over piecemeal logistical support. Rather than the RSAF stocking up on its own shelves of component spares, life-cycle support service is a better predictive model, whereby the private contractor manages the supply chain, systems and parts. With data from its global network of customers, the contractor is best positioned to understand aircraft serviceability, forecast inventory state and initiate service or upgrades on aircraft before parts or systems wear out. PBLs thus effectively increase system availability and reliability at the lowest possible cost for the contractor, supplier and the RSAF.[11] The availability of engineering and supply support from the contractor reduces the time required for the RSAF to learn the engineering characteristics of a system. This makes PBL a viable option in shortening the learning curve for the RSAF, because it allows our people to develop deep engineering expertise, while simultaneously reducing manpower requirements.

## POWERING THE THIRD GENERATION RSAF: PEOPLE – THE KEY ENABLER

People are needed to take a concept from idea to reality. To achieve the fullest potential of the high "teeth-to-tail ratio," the RSAF requires people who are skilled, understand system level thinking and are able to fit into defined roles. Manpower is a scarce resource in Singapore; overcoming the demands of deep engineering expertise, while facing the challenge of a shrinking workforce is a herculean task. However, there are opportunities which the RSAF can benefit from.

In the area of developing deep engineering expertise, the Singapore society presents the RSAF with some opportunities. The Singapore government's emphasis on education, particularly in math and science, has developed a well-educated and talented pool of potential RSAF recruits. Furthermore, the development of Singapore as a Maintenance, Repair and Overhaul (MRO) and aviation hub has also increased interest in aviation-related fields of study. Hence, while the RSAF used to recruit only engineering diploma holders, certain Institute of Technical Education (ITE) courses can also provide the necessary skill sets required by the RSAF. These opportunities, coupled with the RSAF's people development model, will serve to develop the necessary logistics community to generate effective support for airpower.

For an air force that operates highly advanced and complex equipment and systems, engineering and logistics support is much needed and specialized field of expertise. In order to recruit, develop and retain capable and committed people who will power the RSAF's airpower capability, nearly all of the RSAF's engineers and technicians are recognized under the Military Domain Experts Scheme (MDES). Implemented in 2010, the MDES recognizes the requirement for deep expertise in the Third Generation SAF and allows SAF regulars to specialize in key military domains such as engineering.[12] Their expertise is also greatly valued by the SAF and is evident in the MDES' longer career span—between five to ten years longer than other career schemes for SAF regulars. As part of their career progression in the SAF, MDES personnel are also given broad exposure to various specializations. This can include cross-postings within the RSAF across engineering domains or with other organizations like the DSTA. These postings broaden an individual's perspective and also strengthen his understanding of his specialist domain in the system, which allows him to better contribute to the entire system. Furthermore, the MDES also permits and sponsors the pursuit of further education to doctorate level in specialized military engineering domains. The opportunities represented in MDES thus help in the development and retention of deep engineering expertise within the RSAF.

Besides running a leaner organization to overcome the constraints of limited manpower, the RSAF has also explored other methods to increase its capacity. Leveraging on new training technologies and pedagogies, the RSAF is able to effectively train people in a shorter period of time and employ them in operations sooner than before. The use of computer-based learning programs allow trainees to learn at their own pace, while the use of maintenance training simulators enable trainees to put their learning into practice in a near-realistic simulation, at their own time, in a benign environment. In effect, these new training methods shorten the learning time and give trainees greater exposure and experience—virtual, but useful nonetheless—before real-life application. In addition, simulators are also used for continual training. Exposing crew to a wide spectrum of operational scenarios which would otherwise be opportunity-based in real-life keeps maintenance personnel current in their skills and knowledge. These enhancements to the RSAF's training help lay a strong foundation for the engineering and logistics personnel, and increase opportunities for them to develop professional competencies.

Notwithstanding the various initiatives that the RSAF has implemented to develop engineering capability and to optimize manpower, one of the most valuable latent resources it possesses is the National Service (NS) population. Being highly educated and tech savvy, Full-Time National Servicemen (NSFs) and NSmen are assets to the RSAF. Through a combination of new training methodologies that shorten training time and empowering them with

more authority, NSFs and NSmen are allowed to contribute to the RSAF's mission and to the security of Singapore. The RSAF has begun to see the fruits of this approach with NSF engineers volunteering to extend their National Service term in order to take part in the RSAF's air combat exercises.[13] Similarly, NSmen engineers accompany the regulars on overseas exercises and are a part of the team, demonstrating the RSAF's operational readiness and competency.[14] In the past, it was thought impossible to employ the NS population in maintaining aircraft due to the long training requirements. However, is has become a reality in today's RSAF, and indicates that more can be done to tap the latent NS resource pool.

## POWERING THE THIRD GENERATION RSAF: TECHNOLOGY – FORCE MULTIPLIERS

In military parlance, force multiplication is a dramatic increase in operational effectiveness, in which the required effect can be achieved with greatly reduced numbers. The US Department of Defense defines a force multiplier as "a capability that, when added to, or employed by, a combat force, significantly increases the combat potential of that force, and thus, enhances the probability of successful mission accomplishment."[15] In the context of engineering and logistics, it is about achieving the same outcome with fewer resources, and consequently more with the same amount of resources. The most tangible force multipliers relevant to the RSAF are technologically driven. The employment of technology enhances fundamental capabilities and efficiencies which in turn enhances operational effectiveness. Against a backdrop of new operational demands and human resource constraints, the RSAF has been experimenting and adopting emerging technologies to boost productivity and to do more with less. Besides utilizing technology such as simulators and computer-based learning programs in training, the RSAF has also been harvesting technologies in operational settings as force multipliers to meet new operational demands while also overcoming manpower constraints.

As increasing integration requires platforms in the RSAF to become increasingly sophisticated, there will be a decrease in linearity between the root causes of failure and failure symptoms, resulting in more time needed to conduct failure investigation and analysis. To prevent long delays in platform availability, maintenance methodology has had to evolve accordingly to include new techniques like condition-based maintenance and prognostics, and health management, whereby performance is monitored with improved instrumentation equipment and failure rates predicted with models. These processes utilize high-tech diagnostic tools and software that identify point faults at an early stage for rectification, so that faults can be corrected quickly and an entire system need not be rendered unusable because of maintenance issues. Some examples of using technology to improve maintenance processes in the RSAF include the use of digital X-ray for non-destructive inspection of helicopter airframes, and the use of computerized diagnostics tools to download fighter engine data and parameters for timely troubleshooting and maintenance through accurate diagnostics and fault detection.

Other ways that technology has been used to increase productivity include the use of digital manuals and the automation of maintenance and logistics processes. The introduction of electronic Technical Data Manuals has helped to enhance efficiency by enabling engineers to access information faster, comprehend them better and find solutions through the use of interactive media. For example, step-by-step written instructions for removing and replacing a component can be supported by videos of 3D models and colored wiring diagrams. Automation of logistics processes takes the form of auto-identification and radio-frequency identification (RFID) tags on spares and equipment which serve to ease the workload and eliminate human errors in inventory and asset management. While the use of automation in maintenance and logistics has largely been limited to inventory and asset management, technological

developments may see the introduction of robotics in the conduct of maintenance and logistics tasks. In fact, robotics has already been explored as an avenue for stripping and applying paint to fighter aircraft.[16] Soon, the use of robots in military logistics may even extend to aircraft inspections and the performance of basic maintenance and repair tasks.

Besides being used to manage processes, technology has also been used to boost the resiliency of the logistics support system. One of the unique characteristics of airpower is that its logistics support system is highly concentrated at a single location—the air base. In order to sustain the air force's ability to support continuous airpower over a wide range of operations, the air base logistics system has to be sufficiently robust and resilient to withstand surges in demand and hostile environments. Sensors and software can thus be used to monitor performance along the logistics pipeline. When compared against a model of optimal performance, it allows logistics personnel to address bottlenecks or excesses to ensure a smooth running system. In terms of air base survivability, technology has been utilized to support capabilities that permit undisrupted projection of airpower. Advanced equipment used in runway repair, refueling systems and maintenance of supply chain integrity all contribute to greater efficiency and productivity. This allows the RSAF to achieve the required standards of support with less manpower and within a shorter amount of time.

## CONCLUSION

It is evident that logistics is a key capability of the RSAF that powers the delivery of effective airpower. Without engineering and logistical support, it would not be possible for the RSAF to sustain a high tempo in daily training and operations or meet the high demands of war time operations. Critical to a good logistics system are flexibility, responsiveness and resilience. However, faced with the need for deep engineering expertise and the challenge of a smaller workforce, the RSAF has had to refine its concept of logistics to keep up with new demands. By reviewing the logistics concept of operations to achieve a higher "teeth-to-tail ratio," the RSAF can not only retain its core engineering and maintenance capabilities that directly affect the responsiveness and flexibility of airpower delivery, but also increase its combat capability by freeing up resources to be rechanneled. By leveraging on partners within the SAF, the larger defense ecosystem and the private sector, the RSAF has been able to strengthen its network of logistics support while still preserving depth in much-needed engineering expertise. People development has also been a focus in the RSAF's approach towards strengthening logistics as concepts alone are not realizable without people and technology. Finally, by leveraging on technology, the RSAF has been able to assuage the challenges of human resource constraints, while still being able to meet its operational needs. An air force would only be as capable as its ability to deliver airpower, which in turn is generated from the potential residing within a strong logistics system. Neglecting logistics in a military is thus foolish, because without a strong bow to provide energy for propulsion, an arrow would only be a glorified dart. dart.

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