

Canadian
Forces
College

Collège
des
Forces
Canadiennes



SUSTAINMENT OF AIR OPERATIONS: ANY ROOM FOR MORE EFFECTIVENESS?

Major Isabelle Rochon

JCSP 48

Service Paper

Disclaimer

Opinions expressed remain those of the author and do not represent Department of National Defence or Canadian Forces policy. This paper may not be used without written permission.

© Her Majesty the Queen in Right of Canada, as represented by the Minister of National Defence, 2022

PCEMI 48

Étude Militaire

Avertissement

Les opinions exprimées n'engagent que leurs auteurs et ne reflètent aucunement des politiques du Ministère de la Défense nationale ou des Forces canadiennes. Ce papier ne peut être reproduit sans autorisation écrite.

© Sa Majesté la Reine du Chef du Canada, représentée par le ministre de la Défense nationale, 2022

CANADIAN FORCES COLLEGE – COLLÈGE DES FORCES CANADIENNES

JCSP 48 – PCEMI 48

2021 – 2022

Service Paper – Étude militaire

Sustainment of Air Operations: Any Room for More Effectiveness?

Major Isabelle Rochon

“This paper was written by a student attending the Canadian Forces College in fulfilment of one of the requirements of the Course of Studies. The paper is a scholastic document, and thus contains facts and opinions, which the author alone considered appropriate and correct for the subject. It does not necessarily reflect the policy or the opinion of any agency, including the Government of Canada and the Canadian Department of National Defence. This paper may not be released, quoted or copied, except with the express permission of the Canadian Department of National Defence.”

“La présente étude a été rédigée par un stagiaire du Collège des Forces canadiennes pour satisfaire à l'une des exigences du cours. L'étude est un document qui se rapporte au cours et contient donc des faits et des opinions que seul l'auteur considère appropriés et convenables au sujet. Elle ne reflète pas nécessairement la politique ou l'opinion d'un organisme quelconque, y compris le gouvernement du Canada et le ministère de la Défense nationale du Canada. Il est défendu de diffuser, de citer ou de reproduire cette étude sans la permission expresse du ministère de la Défense nationale.”

Sustainment of Air Operations: Any Room for More Effectiveness?

AIM

1. With aging fleets in the Canadian Armed Forces (CAF) and the “premise that the RCAF¹ will continue to conduct operations at home and abroad”², the effectiveness of the operational sustainment is critical to expeditionary operations as one of the key enablers of aircraft serviceability. The aim of this service paper is to examine the challenges and shortcomings of the supply chain management of the Defence Supply Chain (DSC) in support of deployed operations, specifically for Department of National Defense (DND) managed aircraft spares and/or equipment critical to air operations.

INTRODUCTION

2. As clearly articulated in Canada’s Defence Policy: Strong, Secure, Engaged (SSE), sustainment is the critical enabler of CAF Operations³. For the Royal Canadian Air Force (RCAF) deployed operations, a great deal of planning is invested into sustainment activities. However, it is impossible to have all spare on hands or to anticipate every single requirement and turnaround. Therefore, ordering of spares from Canada will always be part of the sustainment cycle for air operation. As such, it can completely paralyze air operations when aircraft spares are delayed into the theater of operation.

3. Although the Supply Administration Manual (SAM) outlines the: “policies and procedures in place of materiel requisition/demands to satisfy requirements in an efficient manner”⁴. Adhering to the Material Priority Codes (MPC) have been a challenge on deployed operations especially for High Priority Request (HPR) impacting flying operations. This is service paper will discuss if the CAF and RCAF benefits from processes and lessons learned from commercial carriers and industry equivalent, who have been implementing performance measurement and digitalization of tracking, in order to gain more effectiveness.

DISCUSSION

4. It is necessary to review some doctrine and policies to understand the challenges presented below. First, the RCAF Doctrine defines sustainment as: “the ability of a nation or force to maintain effective military power to achieve desired effects”⁵. It emphasizes as well that: “The technological content and complexities of air power operations demand that sustainment tasks be conducted correctly and with due regard for

¹ RCAF = Royal Canadian Air Force.

² Department of National Defence. B-GA-402-003/FP-001, *Royal Canadian Air Force Doctrine: Force Sustainment* (Trenton: Canadian Forces Aerospace Warfare Centre), 2017, 1.

³ Department of National Defence. *Strong, Secure, Engaged. Canada’s Defence Policy* (Ottawa: DND Canada) 2017.

⁴ Department of National Defence. A-LM-007-100/AG-001, *Supply Administration Manual*, Chapter 3.2: Materiel Requisition. (Ottawa: DND Canada, 2020), 1.

⁵ Department of National Defence. B-GA-402-003/FP-001, *Royal Canadian Air Force Doctrine: Force Sustainment* (Trenton: Canadian Forces Aerospace Warfare Centre), 2017, 7.

economy and safety”⁶. Full command of deployed operations belongs to Commander Canadian Joint Operations Command (CJOC). However, Commander RCAF is maintaining some residual authorities over area of knowledge that specific to the RCAF, in order to ensure safety and manage risk inherent to air power operations. Technical airworthiness is the standard for safety of aircraft maintenance and material support of aircraft. Consequently, the RCAF will remain involved in sustainment activities of aircrafts deployed overseas through the Canadian Air Operation Center (CAOC) in Winnipeg. Lastly, since strategic airlifts are under the control of CJOC, they will often find the different L1s competing to prioritize their requirements for space with J4 Mov. This is especially true when multiple small mission are sharing sustainment flights, for example: Op REASSURANCE Air Task Force Romania (ATF-R), Enhance Forward Presence Latvia (EFP-L) and Op Unifier Ukraine are sharing the same monthly to by-monthly flights.

5. Next, it is important to highlight some of the recent changes made to the management of requisition process in the SAM⁷. These changes were most likely made after the Auditor General report of Spring 2020, where one of three key finding was that: “A large portion of materiel requests were submitted as high priority without justification”⁸, putting an “excessive burden on supply chain” and resulting in additional costs and delays⁹. To the satisfaction of the RCAF, by the inclusion of Aircraft on Ground (AOG)¹⁰ in the SAM, the CAF acknowledges that the priority of an AOG request and that it follows the same process as a High Priority Request transaction (HPR)¹⁰. The second significant change made to the process is the addition of a Materiel Priority Code (MPC)¹¹. The MPC 0 – Operationally Critical, is used only for request that would affect operations should they not be fulfilled within the required delivery date (RDD). The addition of the MPC 0, was intended to provide more realistic timelines for delivery of non-mission critical items, in order for the HPR to not be abused. Moreover, the MPC 0 requires approval from the Commanding Officer (CO) for its usage, adding scrutiny to the requisition process, but also empowering CO to dictate what is mission critically essential to them.

⁶ *Ibid.*, 11

⁷ Amendments to Chap 3.2 – Materiel Requisition, were published in April 2020 and distributed to the Wing’s Replen O by 1 CAD A4 Systems.

⁸ Department of National Defence. *Supplying the Canadian Armed Forces, Report 3 of Spring 2020 Reports of the Auditor General*, (Ottawa: DND Canada, 19 November 2020), 23.

⁹ *Ibid.* 23. ¹⁰ AOG definition as per inclusion in SAM: “An aircraft that is unable to fly and its unserviceability will impede current operations. If sourcing of resources is required outside the current location, any and all methods of shipping and transportation by the fastest means possible are to be used”. Department of National Defence. A-LM-007-100/AG-001, *Supply Administration Manual*, Chapter 3.2: Materiel Requisition. (Ottawa: DND Canada, 2020), 1.

¹⁰ **High Priority Request (HPR)**: is a requisition for materiel that is required immediately in order to satisfy critical operational requirements. *Ibid.*, 3.

¹¹ **Material Priority Code (MPC)**: are a system of codes, determined by the importance of a demand in terms of operational necessity and dictate the methods of processing and mode of transportation, considering the RDD provided by the customer. **Required Delivery Date (RDD)**: a date, determined by the customer, by which materiel being demanded is required to be delivered. *Ibid.*, 3

MPC	Description	RDD	Use of Premium Transport Authorized
0	Operationally Critical	1-2 Days	Yes
1	Urgent	3-6 Days	Yes, only if the RDD is or will be violated.
2	Essential	7-14 Days	No
3	Routine System Replenishment	15-30 Days	No
4	Planning	30+ Days	No

Figure 1 – MPC Table¹²

6. It has been discussed above, that DND/CAF and RCAF recognizes the critical nature of air operations and the impact of having aircraft that are either on ground (unable to fly) or not mission capable¹³. The requisition process should allow for expedient provision of support to operations. However, in practice when deployed overseas, these timelines are sometimes unrealistic to achieve, thus greatly affecting the ability to conduct flying operations. Numbers of factors can easily impact the Estimated Delivery Date (EDD), for example, but not limited to¹⁴ :
- a. location – distance from Canada and support to the AOR;
 - b. time change – theater having to wait for Canada to "wake up";
 - c. weekend and holidays where some organization don't have duty personnel;
 - d. availability of service flights;
 - e. lack of additional lines of operations;
 - f. inefficient processing of requests;
 - g. delays in processing customs; and
 - h. lack of visibility from the theater on the movement of shipment.

Without proper tracking of the reasons for the delays and reporting of the sustainment performance, it is very difficult for the sustainment units and operators to improve their practices.

7. To support above affirmation, in the report on the Evaluation of Sustain Operations from 2021, one key finding from the Assistant Deputy Minister (Review

¹² Department of National Defence. A-LM-007-100/AG-001, *Supply Administration Manual*, Chapter 3.2: Materiel Requisition. (Ottawa: DND Canada, 2020), 8.

¹³ An aircraft that has defaults that does not preclude it from flying but that could affect its capabilities depending on the nature of the mission would most likely require a deviation from the Weapons System Manager (WSM).

¹⁴ List of examples of reasons that affect deliveries of aircraft spares to operations is based out of my experience as the Mission Support Element Officer Commanding on Air Task Force Romania. However, some of these were also present in audits and reports used to document this service paper, see bibliography.

Services) (ADM(RS)) was that: “inefficiencies in defence sustainment organizations and processes impact the efficient operational sustainment of ops”¹⁵. In particular, the following issues are of interest for this discussion: “Lack of visibility on many stocks, [...] Loss of visibility while materiel is in transit, [...] Global inefficiencies at multiple levels of the supply chain activities”¹⁶. It was also noted in the report, that in response to ongoing concerns, DND/CAF has implemented multiples sustainment initiative, to include but not limited to: “the Modernization and Integration of Sustainment and Logistics (MISL)¹⁷, the Distribution and Materiel Inventory Network Optimization (DMINO)¹⁸, Materiel Identification¹⁹ and the Automatic Identification Technology²⁰”. These initiatives are put in place with the intent to increase material accountability and visibility throughout the chain, and digitalization of sustain activity. These would also align with allies initiatives that have implemented changes to their sustainment structures as well²¹.

8. However, DND/CAF and the RCAF can have all the policies and initiative in place, but to know if they are performing well, they have to measure that performance. Smith, in his book on Defense Logistics, defines performance management as:

“a key business tool, vital to maintaining and improving defence logistic performance. It underpins the operations and processes that are needed in order for an organization to achieve its strategic aims, and if properly designed and implemented, provides the necessary alignment through the organization”²².

While the RCAF is recognizing the need for performance management in their sustain doctrine: “Sustainment providers must also apply sound management practices, such as:
a. establishing performance levels and measurement techniques for the services

¹⁵ Department of National Defence. *Evaluation of Sustainment of Operations* (Ottawa: DND Canada, May 2021).

¹⁶ *Ibid.*

¹⁷ **Modernization and Integration of Sustainment and Logistics (MISL)** – This departmental initiative seeks to enhance materiel visibility across the Supply Chain by achieving national-level integration of current standalone Enterprise Resource Planning Systems (ERP) for transportation and ammunition into the DRMIS environment. *Ibid.*

¹⁸ **Distribution and Materiel Inventory Network Optimization (DMINO)** – This departmental initiative seeks to improve demand satisfaction rates for end-users to acceptable levels in order to enhance operational readiness capabilities of the CAF. *Ibid.*

¹⁹ **Materiel Identification** – This departmental project has been established to clean and standardize DND’s materiel records to enable better Supply Chain execution. *Ibid.*

²⁰ **Automatic Identification Technology** – This is a departmental initiative aimed at adopting barcoding and radio frequency identification technology and associated software across the Supply Chain to improve data quality and allow for both increased effectiveness and efficiency. *Ibid.*

²¹ Some of CAF allies have also implemented changes in their sustainment structures. For example, some have found answers to their challenges by pairing unity of command, centralized control and decentralized execution as a C2 concept for their military sustainment activities. *Ibid.*

²² Jeremy Smith. *Defence logistics: enabling and sustaining successful military operations*. (London: Kogan Page, Limited, 2018), 229.

provided”²³. However, there is no clear direction from the RCAF or CJOC on performance measurement on operations. It is noted in the ADM(RS)) report on the Evaluation of Sustain Operations as one of their key findings that: “The program covering the C2 and Sustainment of Operations is supported by a PIP²⁴ which neither defines specific activities nor establishes key performance indicators for operational sustainment”²⁵. They observed that, although there was a performance plan in place, it was “very limited in terms of defined results and performance measurement parameters applicable to operational sustainment”. There would be great benefits to learn from the aviation industry who have been implementing performance measurement plan for decades now.

9. As a defense contractor, Boeing²⁶ has implemented performance measurement metrics for maintenance and supply. These metrics are derived mostly from the USAF Maintenance Metrics Handbook²⁷. The USAF principle is to collect and use analytics to give it a narrative that would speak to commanders²⁸. Locally, Boeing Base Manager’s collects data and presents monthly reports to the Unit CO, WSM team and to USAF/International C-177 program directors. The supply-related metrics includes: “Requisition Responsiveness, Percentages of MICAPs²⁹ delivered on time, Repairable and Consumable Issue Effectiveness and Supply Support Import/Export”³⁰. Not only does Boeing managers keep data and performance on Boeing aircraft spares (F77), but they also keep data on non-Boeing items (non-F77). These metrics help to explain issues and trends, but also used to request further investigation and to set new performance objectives to ensure that they are meeting operational requirements. Boeing has performance standards set for supply deliveries of 1A MICAP of 65h hours, but performance metrics are showing that they are provided in an average within 48h. All deliveries, whether they are done domestically or abroad shall meet that standard. Deliveries are tracked live from cradle to grave and information is available at any time required. They are accountable to provide explanation for all deliveries exceeding this standard. The C-177 also has the advantage of being part of a worldwide C-177 parts system, referred to as the virtual fleet³¹. Although the Boeing model (or any other

²³ Department of National Defence. B-GA-402-003/FP-001, *Royal Canadian Air Force Doctrine: Force Sustainment* (Trenton: Canadian Forces Aerospace Warfare Centre, 2017), 1.

²⁴ PIP = Performance Information Profile.

²⁵ Department of National Defence. *Evaluation of Sustainment of Operations* (Ottawa: DND Canada, May 2021).

²⁶ Due to the word count limitation of this Service Paper, only Boeing’s program is discussed as an example. Boeing was chosen due to personal experience with the program. In her DRP (in reference), Kristen Dubreuil evaluates in length all contracted maintenance/supply in the RCAF provides an assessment on the performance and benefits of the program. The intent of this SP was not to make recommendations on should maintenance/supply be contracted but rather to analyze if lesson learned could be draw from their performance management programs.

²⁷ Boeing Global Services. *NMC/AA Metrics*. (Trenton: Boeing, Unpublished, 2019).

²⁸ Air Force Logistics Management Agency. *Metrics Handbook for Maintenance Leaders*. (Maxwell AFB, Gunter Annex: Air Force Journal of Logistics, 2001).

²⁹ MICAP (Mission Capability) is the US priority code that is equivalent to an HPR (1A MICAP = MPC 0, JA MICAP = 1) in the CAF supply system.

³⁰ Boeing Global Services. *Base Manager’s Report – Canada*. (Trenton: Boeing, Unpublished, 2021), 5.

³¹ K.E. Dubreuil, “Agile and Responsive? Is the Royal Canadian Air Force Contracting Out its Agility and

contracted model) is not perfect, there is lessons that the RCAF could learn from them on managing performance of supply organization.

10. Other civilian industries that the CAF could draw lessons from are the commercial shippers/carriers, for example: Amazon, FedEx, UPS, etc. Commercial carriers are taking full advantage of technology with real time tracking and updates, and chat services available 24/7 should a customer have any questions with its delivery. Although the COVID-19 pandemic has been hard on worldwide supply, commercial carriers have been creative to adjust and take lessons learned from the pandemic. Not surprising that the CAF mandate vaccine distribution (Op VECTOR) opted to use commercial carriers for its deliveries. As mentioned by BGen Brodie, the commercial carriers were providing live tracking with temperature control from the arrival in Canada of the vaccines to the point of distribution³². In opposition, CAF Depots, and operational support units (3 Canadian Support Unit (3 CSU), 4 Canadian Forces Movement Control Unit (4 CFMCU), 2 Air Movements Squadron (2 Air Mov Sqn)), at time, have seem to not always be in sync with deployed units' operational requirements, adding unnecessary delays to the sustainment operations. Visibility of items in transit within the DSC has also been a challenge; information is contained in multiple systems and is sometimes partial, where the human at the other of the computer is holding the other part of the information and consequently not enabling operational requirements.

CONCLUSION

11. As pointed out by the Auditor General: “A strong supply chain is critical to [...] ensuring our people in uniform have the right equipment to do the challenging work our country asks of them, [...] the lack of one is a strategic risk”. Although the DND/CAF has recently realigned his priority codes and acknowledged AOG, the cycle is still disconnected and little to no mechanism are currently in place to monitor and report performance of service delivery of RCAF aircraft spares, consequently affecting flying operations.

RECOMMENDATION

12. With the ongoing implementation of MISL, there is hope that the digitalization of sustainment will contribute to provide analytics that L1s and supporting organizations will be able to use to identify issues, draw trends and brief Commanders. To support this affirmation, in his report on operational sustainment, ADM(RS) recommends that: “that tools under development to support the national sustainment process (e.g., [...] MISL and [...] DMINO) be designed to facilitate the identification of operational support requirements and tracking of materiel shipped to deployed ops”³³. It is crucial that the

Responsiveness through Outsourcing Supply Chain Management” (Joint Command and Staff Programme Course Paper, Canadian Forces College, 2018), 70.

³² Brief from BGen Brodie du JCSP 48 students during the ELV in Ottawa on 23 November 2021.

³³ Department of National Defence. *Evaluation of Sustainment of Operations* (Ottawa: DND Canada, May 2021).

tools currently being developed answer the requirements of all L1s and enables effectiveness in deployed ops.

13. This paper also shown the importance of implementing performance management to contribute to the efficiency and effectiveness of sustainment to deployed operations of the RCAF. It is recommended that fleet programs be expended and replicate some of their aviation industry counterparts, to include performance measurement methods for the provision of aircrafts spares. The use of analytics will provide the ops and support staff critical data to determine trends and areas for improvement. Again, the integration of MISL is a great opportunity to capitalize on technology, integration and digitalization to tie into performance management methods.

14. Finally, Operational Support Units (3 CSU, 4 CFMCU, 2 Air Mov, Sqn, etc.) would benefit from implementing commercial carrier methods and standards to gain more effectiveness in the provision of service. This includes digitalization to track shipment from sourcing to receiving and modernization of activities to better reflect 24h/7 operations.

BIBLIOGRAPHY

- Air Force Logistics Management Agency. *Metrics Handbook for Maintenance Leaders*. Maxwell AFB, Gunter Annex: Air Force Journal of Logistics, 2001.
- Boeing Global Services. *Base Manager's Report – Canada*. Trenton: Boeing, Unpublished, 2021.
- Boeing Global Services. *G3 Performance Objective & Performance Thresholds*. Trenton: Boeing, Unpublished, 2021.
- Boeing Global Services. *NMC/AA Metrics*. Trenton: Boeing, Unpublished, 2019.
- Canada. Chief of Review Services. *Evaluation of Aerospace Equipment Maintenance*. Ottawa: CRS Canada, February 2013.
- Canada. Department of National Defence. A-LM-007-100/AG-001, *Supply Administration Manual*, Chapter 3.2: Materiel Requisition. Ottawa: DND Canada, April 2020.
- Canada. Department of National Defence. B-GA-402-003/FP-001, Royal Canadian Air Force Doctrine: Force Sustainment. Trenton: Canadian Forces Aerospace Warfare Centre, Jul 2017.
http://publications.gc.ca/collections/collection_2017/mdndnd/D2-384-2017-eng.pdf
- Canada. Department of National Defence. *Evaluation of Sustainment of Operations*. Ottawa : DND Canada, May 2021. <https://www.canada.ca/en/department-nationaldefence/corporate/reports-publications/audit-evaluation/eval-sustainoperations.html>
- Canada. Department of National Defence. *Supplying the Canadian Armed Forces, Report 3 of Spring 2020 Reports of the Auditor General*, Ottawa: DND Canada, 19 November 2020. <https://www.canada.ca/en/department-nationaldefence/corporate/reports-publications/proactive-disclosure/supplying-thecaf.html>
- Canada. Department of National Defence. *Strong. Secure. Engaged. Canada's Defence Policy*. Ottawa: DND Canada, 2017.
- Canada. Office of the Auditor General. *Chapter 2 Support to Overseas Deployments*. Ottawa: OAG Canada, May 2008.
- Dubreuil, K.E. “Agile and Responsive? Is the Royal Canadian Air Force Contracting Out its Agility and Responsiveness through Outsourcing Supply Chain Management”

Joint Command and Staff Programme Course Paper, Canadian Forces College, 2018.

Dubreuil, K.E. “High Priority Requisition: An Unresponsive System” Joint Command and Staff Programme Course Paper, Canadian Forces College, 2018.

Ellacott, Jes. “DRMIS: Resource Management at DND.” *FrontLine Defence* 9, no. 4 (2012). <http://defence.frontline.online/article/2012/4/1235-DRMIS%3A-ResourceManagement-at-DND>

Glas, Andreas, Erik Hofmann, and Michael Eßig. "*Performance-Based Logistics: A Portfolio for Contracting Military Supply.*" *International Journal of Physical Distribution & Logistics Management* 43, no. 2 (Mar 8, 2013): 97-115.

Mach 1 Global Services. “*Our Top 3 Global Shipping Lessons Learned from COVID-19*” Last modified 29 July 2020. <https://www.mach1global.com/global-shippingcovid-19/>

Smith, Jeremy. *Defence logistics: enabling and sustaining successful military operations*. London: Kogan Page, Limited, 2018.

Young, N.C.P. “Efficiency and Effectiveness – Military Myth or Necessity?” Joint Command and Staff Programme Course Paper, Canadian Forces College, 2015.

Zimmer, C.J. “‘For Want of a Nail the Campaign was Lost’: DND's Supply Chain: A State of Performance Paralysis” Joint Command and Staff Programme Course Paper, Canadian Forces College, 2009.
<https://www.cfc.forces.gc.ca/259/290/295/286/zimmer.pdf>