



Supply chain transformation under fire

Deployments to Iraq and Afghanistan exposed weaknesses in the UK Armed Forces' supply chain and provided a powerful impetus for change. The resulting improvements offer valuable lessons for other militaries' supply chains.

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The idea that “[l]ogistics are fundamental to the generation and maintenance of fighting power in every environment”¹ is not new—it has been true in all major combat from Alexander’s Macedonian army until today. For commanders of the UK Armed Forces, however, near-continuous overseas operations since the early 1990s have brought the importance of logistics to the fore.

One of the most critical areas of military logistics is the supply chain: the set of processes, infrastructure, equipment, and personnel that moves a force to the theater of operations and sustains it by maintaining stocks and transporting additional goods and people. The supply chain also must meet day-to-day needs at a country’s military bases throughout the world. For the

United Kingdom, the supply chain involves 11,000 destinations (including air bases, ships, and garrisons at home and abroad), more than 200 million orders a year, dozens of internal organizations, hundreds of suppliers, and billions of pounds in spending.

In some ways a military supply chain resembles a commercial one, and the UK Armed Forces has at times considered adopting the best practices of companies such as Amazon or FedEx. However, commercial practices are far from adequate in meeting all the challenges a military force faces when engaged in a theater of operations. For example, while commercial logistics operations and militaries are both prone to massive peaks in demand, in the commercial world those

¹ *Joint Warfare Publication 4-00: Logistics for Joint Operations*, Joint Doctrine & Concepts Centre, UK Ministry of Defence (2003).



peaks are often predictable (such as product launches or holidays) whereas the military cannot predict where or when peaks will occur. In the military, most of the “points of sale” (such as army units, ships, and air bases) are mobile and move several times a day, and the range of items they need to stock and supply—including spare parts of vehicles and aircraft, heavy industrial equipment, and hospital supplies—is more diverse than that of most commercial businesses. In addition, the military has much more at stake: while commercial operators need to keep a close eye on competitors, the Armed Forces needs to watch out for enemies who can kill drivers, blow up depots, or threaten suppliers. While in the commercial world, stockouts can lead to loss of profits, in the military world stockouts of certain items—ammunition, fuel, blood—can lead to loss of life.

Nobody notices the supply chain when it works well, but it quickly becomes a focus of attention—even among the general public—when it does not meet expectations. This was the case during the UK forces’ extremely demanding deployment to Iraq in 2003. Shortcomings in the supply chain became very clear and provided a powerful impetus to make improvements. An important enabler of these improvements was the integration of the supply chains that previously

resided in each branch of the military to create a Joint Supply Chain (JSC). In this article, we share some of the most effective changes made as part of the creation of the JSC, the successes achieved, and lessons learned.

Supply chain challenges exposed

The buildup to the second Gulf War required a massive movement of equipment and personnel from their bases in the United Kingdom and Germany within only ten weeks (exhibit). To put this in perspective, it was roughly the equivalent of moving the entire population of Canterbury, England; Arles, France; or Biloxi, Mississippi, more than 4,000 kilometers (2,485 miles).

Sustaining this force was demanding as well, especially considering the hundreds of different pieces of equipment in use, the complexity of the technology, and the harshness of the environment. To give an idea of how many spare parts were needed in steady supply, a single aircraft may consist of more than 100,000 parts; in this operation, seven different types of aircraft were used. For the troops, the supply chain had to ensure the constant flow of food and water that met UK hygiene standards and tastes, mail and other connections, and medical supplies, as well as a means of transport home for leave and at the end of a tour of duty.

Exhibit

Buildup to Iraq

The 2003 deployment of the UK military involved rapidly preparing equipment and personnel.

Transporting ...

46,000 personnel
 ~15,000 vehicles
 15,000 metric tons of ammunition
 115 fixed-wing aircraft
 ~100 helicopters
 19 warships
 14 Royal Fleet Auxiliary vessels

... required

9,000 containers
 1,002 military and civilian transport flights
 113 surface-vessel sailings

When we measured the supply chain's performance at the end of the ten-week period, we found shortages of many critical items. A common assumption among the front line was, "If I don't have it with me, it will never arrive." Additionally, the large volumes and tight timelines exposed shortcomings in information systems, particularly with regard to the ability to track items moving through the supply chain. These shortcomings led units to hoard stocks and over-order. For their part, supply personnel focused on expediting urgent deliveries rather than ensuring that everything arrived on time.

Successful improvement initiatives

Based on this experience, we set about improving the supply chain's performance through the Defence Logistics Transformation Programme, a comprehensive program to increase the effectiveness of logistics support to the UK Armed Forces. We identified three areas that needed close attention: supply chain planning, performance management, and supply processes. Here, we discuss some of the most successful and easily replicable initiatives in each of these areas.

Planning

The responsibilities of supply chain planners include identifying supply routes and air- and seaports, estimating volumes, establishing warehouses, and negotiating contracts with suppliers. In a multinational force, decisions about each country's force and its specific tasks often are finalized very late, leaving supply chain planners very little time to deliver and execute on plans. This became a significant challenge for planners in the UK Armed Forces, in part because they were using outdated tools, lacked coherent planning approaches, and relied heavily on their judgment and experience—experience gained during the Cold War,

when the logistical challenges were less complex and time-constrained.

Improvements to supply chain planning started slowly; many initiatives launched in Iraq had not yet been fully delivered by the time the United Kingdom deployed to Southern Afghanistan in 2006 as the lead of the International Security Assistance Force (ISAF). We therefore decided to pilot some new processes in Afghanistan. While there was certainly a need for information systems and decision-support tools, we started with a very low-tech solution to help achieve early results. The planning group developed a simple simulation of the supply chain, using different-colored poker chips to represent different types of supplies (for example, fuel and food) and a long table to show the layout of facilities in the United Kingdom and Afghanistan; we used simple computer models to calculate volumes. This visual approach enabled us to test different scenarios quickly and understand their implications and risks. It also made it easy to involve and communicate with a broad range of stakeholders.

Once the approach was proven to work, it was relatively easy to build computerized tools that could conduct the simulations and calculations for future operations in Afghanistan, Iraq, and other theaters of operation. The new supply chain planning process and tools were a success. The United Kingdom successfully deployed more than 4,500 military personnel in the right order and with the right equipment and associated support, despite unreliable land and air communication lines and a very hostile operating environment.

The UK Armed Forces has continued to develop the planning tools since 2006. The tools are now capable of integrating updated data on actual

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consumption and delivery times, and then creating simulations, testing multiple courses of action, and assessing risks based on those data. These tools are recognized as tools of the trade for supply chain planning and are fully integrated into the standard training for planners.

Performance management

Once a plan is in place, performance management—generating, interpreting, and acting on performance data—comes into play. Here our starting point was very weak, largely because data on supply chain performance resided in multiple legacy IT systems. Getting a complete picture of performance was a tedious and time-consuming task.

The first step was to agree on what measures we would use. We selected delivery reliability (how often the supply chain met targets for delivery time) and customer wait time (CWT—how long customers had to wait between ordering something and receiving it). For example, if the delivery target was 5 days and the supply chain met that target 70 percent of the time, the average CWT might be 7 days or 20 days, depending on how delayed the other 30 percent of items were.

The only sources of data on delivery reliability and CWT were the handwritten order books that every unit maintains. We manually entered the data into a database, extracted from multiple IT systems the records for each item that the units ordered, and then linked all the records to understand how items progressed through the

supply chain. The picture that emerged was not encouraging: low delivery reliability and long (sometimes very long) wait times.

Once we had data, we had to change the management culture from one focused on expediting and fire fighting to one focused on effectiveness and measurable results. We formed a supply chain performance-management board, which convened all the individuals involved in the supply chain on a monthly basis to develop tools and review and improve performance.

An early success was a pilot conducted in Iraq. Data showed that items were taking roughly one week to reach units after arriving in the country even though no British unit was more than a four-hour drive from the air- and seaports. The pilot team implemented—in the space of two weeks—a very simple performance-management system using colored stickers: every package sent to Iraq had a colored sticker attached, on which everyone in the supply chain wrote the time and date that they handled the package. When packages arrived at their final destination, the units sent the stickers back to the performance-management team in the United Kingdom. The data were tabulated, then circulated to all involved on a weekly basis. (We had high-tech devices that could read barcodes and electronic tags on packages, but because of the lack of data integration and limited communications in Iraq, we could not use these devices to make quick improvements. We also knew that visual-

management tools—which make performance data highly visible and easy to grasp—have been very effective in industrial settings, and we suspected they would also have impact in Iraq.)

After four weeks, we held a workshop to redesign the supply processes, implementing simple changes such as removing double handling, coordinating delivery timetables, and making deliveries directly from aircraft to combat unit. We also set a new target: next-day delivery. The results were immediate and sustained. When threat levels increased, the target was lengthened to two days to account for added logistical challenges—a target the supply chain continued to meet.

Based on our experience in this and other pilots, we created a permanent performance-management cell—a small team that gathered data and ensured that improvements were implemented—and replaced the ad hoc and largely manual collection of performance data with an automated data warehouse. Performance data has become the main input for the supply chain staff’s weekly videoconferences and planning sessions. The impact has been impressive: specific successes include a reduction in delivery times to bases in the United Kingdom and Germany from 30 days to 7 days and, thanks to an improved ability to detect the root causes of delays and intervene accordingly, a more-than-15-day reduction in CWT in Iraq and Afghanistan. Using a new “effectiveness” performance metric, we have been able to determine that the supply chain has given commanders in Afghanistan the operational flexibility they require—a major achievement.

Most impressive, however, has been the cultural change. The supply chain is managed by the numbers, all involved have a clear view of how they are performing relative to their targets

and how they contribute to overall performance, and there is a shared set of development goals to maintain continuous improvement.

Supply processes

Among the process changes we made, the one that touched the largest number of units was a change in the way units receive equipment prior to deployment. Traditionally, each unit would have 30 days of stores on its shelves so it could deploy and sustain itself while waiting for the supply chain to operate at full capacity. Many units did not know where and for what type of mission they would be deploying, and therefore stored items that they probably would not need in the near term, resulting in constant shortages—a significant problem in an organization with constrained budgets and suppliers that often need long lead times. When deployments were announced, units quickly tried to stock up on what they did not have, thus creating a massive strain on the supply chain. Furthermore, all units were holding stores when only a few were ever deployed, and each unit designed its own stores holdings; there was no established methodology, and there were limited guidelines.

Today, units no longer maintain their own stores. Instead, the supply chain stores both standard and destination-specific “priming equipment packs” (PEPs), designed based on usage data, expert engineering analysis, and the judgment of experienced quartermasters. PEPs are designed to maximize the ability of the unit to sustain itself. They have been tested in live, high-readiness operations, and they work well. The increase in self-sufficiency substantially reduces the strain on the supply chain in the early days of an operation, when staff is often overloaded and the infrastructure is not fully in place. The concept also allows for gradual withdrawal of stock from units as they gain confidence that what they

need will be available from the depot when required.

In addition, the supply chain has captured cost savings by ensuring that all the items a unit needs for a deployment can be ready at the time they are needed. For example, units being deployed within days have everything packed and ready to load, while units that have a warning time of months have protected inventories in central warehouses and contracts with suppliers that guarantee they will meet the readiness timeline.

Lessons learned

The progress we have achieved since 2003 has been massive. We may not be able to stop delays of freight at the Pakistan-Afghanistan border due to customs checks or poor weather, but we now can anticipate such delays, plan for them, and mitigate their impact through close and sustained management.

With the benefit of hindsight, we can share a few lessons for anyone else embarking on a similar journey:

- A good supply chain plan is the basis for success. Make planning as scientific and quantified as possible, even though there will always be unknown factors. Also, make it easy to test new approaches and adjust course—military operations have a habit of changing direction at short notice.
- Focus on performance. Be clear about the supply chain's objectives and measures, and gather the best data available to make performance

transparent. Otherwise, you are navigating without a map or compass. An important starting point is to get consensus on which performance measures really matter. Once all stakeholders are in agreement, start measuring right away.

- The best data available—no matter how imperfect—are better than no data. One critical leadership challenge is to ensure that the team is focused on studying and improving performance, rather than on debating the data and coming up with reasons for why the numbers *must* be wrong.
- Process change, management tools, and cultural change have to develop in parallel. Otherwise change will not be sustainable. Leaders can use a “blueprint”—a vision of the desired future state—as a tool to achieve alignment and drive the improvement process forward.



Since our early work, we have completed a major program to provide full consignment tracking visibility across the extended supply chain, started to roll out a single inventory-management system across all the armed services, and developed techniques to balance inventory across operational theaters. We are managing the supply chain's performance in increasingly sophisticated ways, and we are now able to properly cost and benchmark its performance. That said, continual attention to performance management is essential, especially given the ever increasing demands of combat operations in Afghanistan. Our journey is ongoing. ○