Streamlining humanitarian relief operations: the case of United Nations Peace Keeping Operations

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Streamlining Humanitarian Relief Operations:

The Case of United Nations Peace Keeping Operations

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Abstract

This paper discusses supply chain and logistics issues that arise in the operations of the Peacekeeping base of the United Nations in Brindisi. First, a conceptual introduction of current lean-agile and risk debates in the supply chain literature is proposed, followed by a description of the operational activities of United Nations base at Brindisi. Then, the Peacekeeping operations are put in the context of the lean-agile debate, and possible logistics efficiency improvements are proposed.

Key words: Supply chain management, Supply chain uncertainty, United Nation Logistics Base, Brindisi, Lean logistics, Agile Logistics

Introduction

Statistics on the number of countries where United Nations intervention forces are stationed show a steadily rising trend. Managing supply chains in the uncertain circumstances of these countries is a complex undertaking in the best of cases. Although the literature on the supply chain humanitarian missions has demonstrated a similarly increasing trend, much of the research is mostly descriptive. Whereas the description of the wide range of challenges facing the supply chain is the invaluable, better, theory-based understanding of these particular supply chain environments is needed. Such better understanding will facilitate further learning and enable more specific practical recommendations that will contribute to a improvement in the efficiency and effectiveness of humanitarian interventions. This paper is an attempt just to do make such a contribution. More specifically, we examine the logistics approach of the United Nations' Humanitarian (i.e. Peace Keeping) Missions organized from United Nations' logistics base in Brindisi in Italy through the lens of the lean vs. agile approach. Our paper is in part based on the analysis of the case "*The Peacekeeping Operations of the United Nations:*

The logistics of the Intervention" (Borla, 2006) and in part, on a synthesis of pertinent concepts drawn from the supply chain management literature.

Our approach is based on four main premises derived from the aforementioned literature: First, in order to optimally manage a supply chain, one has to specify the nature of the environment as, to a large extent; it will define the challenges inherent to that supply chain environment. Second, possible solutions will have to be assessed taking into consideration the demands and requirements of all involved stakeholders. Third, to effectively implement and manage the proposed supply chain solution, the structure has to fit the needs and capabilities of the organization as well as that of other supply chain partners. Fourth, appropriate management policies and actions need to be integrated with an on-going effectiveness assessment and co-ordination among partners.

We find that peacekeeping operations differ from other humanitarian relief operations in their less immediate character and prolonged duration. Deployments of peacekeeping operations tend to require more time to get established but at the same time, take place over a longer period of time. These different characteristics point to a need for leaner supply chains. This in turn suggests the possibility, of adopting efficiency improvement strategies akin to those used in business environments.

We conclude that more grounded research is needed to provide a further development of the conceptual framework of supply chains in the context of peacekeeping operations. The relevance of our approach is underscored by the increasing requests for resources from member states of the United Nations, which are in turn driven by a growing need for simultaneous interventions.

The supply chain performance context

In supply chain management research, much debate during the last decade has been dedicated to the relative merits of the so-called "lean" and "agile" paradigms in supply chain

management. Leanness means developing a value stream to eliminate all waste, including buffer stocks and time, and to ensure a level schedule (Naylor, Berry, Naim, 1997; Aitken et al, 2005). In the context of the peace keeping operations, leanness refers to avoiding peaks and troughs in field requirements.. The leanness concept resonates with the concept of efficiency of operations (Mentzer and Konrad, 1991). There is evidence to suggest that level scheduling combined with the elimination of waste (in terms of space and in time) has successfully delivered a wide range of products to those operations where financial resources are scarce (Aitken et al, 2002).

However, there are many other circumstances where the need for supplies is volatile and where availability is the key to securing a successful intervention. In such contexts, a much higher level of agility is required (Aitken et al, 2002). Agility is defined as an organization-wide capability that embraces organizational structures, information systems, logistics processes, and mindsets (Christopher and Towill, 2000, Naylor et al, 1997). It refers to using field knowledge to exploit the most effective opportunities in the given operational context (Aitken et al. 2005). Agility could be construed as a broader conceptualization of the need for responsiveness to the changing needs of evolving intervention suggested by Richardson and Gordon (1980).

As can be gleaned from the above definitions, leanness and agility can be seen as a set of organizational capabilities that concern many of the organization's functions including assortment composition, planning, procurement, storage, and distribution.

In the Supply Chain context, the main operational performance drivers relate to the management of inventory, transportation, facilities and information. Chopra and Meindl (2001) describe these four drivers as follows:

(1) *Inventory* – Inventory refers to all the raw materials, work in progress and finished goods of the organization. Inventory levels are a powerful tool that influences the supply chain's

efficiency and responsiveness. Through their reduction organization become more efficient as it lowers their inventory carrying costs. However, maintaining minimum inventory levels may compromise the organization's ability to respond to sudden surges in requirements. Maintaining higher levels of inventory contributes to an organization's ability to respond promptly. However these additional inventories increase the overall costs by locking up capital in inventory carrying costs. In addition, they also increase the risk of product damage obsoleteness.

(2) *Transportation* – Transportation refers to the movements of inventory from one point in a supply chain to another. Reducing minimum shipping quantities might benefit immediate response time but it will decrease transport efficiency and increase costs.

(3) *Facilities*. The facilities in the supply chain context encompass all places in the network where inventory is stored, assembled or fabricated. A higher density of facilities will enhance responsiveness but reduce efficiency by increasing costs. In the particular context of humanitarian relief case, dispersing inventory over a wider geographical area potentially implies facing additional safety concerns that might further increase costs due to a greater need for security.

(4) *Information.* Finally, the information consists of data and analysis regarding the inventory, transportation, facilities and customers throughout the supply chain. Information is potentially the biggest driver of performance in the supply chain as it directly affects each of the other drivers. In environments prone to instability, such as the ones in our case, a highly dispersed network strongly increases the need for information yet at the same time, it increases the threat of an obstructed flow of accurate and timely information.

Table 1 shows how the application of leanness and agility approach influences an organization's supply chain performance drivers. To make its supply chain leaner, organizations attempt to reduce their inventory levels and increase minimum shipping

quantities (so as to reduce transportation costs). Less dense networks of facilities contribute to elimination of waste and reduce the exposure to potentially hostile elements (stealing/attacks). Gaining more precise and detailed information on the requirements and preferences of different members of the supply chain facilitates supply chain officers' ability to optimize the supply chain performance drivers, regardless of whether the organization aims to have lean or agile operations.

Table 1: Application of the leanness and agility paradigm to the supply chain performance drivers

	Lean	Agile
Inventory levels	Decrease	Increase
Transportation costs (Minimum order quantity)	Increase	Decrease
Facilities density	Decrease	Increase
Information	Increase	Increase

In short, supply chain officers are appointed to enhance organizations' effectiveness by managing the supply chain drivers such as to reduce waste whilst assuring responsiveness to demand fluctuations. The appropriate management of these drivers, furthermore, helps keeping costs associated with operating the supply chain at lowest possible levels whilst avoiding erroneous deliveries, undesired supply delays or full stock-outs.

The ideal supply chain, however, is likely to embody both lean and agile principles to ensure the highest level of responsiveness combined with low costs and efficient processes. The particular supply chain configuration that describes such upstream processes has been termed as "leagile" (Naylor, Naim and Berry, 1999). Lean processes upstream facilitate a low cost and low risk supply chain whilst agile processes downstream assure high levels of responsiveness to the needs in the field. The agility of the latter processes is achieved through creating higher strategic buffers (inventories) at the lower end of the supply chain and the postponement of product customization. Towill and Christopher (2002) contend that the lean

and agile paradigms operate at different times in the same place or at the same time in different places of the supply chain. In other words, an organization might simultaneously operate the leanest agile system and the most responsive lean system. In humanitarian relief environments, the optimal position on the lean-leagile-agile continuum will differ from item to item and from mission to mission. The definition of the best approach will therefore require continuous revision. What might be the optimal approach for one field operation might not be adequate for another. Ultimately, the choice of the main focus of the supply chain management efforts (be it lean or agile) depends on the composition of the market winners/market qualifiers (Hill 1993, Towill and Christopher 2002). *Market qualifiers* refer to competitive pre-requisites which represent a base level of performance, whilst *order winners* refer to critical differentiating factors.

Risk and uncertainty

Whereas for many commercial organizations, the understanding and appreciation of supply chain vulnerability and its managerial counterpart - supply chain risk management - are still in their infancy (Jüttner et al., 2003), it has been a fact of life of those involved in military interventions. Research sponsored by the UK Department for Transport in 2004, found that even when organizations face supply chain-related threats, they have difficulties identifying, assessing and managing the underlying risks. A thorough understanding of the scope and the nature of supply chain risks is therefore a key hurdle that organizations must overcome.

The assessment of Supply Chain uncertainty

To gain a sound understanding of supply chain issues at play, it is imperative to develop conceptual models that explain the most pertinent risk management issues. The need for such models is likely to increase given progressive fragmentation and recombination of supply chains and emphasis on revenue management and its impact on the supply chain performance, to name just a few factors (Seshadri & Subrahmanyam, 2005). To maintain the overview in a

situation of increasing supply chain fragmentation, it is essential that the value of each component in this supply chain is accurately determined. This calls for a clear understanding of the responsibilities, performance and the effects of the actions of each member on the supply chain as a whole.

Substantial research has been dedicated to managing disruption risks in supply chains in order to make these chains more resilient and reduce the effect of disruptions. Much of this research relates to the development of frameworks based on premises of industrial risk management. For example, Haines (1998) and Kleindorfer & Saad (2005) use a four step approach:

1. *Hazards:* In order to manage risk, one has to specify the nature of underlying hazard that gives rise to the risk. In case of the intervention forces, it is imperative that an accurate inventory is made of the most immediate and threatening factors to the mission.
2. *Pathways:* Risks are quantified through a comprehensive assessment process that includes the determination of the pathways through which disruption risks might be triggered.
3. *Alignment with decision environment:* To be effective, risk management approach must fit the characteristics and the needs of the decision environment. The dynamics and needs of different supply chain environments will give rise to differences in approaches to assessment and design. Despite the often immediate need for stability and relief, the decision environment of the United Nations, often includes a strong political element (i.e. specific preferences of the members states) that potentially can altering or slow down the decision making process.
4. *Implementation:* Ultimately, appropriate management policies and actions need to be integrated with ongoing risk assessment and coordination amongst supply chain partners.

Much more detailed but similar in approach are the best practices identified by Elkins et al (2005), developed based on surveys and interviews with leaders of global best-in-class organizations. Some suggestions that can be taken from these best practices include:

(1) Require critical suppliers and collaborators to produce a detailed disruption-awareness plan and or business continuity plan;

(2) Require suppliers and collaborators to be prepared to electronically share timely information and visibility of material flows with your organization;

(3) Conduct a detailed performance report and analysis following every intervention (see Peace keeping best practices web page: http://www.peacekeepingbestpractices.unlb.org/pbpu/)

(4) Gather supply chain intelligence and monitor critical supply-base locations;

(5) Improve visibility of inventory buffers in domestic distribution channels at the part level;

(6) Classify buffered material by its criticality;

(7) Train key employees and groups to improve real time decision making capabilities;;

(8) Understand the cost trade-offs for different risk mitigation strategies;

These best practices are based on initiatives that commercial companies currently have in place or are working toward. Interestingly, no single company in the Elkins' research has implemented all of the practices.

The benefits of Resilient Supply Chains

It is needless to emphasize that the immediate victims of civil unrest or natural disasters may be indifferent as to why or where a disruption has occurred. What matters to them is that they receive aid or that the forced have then materials to bring the stability to the region. Therefore, in a globe spanning supply chain environment the provides resources to highly unstable environments, the intervention forces with the most resilient and responsive supply

chain will be best able to carry our the mandate given to them by the international community (Elkins et al, 2005).

Common wisdom and the literature (Towill and Christopher, 2003) points to agile or leagile approaches to environments of high uncertainty, as are peacekeeping operations. However, as we discuss bellow, increased agility in the case of the Brindisi base is negated by non-logistics issues such as the allocation of troops and budget from member states. Increased efficiency on the other hand can be achieved by current supply chain and logistics practices, facilitating the accomplishment of operations restricted by budget considerations in an increasingly complex environment.

The Peacekeeping Operations of the United Nations: The logistics of the Intervention

Within the United Nations, the power and responsibility to institute and maintain peace keeping operations rests with the Security Council. At the operational level, the Department of Peace Keeping Operations (DPKO), instituted in 1992, has the mandate for the planning, preparation and directing these peace operations, which are considered the United Nations' instrument to help countries suffering from conflicts to create conditions for sustainable peace.

At present, there are sixteen ongoing peace keeping missions and two political missions (Fig. 1). Since the creation of the United Nations in 1945, 62 of such missions have taken place, 15 prior to1990 and more than 40 ever since). During these missions, military contingents and/or military observers that are provided by the member states of the United Nations. Seven of these missions have a more permanent character. Some of the missions are financed with the regular budget of the United Nations.

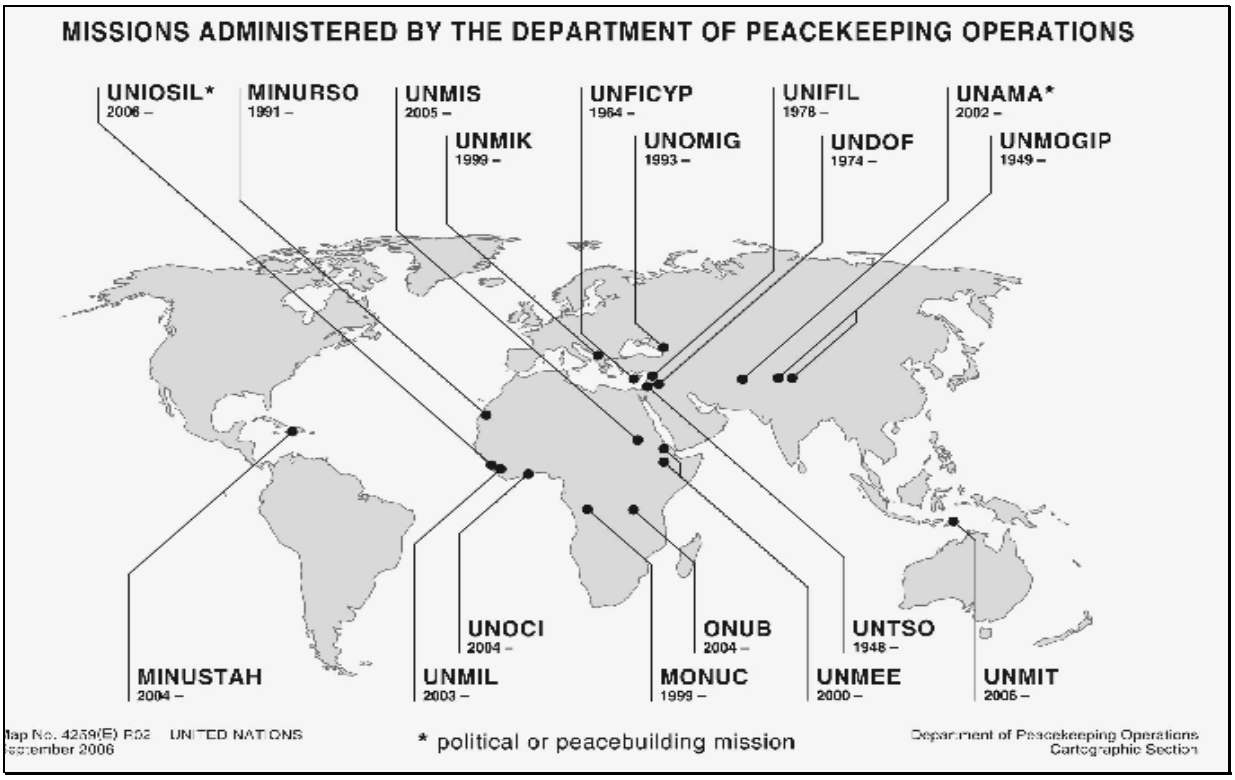

Figure 1 (from http://www.un.org/Depts/dpko/dpko/index.asp)

The budget of these operations exceeds 5 billions of dollars for the current fiscal year. Military staff exceeds 80,000 and civilian staff 15,000 from across 114 countries (fig. 2).

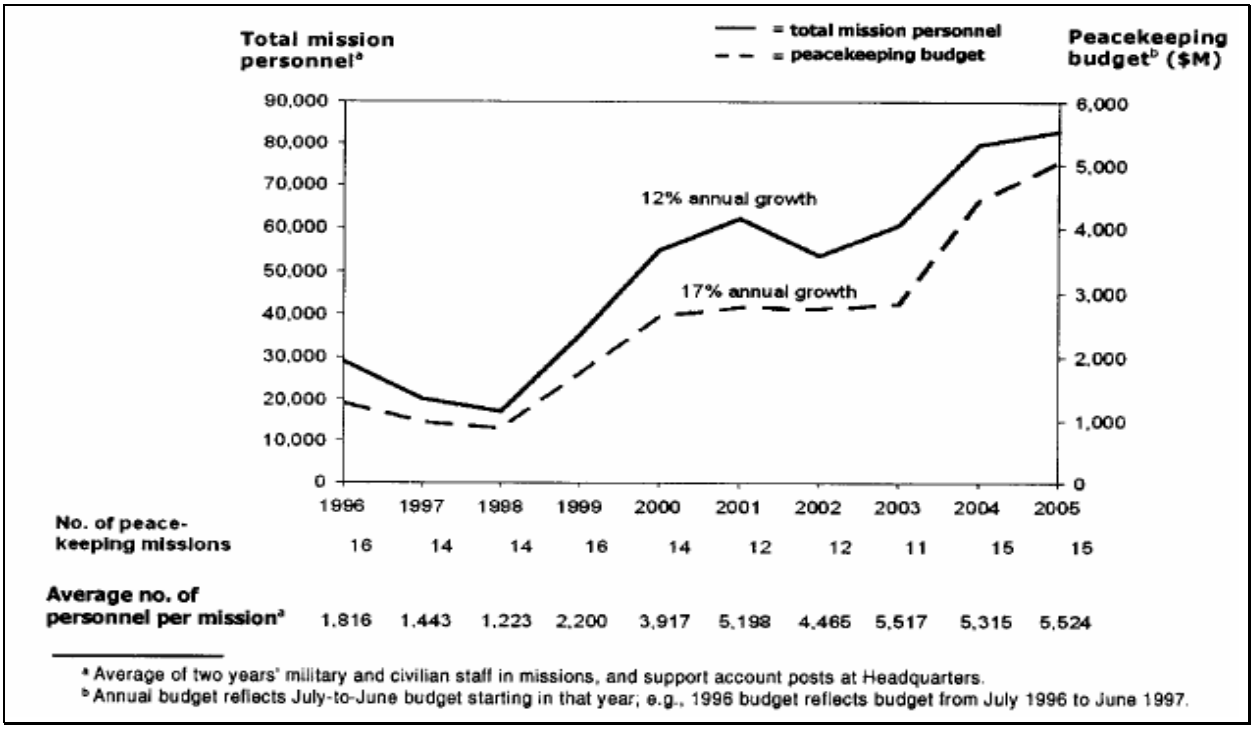

Figure 2 - Budget of Peacekeeping operations (Borla 2006)

To illustrate the magnitudes of the entire United Nations Peace Keeping operations; in 2004 the DPKO transported 580,000 passengers during 90,000 hours of flight, mobilized 470,000 tons of cargo and managed a fleet of 319 planes and helicopters.

The Organizational Structure of the DPKO

At present the DPKO is divided in 2 offices; the Office of Operations, which essentially takes care of political issues and the Office for Mission Support (OMS). The OMS in turn is again divided in two divisions; the Logistics Division and the Administrative Division. The Logistic Division is responsible for the coordination of activities related to information, telecommunication, health, engineering, transportation (air and land), and supply of materials for construction and maintenance of missions. The proposed organization for the Logistic Division of the OMS for 2006-2007 includes some 182 persons and is structured in three Services (fig. 3): the Operational Support Service; the Specialist Support Service and the Communications and Information Service Technology.

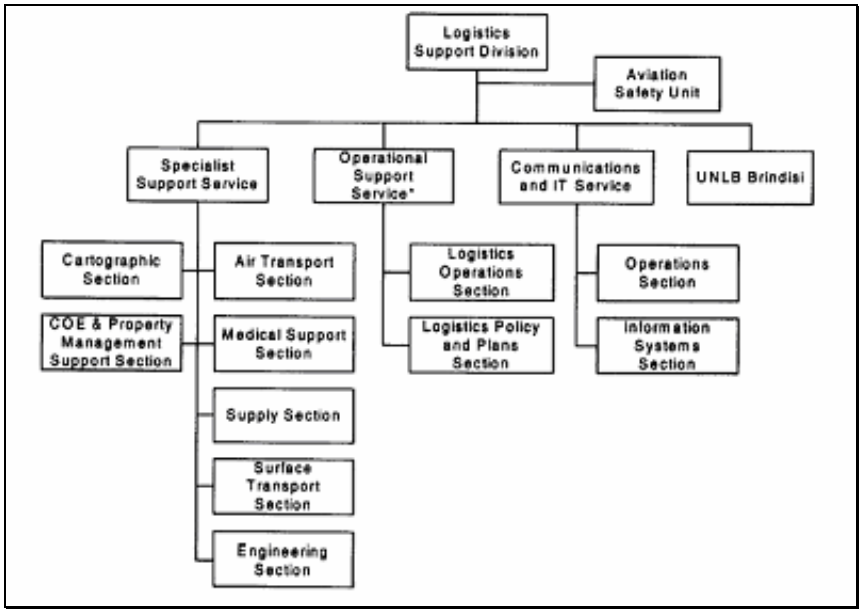

Figure 3. Organization of the Logistics Division of the DPKO (Borla 2006)

The Office of Aviation Safety controls the flight security through external contractors as the United Nations itself does not possess any aircraft. This unit is not a part of the Air Transportation Section, in order to assure its objectivity and transparency.

The Operational Support Service too is divided in two sections: Logistic Operations and Logistics Policy. The former coordinates the logistic operations of interfaces (such as engineering and materials flows) between troops (also referred to as the Blue Helmets) and the civil administration of the United Nations. The latter takes care of the definition of the policies and technical normative of the intervention.

Specialist Support Service (SSS) is constituted of seven sections: Air Transport; Surface transport; Medical; Supplies; Contingent Owned Equipment (COE); and Engineering and Cartography. The Air Transport section assists the missions in the activities arranging air transport, conducted by external contractors, in all contractual aspects. The Surface Transport Service has similar functions, although in this case the vehicles actually belong to the United Nations. The Medical Support Service, other than the complex exercise of coordination of several missions, has a normative task of standardization of doctors, budget preparation, contracts, and location of the doctor-sanitary materials and management of refresher courses. The Supply Service takes care of (a) the preparation of the technical detailed lists of material demands for the exercise of peace operations (e.g., food supplies, potable water, gasoline); (b) administration of this material and the contractual aspects. The activities of procurement and contract bids are directed by an external office to the DPKO belonging to the Department of Management of the Secretariat. For each mission a decentralized office of procurement handles amounts up to $200.000, operating independently from Headquarters in New York. Materials management (COE) belongs to troops participants to missions and coordinates the complex negotiations and technical detailed lists between troops of the Member States and those of the United Nations. Engineering takes care of technical norms and policies for the

standardization of the engineering activities; technical detailed lists for bids; technical assistance to the missions; training of the staff; and the management, through a computing network, of engineering materials of the SDS. Cartography supplies cartographic technical assistance and logistic assistance in the field (e.g.: identification of optimal sites for the construction of military encampments). Communications and Information Technology operates and manages, through UNLB, all computer telecommunications equipment. This Service maintains in real time a databases relative to materials and staff.

Minimum Requirements for a Successful Peace Keeping Operation.

In 2000 Lakhdar Brahimi, adviser to the General Secretary, supervised the preparation of a document (A/55/305-S/200/809) which proposed the minimum requirements for a successful peace operation. These requirements included:

i) The creation of a new function close to DPKO in New York dedicated to the logistic and administrative support its operations;

ii) The institution of a mechanism for financing new and unexpected operations;

iii) The creation of strategic material reserves (Strategic Deployment Stock, SDS) near the logistics base of Brindisi in Italy.

These recommendations introduce more specific indications for the logistic of operations, among which:

- The ability to deploy missions within 30 (or 90 days for one complex missions[1]) counting from the date of adoption of one resolution of the Security Council (recommendation no.7)

[1] A complex operation employs, by definition, at least 10,000 military troops, 1000 observers and 1000 civil employees of civil administration (local and international personal); a traditional operation employs instead not more than 5000 troops, 200 military observatories and 200 civil staff (ref. par. 113, doc. A/55/977).

- The authorization to hold start-up kits at the UNLB for a minimum of at least 5 peacekeeping operations. These kits, which are part of the Strategic Deployment Stocks (SDS), include the basic equipment (such as for telecommunications, computers, etc.) necessary to start an operation (recommendation n.13, b).

The Logistics Base of Brindisi

The United Nations Logistics Base (UNLB) in Brindisi, in southern Italy, which has been operating since 1994, reports to the Logistic Division of the DPKO. This base was instituted after an agreement signed between the United Nations and the Italian Republic and occupies infrastructure of a former base of the Italian Air Force. The main reasons of this choice for this location were the stable location and good infrastructures.

The mandate of the UNLB includes the following services: (1) the management of assets and infrastructures, (2) supplies and the management of warehouses, (3) a center of telecommunications and computing, (4) a training center, (5) the coordination of the air operations and (6) administration. In the warehouses of the UNLB the necessary materials for the assembly and the maintenance of peace operations are stored. These stocks are also being referred to as the Strategic Deployment Stocks. In order to successfully fulfill its objectives the UNLB, similar to any professional logistics operation must meet the performance criteria typical of supply chain management.

Strategic Deployment Stock

The Strategic Deployment Stocks (SDS) are the material reserves kept to support rapid deployment and initial operational establishment of complex United Nations' peace keeping missions. The plans for the implementation of SDS have been under review since the early nineties (e.g., DA PAM 700–31 1994) and were finally endorsed by the Brahimi report of 2000.

In June 2002, the General Assembly in resolution 56/292, approved the implementation of the Strategic Deployment Stocks for complex missions and dedicated $141.5 million for this purpose. Since then equipment with a worth of over $165 million has been issued; most recently supporting the deployment of missions in Liberia, Cote d'Ivoire, Burundi, Haiti, Iraq, Sudan and the expansion of the Democratic Republic of the Congo. The fact that some 75% of the budget has been dedicated to deployments to Africa underscores the location choice of Brindisi.

The Strategic Deployment Stocks are classified in eight main categories; Facilities and Infrastructures, Ground Transportation, Communication, Information Technology, Medical Equipment, Special Equipment, Temporal Generic Assistance and Miscellaneous Supplies. Approximately 84% of the budget concentrated in the first three categories. In 2005, an analysis of the experiences for the first three years of SDS' implementation was reported in document A/59/701. It was found that the SDS had served the purposed of fast deployment of peacekeeping operations. However, numerous opportunities for improvement too were identified, among which:

- A reconfiguration of the composition of SDS, implying changes in the type, quantity and replacement costs of replenishments; transfer of equipment from United Nations reserve stocks; rotation of the stocks through existing missions and other United Nations entities; and procurement. It was concluded that the management of the SDS requires more flexible methods to reconfigure SDS composition.

- To accelerate the redeployment rate, the inventory levels of long lead-time items will need to be increased and the stocking of short lead-time items reduced appropriately. Currently lead time for the procurement of SDS equipment varies from 30 to 360 days. Whereas for most equipment lead times are less than 120 days, many specialized high-

value items, like ambulances, fire-engines and material handling equipment have longer lead-times of up to 360 days.

- The provision for up to five simultaneous missions has to be increased as it is already overloaded by current demand.
- Budget replenishment has to be accelerated. The General Assembly, in its resolution 56/292, approved a replenishment policy for SDS whereby mission budgets, when approved by the Assembly, would pay for the replacement of stocks drawn from SDS. Replenishment from approved mission budgets however, takes approximately 150 days, (including 60 days before the mandate), due to the need to be authorized by the Advisory Committee on Administrative and Budgetary Questions. This delay in the replenishment of SDS from the time a commitment authority is approved until the time a new peacekeeping mission budget is approved could diminish its ability to support other new missions.

Based on the experience acquired through the surge in peacekeeping missions during the recent years, the general assembly meeting (A/59/296 and 299) has requested:

- To review the composition of strategic deployment stocks, included the introduction of a “fly away kit” (transportable with airplanes) for the immediate construction of new missions and;
- To reconsider the operating functions of the Logistics base in Brindisi (UNLB). The current agenda for reform (referred to as the Peace Operations 2010 plan) proposes further restructuring of the DPKO, with the introduction of substantial changes in 2010.

Discussion

At the strategic level

Peacekeeping operations cannot be easily classified within the traditional frameworks used for effectiveness-efficiency analysis, sketched in the first section of this paper. On the one hand, deployments do not have the urgency of disaster relief operations. In fact they have a standardized reaction time of at least 30 days. On the other hand, the operations tend to last longer and a growing number of them can be organized simultaneously. Arguably, a reduction in reaction time cannot only be driven by an increase of resources (e.g. stocks, air transportation). A critical factor in the time-to-deploy is obtaining troops from member states at short notice. A report of the Peacekeeping Best Practices Unit (describing the lessons learned from the start-up phase of the United Nations mission in Liberia, 2004) states that "one of the reasons for delays in deployment was that a number of countries that had offered troops, subsequently had to obtain legislative or executive approvals before confirming their offers. In addition to that, one key contingent pulled out following its pre-deployment reconnaissance mission to Liberia. DPKO also experienced some difficulty in generating specialized units". Thus, increasing the agility of the supply chain through additional stock and equipment buffers will not likely have a large impact vis-à-vis political barriers. A more lean approach could therefore be more appropriate in the light of the continuous increases in expenditure in a public institution. We argue that the adoption of business logistics practices can be used to address these issues, as discussed below.

At the tactical level

Fontaine (1998) cites a number of key reasons for the hampering logistics support in four post-cold war interventions (Desert Shield & Storm, Restore Hope and Joint Endeavor). Amongst those reasons were; limited asset visibility, complications in building and maintaining time-phased force deployment plans and of ambiguity in the command and

control structure. These issues have been successfully (be it arguably) addressed by the DPKO and the establishment of the UNLB at the Brindisi base. Much remains to be done, however, at the tactical level as can be deduced from the A/59/701 report, described in the previous section. Among the issues discussed in this report are:

- The out-of-balanced distribution of material stocks among bases. This can be address by transshipment practices, especially among neighboring bases. The modeling and handling of these practices has long been study in the literature and applied in the field, e.g., Sherbrooke (1992), Axsäter (1990).
- Long procurement lead-times (up to one year). E-procurement practices, including automation of workflows could help to address this issue.
- Fixed composition of Strategic Deployments Stocks. SDS have to be adapted flexibly to the needs of the field-bases. Common practices in logistics platforms and in mass-customization can help to address this issue.
- Non-integrated information systems. United Nations' inventory information system (called Galileo), for example, is not integrated with the management accounting modules. An extended body of knowledge exists on ERP implementation that could address this issue.
- Long authorization processes for outgoing shipments to missions. Materials ready to be deployed can get stuck for months at the Brindisi base. This is caused by the decentralized approach in the ordering from field bases which are frequently operating in hostile and difficult environments. Logistics processes at field bases therefore should be simplified towards a more centralized approach, "push" style. Furthermore the adoption of MRP practices are currently being considered to address this issue.
- Time consuming inspection of received materials at bases. Once equipment and materials have been dispatched to field bases, they have to be thoroughly inspected in a time

consuming process. This issue too is related to the need for simplification of logistic processes at field bases. The adoption of Jidoka (or quality at the origin) practices could also address this issue.

- Some equipment (e.g. medical equipment) requires specialized handling. This issue is being address by outsourcing it's handling to specialized third party logistics companies.
- Low rotation of stocks and the number of items, and in particular short-shelf life items. The utilization of multi-echelon inventory models coupled to real-time inventory systems and transshipment practices would help to addressing this issue.
- Vulnerability due to over-centralization at Brindisi. Although this goes against lean principles, selective decentralization/duplication of critical functions can make Brindisi less vulnerable. This issue is already being partially dealt with through the planned establishment of a new base near Barcelona, Spain, which is going to handle all critical information and databases.
- Slow deployment times caused by the many afore mentioned constraints mentioned. This issue can be addressed by improving logistics practices and by the adoption of standardized "fly-away" kits, currently under consideration.
- Reconstitution and redeployment of stocks. Reception proceedings of materials at the Brindisi base can take up to six weeks. This delay is partially produced by capacity limitations due to increase in the number of missions, but also because many items are received in bulk and have to be repackaged. Better integration with key suppliers could help to addressing this issue.
- Shipments do not carry bar codes, thus tracking and tracing (i.e. visibility) remains seriously impaired. The adoption of standard tracking techniques, possibly including RFID could address this issue and also facilitate the inspection of materials at reception.

- Materials are not deployed in sealed containers. Doing so however will reduce losses in the field and therefore greatly simplify the activities at field bases.

Table 2. Current logistics issues

Current logistics issues	*Business logistics practices*
Balance of material among bases	Lateral transshipments
Procurement lead-times of 30 to 360 days	e-procurement principles
Fixed composition of SDS	Flexible configuration to field base needs
Inventory Mgmt. System not integrated	ERP principles implementation
Long waiting for shipping authorization	Use push/MRP principles
Time consuming inspection at reception in the field	Implement Jidoka principles: inspect at source
Specialized handling of medical equipment	Outsourcing to specialized 3PL
Low rotation of items with short-shelf lives	Multiechelon logistics practices
Risk of over-centralization	Selective decentralization
Slow deployment	"Fly-away kits", 3 & 4 PL practices
Reconstitution & redeployment of stocks	Integration with key suppliers
Lack of traceability	Standard bar-code/RFID tracking techniques
Lack of containerization	Implement containerization

All above issues are being acknowledged by the United Nations. Clearly a systematic adoption of business logistics practices and the institution of a Chief Logistics Officer with enough authority to implement this would greatly improve the leanness of the operations at Brindisi.

Conclusion

Peacekeeping operations have some of the supply chain and logistics elements of humanitarian relief and of military interventions. However, they differ from humanitarian relief both in the need for a speedy deployment and in its duration. In particular, peacekeeping operations tend to be characterized by slower yet longer deployments, implying the need for leaner supply chains.

Clearly, more research, possibly of a grounded theory nature, is needed to provide a conceptual framework of supply chains in the context of peacekeeping operations. At a more

tactical level, possible sources of improvement of peacekeeping operations extend beyond logistics. Loewenberg (2006), for example, cites conflicts arising from multiple interfaces with the media. Abraszewski et al (1995) emphasizes issues of personnel rotation and benefits. We argue that the application of formal supply chain and logistics principles, validated through more formal inductive techniques could facilitate the transfer of best practices developed in the civilian world to the support peacekeeping operations. We find that peacekeeping operations differ from those of humanitarian relief both in the need for a speedy deployment and in its duration. Peacekeeping operations call for slower but longer deployments, necessitating leaner supply chains.

References

Abraszewski A., R Hennes, B. Krasulin, K. Othman. 1995. *Military component of United Nations peace-keeping operations*. Joint Inspection unit, United Nations, Washington DC

Aitken J., P. Childerhouse, M. Christopher, D. Towill. 2005. Designing and Managing Multiple Pipelines. *Journal of Business Logistics* 26(2)

Axsäter, S. 1990. Modelling emergency lateral transshipments in inventory systems. *Management Science* 36 (11) 1329

Borla, G. 2006. *The Peacekeeping Operations of the United Nations: The logistics of an Intervention*. CEDAM, Padova, pp. 256

Chopra S. S., P. Meindl. 2001. *Supply Chain Management – Strategy, Planning and Operation.* Prentice Hall

Christopher M., D. Towill D. 2000. Supply chain migration from lean and functional to agile and customized. *International Journal of Supply Chain Management*. 5(4), 206-213

Elkins D., R. Handfield, J. Blackhurst, C. Craighead. 2005. 18 ways to guard against disruption. *Supply Chain Management Review* 47-53

Fontaine, Y. 1998. Strategic Logistics for Intervention Forces. *US Army War College Quarterly*, Vol. XXVII, No. 4

Haines, Y. Y. 1998. *Risk Modelling, Assesment and Management*, Wiley and Interscience, New York, NY.

Hill, T. 1993. *Manufacturing Strategy*. Humanity Press/Prometheus Bk; 2Rev Ed edition

Kleindorfer, P.R., G.H. Saad. 2005. Managing Disruption Risks in Supply Chains. *Journal of Production and Operation Management* 14(1) 53-68

Loewenberg, S. 2006. Case study: an interim administration mission in Kosovo External study. From *The United Nations media strategy recommendations for improvement in peacekeeping operations*. Peacekeeping Best Practices Section, Washington DC

Mentzer J.T., B.P. Konrad. 1991. An Efficiency/Effectiveness approach to Logistics Performance Measurement. *Journal of Business Logistics* 19(2) 155-171

Naylor, J. B., M. M. Naim, D. Berry. 1997. Leagility: Integrating the lean and agile manufacturing paradigms in the total supply chain. *International Journal of Production Economics*, 62, 107-118.

Van Wassenhove L., N. Blackett. 2006. Memorial Lecture: Humanitarian aid logistics: supply chain management in high gear. *Journal of the Operational Research Society* 57, 475–489

Seshadri, S., M. Subrahmanyam, 2005, Risk Management in Operations, *Journal of Production and Operation Management.* 14 (1) 1-4

Sherbrooke, C. "Multiechelon Inventory Systems with Lateral Supply." Naval Research Logistics v39 n1 p29 Feb. 1992.

Wright, J.M. 1994. *Commander's handbook for peacekeeping operations (a logistics perspective).* Department of the Army Pamphlet 700–31. Washington

Towill, D., M. Christopher. 2003. A Taxonomy for selecting global supply chain strategies *Proceedings of the EurOma conference*

Web resources:

United Nation Logistics Base Webpage, *www.unlb.org*

UN General Assembly 59th Session: Session Documentation, *www.un.org/ga/59/documentation/list2.hmtl* (for all documents listed in the article)