

MILITARY TRANSPORTATION STATUS IN ARMY OF THE CZECH REPUBLIC

СОСТОЯНИЕ ВОЕННОГО ТРАНСПОРТА В АРМИИ ЧЕШСКОЙ РЕСПУБЛИКИ

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Abstract: *The paper deals with actual tasks for military transportation. There are some actual tasks in military transportation and analysis for transportation of technical material and groceries at the missions. Share University of Defence in education of new transportation specialists. There are theoretical and practical solutions of transportation and transshipment problem.*

KEYWORDS: MILITARY TRANSPORTATION, TASK FOR TRANSPORTATION COMPANY, TRANSPORT OFFICER'S EDUCATION PROGRAM, TRANSPORTATION AND TRANSHIPMENT PROBLEM.

1. Introduction

The Logistics status is given by status and place of military transportation. Transportation is immaterial product; its result is replacement in space and time. Transportation has specific position; practically it is service which is part of logistics. It realised replacement goods and persons. Transportation is mostly influenced by transport infrastructure, involving traffic roads, amount and capacity efficient transport equipment, ability and capacity transportation management.

Military transportation is one of carrying pillars of military logistics not only in ACR (Army of Czech Republic). It has given the commitments which must be fulfilled. Among tasks is also building up Transportation Company for use for specially mission transportation of material and to be prepared for NATO tasks and for fulfilling of tasks will contribute planned purchases and education of new specialists in transportation branch.

For manager's solution of transportation officer and finding solution are used different manager's methods. As an example can be used methods of linear programming. Its typical application is relate to find maximum respective minimum of objective function with the right inclusion of limiting constrains. With respect to objective function and constrains are also linear, optimal solution is as solution of linear equations or as solution finding by linear programming solution.

2. Stage in military transportation and tasks connected with in ACR

Objective of military transportation is to ensure department MO (Ministry of Defence) needs in frame of ACR in area intrastate and international transportation. Among main tasks belongs to:

- Optimal integration military transportation to the organization structure ACR at the all levels command and management include the guarantee direct relationship to command and managing authorities.
- Preparation members and authorities of MT (Military Transportation) for continuous planning, safeguarding, coordination, operating, monitoring and analysing displacement and transportation.
- Operating and development transport supply system in peace and in military operations (In Czech Republic area or outside).
- Improvement co operational structures with NATO, military transportation elements different countries, with related national civilian authority state administration and transport or transport securing authorities and establishment.
- Preparing for formation Joint National Centre CR (Czech Republic) for securing, coordination and operating of redeployment and armed forces transportation for solving

the crisis situations. The Centre could be created authorities –based MT ACR and enlarge for representative appropriate central administrations and the transportation organization controlling by them.

- Share in creation the Joint National Centre for coordination NATO transportation, displacement given for leading operational displacement inside of given area of responsibility.
- To begin education procedure new transportation specialist in program economics military transportation at University of Defence.

3. Build up transportation company and connected tasks with units supply in international missions

3.1 Build up need transportation company and its job description

Build up of Transportation Company is one of priority in area military transportation in ACR (Army the Czech Republic). The development of a middle transport company is one of the priority transport tasks in the ACR. The planning determination is to relocate 600 tons material, material on pallets or in containers to distance maximally 300 km. This company has self abilities of operation and will be permanently supply fulfilling transport tasks.

Main tasks of building Transport Company are: Logistic self reliance, realization of support circle to NATO units of fast reaction and realization of all support to NSE.

The transport company continually supports truck transportation and all activities at whatever include extreme climate conditions. Tactical and logistical self acting of this company is planed for minimally 6 month. The company will be equipped by equipments for support of 1-rst and 2-ond level includes 30 DOS. Based on NATO decision Transport Company was created within the frame of 141.. It is fully personally generated from numbers of 141. Support Battalion. Company in frame of Support Battalion will be ready to fulfil tasks from January first 2008.

3.2 Supply our units during abroad missions

Transport Company should be used for realization of practical transportation problem, to supply units abroad mainly in Kosovo. Until now in was realised by form outsourcing- by civilian company. For future, there is afford to realised by own army forces. [5]

On the base of Order of the head of GS ACR training supply transport of technical material was realized under these binding conditions of transportation: To implement transport of 2 pieces of T-815 8x8 Multilift with containers ISO 1C, two drivers with each vehicle and one additional vehicle. To transport material of an ordinary use. To realize transport using generally valid procedures for securing foreign official trips and on-road transport abroad and supplies for foreign missions. To make mutual communication during the transport using mobile phones and hand radio station. Financially ensure the transport resources from PCC = NSE (Permanent Control Centre) designed for Kosovo. The reason of this training supply transport is to check operation ability of own forces and self-sufficiency.

Realization of the task. Tasks were fulfilled by commander of Joint forces, commander of support forces and training, deputy chief of general staff- director of permanent control centre and director of support section MO. It was established to provide planning of transport i.e. all possible costs- expenditure forecasts, plan of transportation line including transport permitting through transit countries and MP (military police) guidance on the border checkpoint.

Transportation lines. For planning are possible ways of transport either through Rumania or through Croatia and Serbia. The Rumanian way is longer, motorways are worse state, mainly there are a lot difficulties and it requires using of ferry which goes up in price. Serbian way would be more cost effective but there are troubles in legislative system.

Possible line of transport: Pardubice – Mikulov (CZ) – Wien (Austria) – Graz - Maribor (Slovensko) Zàgreb (Chorvatsko) – Split – or Bèlehrad (Srbsko) – Niš - Priština (Kosovo) – Šajkovac (Czech base in Kosovo).

Real line o transport: Realised transportation was so call Romania way: Pardubice – Holicè – Svitavy – Brno – Breclav (duty – border checkpoint to SR) Bratislava (Slovakia) Rajka – Gyòr (Hungarian base) – Szegeð - Orsova (Romania)– Craiova - Vidin (Bulgaria) Montana – Vraca – Sofia – Gjusevo – part of Macedonia - - Pristine – Sajkovac (base –final destination) – and back.

Time for realization of the transport was 4 days in one way and 4 days back. There were another 2 days intended for unloading and loading of material and for a relaxation of the crews.

Acquired results for economical comparison

The results and comparison of transportations with possible realization on the railway, with current transport contractor or with ascertained or in some cases approximate results of practical training transport is possible to see in table Tab. 3.1 [5]. In table are results obtained from the transportation realized by contractor 's, realized by own forces of the ACR and by calculation of railway transport office

Tab 3.1. Expenses on each possible transport

Number of containers There-back [piece]	Weight of cargo There-back [tonne]	Transport using ACR forces through Rum. [Czc]	Undertaking Czech Railways [Czc.]	Transport contractor through Serbia (shorter) [Czc]
1-1	10+10	41 000,-	88 000,-	-
2-2	20+20	82 000,-	126 000,-	101 000,- - 127 000,-
3-3	30+30	123 000,-	178 000,-	-
4-4	40+40	164 000,-	252 000,-	202 000,- - 254 000,-

3.3 Perspectives of supplies in future

It is considered necessity of transport using own forces. This is supported by experience from the first training transportation. The reasons are:

- This first exercise transportation showed up that ACR is able to realise supply transports to Kosovo mission by own forces – by people and vehicles.
- There is recommendation the routes to plan through Rumania in number of maximum 3 vehicles without semi trailers. Total price for transfer of 3 containers ISO 1 to KFOR and back is up to 250 000,- Cz c (Czech crowns). Civil transporters would be able to transport 4 containers ISO 1C for this amount of money. The price of own transportation will decrease after arranging licence for transit through Serbia.
- In case of using container drags behind vehicle TATRA 815 8 x 8 Multilift would be transport using own forces cheaper option of transportation
- Other reasons for realization of transport using own forces: Result and its conclusion were verified only from one transportation. It is necessary to implement more transportation to find objective evaluation with the aim to lower coefficient of accidentally. Another transportations would certainly support recommendations to use own military forces. By own realization of transport would ACR improved professionalism of soldiers- members of transport unit, it should increase flexibility in critical situation like- technical preparation, vehicle service and drivers experience. Diplomacy and capability to have discussion in foreign language – professionalism in language preparation- necessity of discussing details.

Partial conclusion: Build up of Transportation Company is one of tasks which is necessary to fulfil as contribution for NATO. From practical view is logical to use transportation company as supply element for own units abroad. Even though it can be from economical aspect inconvenient but previous reasons are definitely the benefits.

4. The planed purchases for reinforcement fulfilment tasks ACR for the NATO and EU benefis

For renovation and modernisation the transport abilities the ACR are supposed many changes in the purchases for Army and also for Air defence [3]. For instance, there were signed up agreement to by the middle trucks T- 810, it is planned to buy until 2014 approximately 1 thousand middle vehicles.

In air transportation the agreement between the Ministry of Defence and Airbus Company exists for purchasing two middle transport airplanes the Airbus A – 319 CJ, which replace the obsolete formal Russian Tuplev TU – 154 M. Two new airplanes will be equipped beside standard components also by specific army components. Interior of airplanes is possible to change to two alternatives. The airplanes are in VIP variation with a capacity of 44 passengers or to Economy variation of 100 passengers. These changes will provide airplanes to use for transport of government members or transportation of the Czech soldiers to missions abroad. Currently the first of these airplanes is flying in Czech Republic after successful trials and second one is expected to be handed over in September 2007 [5].

The military officials signed up another agreement – SALIS in frame of this we will have reserved strategic air lift by airplanes An 124 of NAMSA form Russian company Volga – Dnepr. The ACR has subscribed 1000 hours of fly capacity until on December 2008.

5. Transportation problem and its possibilities of theoretical solution

5.1 Transportation problem

Transportation, assignment, and transshipment problems belong to a special class of linear programming problems called network flow

problems. As transportation problem is possible consider distribution planning of material and services from different supply locations to place of destination and to a user. Satisfy quantity of material is usually in different supply store limited and need quantities of material is in each destination known. The usual objective in a transportation problem is to minimize the cost of shipping goods from point *A* to point *B* [1].

As example of transportation problem can be illustrated production which involves the transportation of product from three plants to four distribution centres. Management would like to determine how much of its production should be shipped from each plant to each distribution centre. Situation is described by network diagram Fig. 5.1; it shows graphically the 12 distribution routes. In this graph the circles are referred to as nodes and lines connecting the nodes as arcs. Each origin and destination is represented by node, and each possible shipping route is represented by an arc. The goods shipped from the origins to the destinations represent the flow in the network. The direction of flow is indicated by the arrows.

For this problem called as Foster Generator transportation problem, the objective is to determine the routes to be used the quantity via each route that will provide the minimum total transportation cost. The cost for each unit shipped on each route must be known.

supply not equal to total demand, maximization objective function, route capacities or route minimums and or unacceptable routes.

Final summarization formulas for transportation problem:

Objective function is in the form:

$$\text{Min } F = \sum_{i=1}^m \sum_{j=1}^n C_{ij} X_{ij} \quad \text{or max.}$$

Constrains are:

$$\sum_{j=1}^n X_{ij} \leq S_i \quad i = 1, 2, \dots, m$$

$$\sum_{i=1}^m X_{ij} = d_j \quad j = 1, 2, \dots, n$$

$$X_{ij} \geq 0, \text{ for } i, j.$$

Where:

i = index for origins, material source *i* = 1, 2, ..., *m*; *j* = index for destinations *j* = 1, 2, ..., *n*; *X_{ij}* = number of units shipped from origin *i* to destination *j*; *C_{ij}* = cost per unit of shipping from origin *i* to destination *j*; *s_i* = supply or capacity in units at origin *i*; *d_j* = demand in units at destination *j*

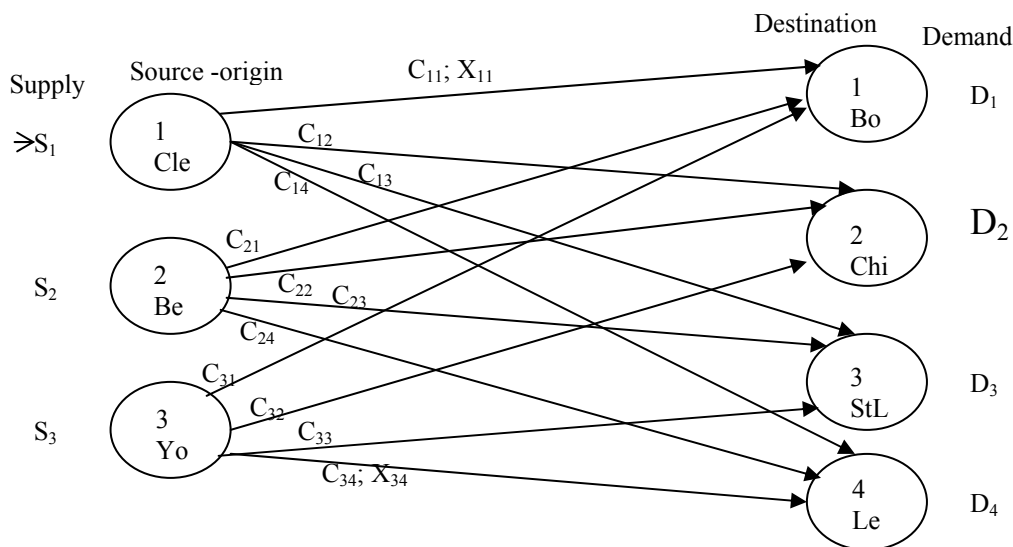


Fig. 5.1 Transportation problem -network diagram

A linear programming model can be used to solve this transportation problem. There are used double-subscripted decision variables, with *x_{ij}*, denoting the number of shipped units from origin - *i* to destination - *j*. For example *x₁₁* denoting the number of units shipped from origin 1 to destination 1; ...or *x₃₄* is from origin 3 to destination 4 and so on. In general, this is possible to deduce from network diagram, where *i* = 1, 2, ..., *m* and *j* = 1, 2, ..., *n*. Transportation problems need constraints because each origin has a limited supply and each destination has a demand requirement. In this general case there are three origins (plants) and four distribution centres as the destinations, four demand constraints are needed to ensure that destination demands are satisfied.

Objective function can be as minimum min *F* or maximum max *F* and constraints are as equations or none equations in case when is *x_{ij}* ≥ 0, in this case *i* = 1, 2, 3 and *j* = 1, 2, 3, 4. Linear equation system is possible to solve analytical way or we can use the computer solution. There are others computer programs packages as COSMOS or ANSYS, or Foster Generators in EXCEL program.

The Foster Generators problem illustrates use of the basic transportation model. Variations may involve situations as: Total

5.2 Solution of transshipment problem

The transshipment problem (Fig. 5.2) is an extension of the transportation problem in which intermediate nodes, referred to as transshipment nodes, are added to account for locations such as warehouse. Generally, shipments are realized among origin nodes, transshipment nodes and destination nodes. In general case, the transshipment problem permits shipment of goods from origins to intermediate nodes and on to destinations, from one origin to another origin, from one intermediate location to another, from one destination location to another, and directly from origins to destinations.

sign contract with civilian companies or as third one is to as for help NATO partners.

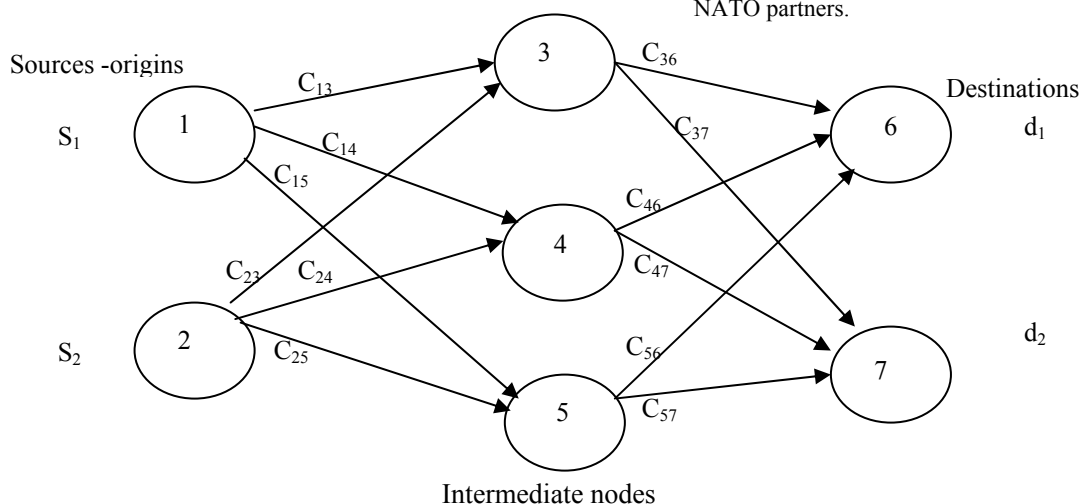


Fig. 5.2 Transshipment problem - network diagram

The general linear programming model of the transshipment problem is:

$$\text{Min } F = \sum_{\text{all arcs}} C_{ij} X_{ij}$$

Constrains are:

$$\sum_{\text{all out}} X_{ij} - \sum_{\text{all in}} X_{ij} \leq S_i \quad \text{Origin nodes - } i$$

$$\sum_{\text{all out}} X_{ij} - \sum_{\text{all in}} X_{ij} = 0$$

Transshipment nodes

$$\sum_{\text{all out}} X_{ij} - \sum_{\text{all in}} X_{ij} = d_j \quad \text{Destination nodes}$$

-j

$$X_{ij} \geq 0, \text{ for all } i \text{ and } j.$$

X_{ij} = number of units shipped from node i to node j ; C_{ij} = cost per unit of shipping from origin i to destination j ; s_i = supply at origin node i ; d_j = demand at destination node j .

Partial conclusion: In previous 2 examples were described transportation and transshipment problems. There were shown how to use network diagrams for this case to obtain formulas the easiest way. The general linear programming models show how to obtain objective function and constrains.

Classical transportation problem and theoretical model of solution is possible to use for tasks as were mentioned but also for the assignment problem. For the assignment problem, all suppliers and demands equal 1; thus the optimal solution must be integer valued and the integer values must be 0 or 1.

Although the shipment of goods is the subject of many transportation and transshipment problems, these models can be developed for applications that have nothing to do with the physical shipment of goods from origin to destination. It can be used to solve a production scheduling and inventory problem. This system is for instance in army USA.

6. Conclusion

The effort of military transportation ACR is first of all to fulfil whole tasks implicit in transformation of ACR. Self support and economization belong to them. There is order how to ask for help NATO partners. First step is to help yourself, second one is to

Linear programming is valuable for transportation officer mainly from manager view, but also for automatic use attainable computers programs. These are for fast solution and resolution transportation or transshipment tasks. Transportation problems with 100 origins and 100 destinations are not unusual.

Even though economics has priority every where some times is necessary to decide according to others criteria which are more important for preparation and practicing. It is important be aware of that each transport supply abroad is original. To the transportation procedure are coming unexpected factors as new constrains. These mentioned results can be help to increase professionalism during transportation by own forces ACR, which author prefers to from reasons which are enumerated.

To fulfil whole tasks of transformation some planned purchases and agreements should be help as was said.

In organization and management of military transportation will help education new specialists -officers of military transportation. From this reason was developed new study modulus - economy of military transportation. This type specialist besides language abilities should be able flexible fulfil tasks on different levels not only on tactical level. From this reason University of Defence is prepared to offer them education not only in bachelor level, but also in programs master and doctor degree.

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