

NATIONAL UNIVERSITY OF PUBLIC SERVICE
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OPPORTUNITIES OF SETTING UP A STRATEGIC LOGISTIC
SYSTEM MODEL FOR THE DEVELOPMENT OF A LOGISTIC
SYSTEM OF THE MINISTRY OF DEFENCE

PhD Thesis

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I. DEFINING THE SCIENTIFIC PROBLEM

The definitions related to logistics, a multidisciplinary science, went through significant changes and evolution in the last decades, particularly as a result of economic challenges and dynamic renewal of technological and leadership methods. Reengineering of processes, reduction of lead-time, increase of adaptation and renewable capabilities provide market advantage for companies in a profit oriented environment, and viability in a budget-oriented environment. It explains that constant need for quickly applying the results of new scientific research into the system of theoretical and practical logistic models while expanding, redefining and re-thinking the previous results.

Efficient and economic use of resources, in a budget-oriented environment the use of scarce resources, thus overall process optimisation, efficient system planning, development and coordination are among the biggest challenges of leadership-theory today. This thesis studies the opportunities to join and to harmonize these focal points in accordance with the logistic system of the Ministry of Defence.

In the context of the logistic system of the Hungarian Defence Forces (HDF), there are remarkable researches related to military logistics that open up to leadership-theory methods and technologies already successfully applied in market environment. This is important, because studying the modern technologies and methods related to business logistics and their potential adaptation to military specifications could significantly facilitate the development of military logistics. One of the possible ways ahead for the development of our military logistics could be that we increase the use of such methods and technologies that already provides significant results in system-level harmonisation of logistic processes and in development of new successful logistic models in a global industrial environment. The capabilities, opportunities and limits of models established in an industrial environment, the experience gained in a hectically changing market and the realized results could serve as an example, negative or positive, for the modernization of military logistic systems, and with

taking into account the specificity of military needs they could contribute to the establishment of a modern military logistic system model.

Scarce budget resources, the hierarchical and large organizational structure, the limited accessibility to classified data systems, the isolated data storage, the separation of knowledge databases make it substantially difficult the implementation of different technological and organization-development programmes, therefore significantly reducing the capabilities of the MoD to change and to develop. This is why it is crucial to open up for solutions that exploit the available resources, facilitate the harmonization of opportunities and limits and provide possible alternatives and considerably contribute to the development processes.

The thesis analyses the coherency of MoD's logistic system in a systematic approach, using controlling methods and IT management tools, placing it into a strategic system model, with the aim to make the linkage points of the logistic system visible in space, in time, in the operational processes and in the management structure.

I studied through these strategic level linkage points the opportunities how the different new leadership-theory methodologies could be fitted to the military supply chain, what models and tools could facilitate the increase of transparency, therefore the optimization of logistic processes and the development of a complex logistic system.

II. RESEARCH OBJECTIVES

The main objective of my study was to establish an analytic model that enables the systematic analysis and evaluation of the logistic processes within the HDF, the gradual exploration of their linkage points, the system level harmonization and synthesis of the operational processes.

During the establishment of the model my main objectives were:

1. Related to the analysis of logistic processes, I presented the economic analytical methodologies and tools originated from the newest research and practical environment that could be projected to the military/budgetary environment, such as strategic management, controlling, related economic informatics tools and economic cybernetics methods.

2. In order to survey and optimize the logistic processes, I studied the applicability and suitability of the modelling methodologies – Lean methodology, Supply-Chain Operations Reference Model (SCOR model), Balanced Scorecard model, simulation systems. In accordance with the expectations of military logistics, I restructured these models before building them into the strategic model concept.

My objective was to make recommendations related to the

- development of new strategic level logistic decision supporting tools and methods,
- opportunities for utilizing the system models in the development of economic informatics (logistic) systems,
- optimization of the current logistic system.

III. RESEARCH METHODOLOGY

In order to reach my research objectives, for my thesis

- I studied and elaborated related national and international literature, I synthesized the available knowledge, then restructured them according to my research, worked out new models and, in connection with the logical line of my research, explored new context of definitions, and based on my own model system I determined new structures of definitions;
- During my work – in connection with logistics, controlling, strategic methodology and informatics system development – I joined different working groups. Taking into account that my research has significant linkages with modern technologies and that the technological contexts related to the thesis change extremely dynamically, I measurably used the professional feedback of everyday practice and the values of experience;
- I applied the partial results, the toolset and methods of the research in the study that was prepared for the EU project ÁROP-1.1.19-2012-2012-0001 named „Impact assessments and the preparations of some ministerial documents of the governmental strategic management system and the support of its practical implementation within the Ministry of Defence”. My thesis has been

continuously improved in connection with the conclusions of the interministerial meetings organised by the Ministry of Public Administration and Justice;

- I participate in the drafting of different document prepared by the Ministry of Defence related to the Governmental Strategic Management System (GSMS). I used the strategy creation guidelines defined in Government Decree 38/2012. (III. 12.) on governmental strategic management. I utilised the partial findings, applicable tools, methods and conclusions of this thesis research during the drafting of GSMS related documents. Some of the research areas have been revised based on the feedbacks received from the different fields.
- I utilised my professional experience of international logistics gained in the private sector and the strategic level management of the Ministry of Defence from my current position;
- I consulted scientific researchers from the same field of science and professional experts, representatives of different institutions that apply, develop, research or teach logistic systems. I presented partial findings of my research in several national and international scientific conferences and professional audiences;
- I published articles in Hungarian and international printed and electronic professional publications, and applied the professional opinions expressed related to them;
- I tested the established models and simulation tools in educational projects for both private and military principles. I continuously improve based on the feedbacks.

In my research, I always strove for scientific system approach. I applied models for setting the conceptual bases, and used the laws of cybernetics and system models for analysing cause and effect contexts, for systemising, synthesising and justifying findings. I fixed the results of the research in a target-model.

IV. THE STRUCTURE OF THE THESIS

Chapter 1: Based on the surveying of the logistics related literature, I systematised, analysed, synthesised the development of business and military logistics and the definition of

logistics as a system. The identified contexts reflect that logistic definitions must be expounded from different point of views in different periods of time. Key questions and main directions could be characterised by logistics related technological, management, social, economic and political contexts.

Concerning the challenges of the new logistic model, it can be stated that organisations participating in the supply chain both severally and as a part of the system must be prepared to react quickly to the economic, social, political, environmental and technological challenges. They must be ready for permanent and continuous reforms, therefore the establishment of knowledge management and knowledge transfer, expansion of competencies, exploitation of available resources become key issues for these organisations. In the field of leadership, decision-making and reforming capabilities dynamism, quickness and transparency, reacting capability and proactivity become conspicuous. However, the capability and efficiency of co-operation, the sharable information, the harmonisation of managerial principles and methods, thus the efficiency of co-operation and the questions of effectiveness are critical factors in all areas.

Proceeding from this concept, I determined the qualitative criteria of logistic systems in a new R-Assessment model with the task of measuring, analysing and assessing logistics in its complex coherence.

Chapter 2: With the increasing complexity of logistic systems and supply chain, those principles, models, tools and applications that support the analysis of the coherence of the logistic system become more conspicuous.

During my research I applied three commonly used modelling and analysing methods - SCOR model, Balanced Scorecard system and Lean value-stream model. I applied simulation tools and used methodology of economic cybernetics, controlling and tools provided by information technology for modelling the different processes and for presenting the findings of my research. I synthesised these systems and methodologies in order to set up the strategic system model. In this chapter, I analysed the coherence of the logistic system from a system theory point of view. Based on the literature related to system approaches and system modelling, I analysed and synthesised the correlations of modelling procedures, their

applicable areas and introduced the basic definitions of related resource management information systems and the context of their development and operation.

Chapter 3: In this chapter, I systemised, analysed and further developed the definitions, methodologies and research areas related to strategy setting, controlling, strategic controlling systems, that basically determine the logical framework of this research.

During my research, I studied the structure of defence and military strategies, annual budget reports, methodological and economic aspects of these strategies of the United States, the United Kingdom, Australia, Spain and Hungary. In summary, it can be stated that in 2012 in the focal point of all of these strategies one would find transparency, measurability, wide communication of the objectives, of course with different solutions subject to the applied methods and tools.

The studied source documents highlighted that the tools and methods efficiently ensuring the measurement and the introduction of measurability of strategic objectives of the Hungarian National Military Strategy and MoD's strategies have not yet been established. Therefore the monitoring system of strategy implementation, and the complex analysis and evaluation of strategies of sub-strategies are missing. In this chapter I studied and, in line with their correlation, identified models, methodologies and tools that could fit MoD's strategic system and would facilitate the implementation of planning and monitoring tasks of strategy setting. I presented different methods that internationally already applied in the defence sector, such as Balanced Scorecard, strategic mapping, and other analytical methodologies like PESTEL analysis, SWOT analysis and benchmarking procedures. The methods applied at the strategic documents in case, and presented in the chapter could significantly facilitate the study of MoD's strategic system, its economic aspects, the analysis of the connections and the coherence between the economic and military fields, and the improvement of the efficiency of planning processes.

I synthesised and systemised and fitted the definitions of controlling and strategic controlling to the research framework. During my research, I studied the international and national application and research trends and context of military controlling. Experiences show that the complexity of military controlling lays in the fact that it can synthesise the different objectives both vertically and horizontally, furthermore it can harmonise and connect military

and economic processes and therefore it can integrate military and economic strategic objectives and sub-systems into one, unified system. Based on the national and international research findings, I built up the controlling system model that could best fit to MoD's operation, and in connection with this model, I also set up the strategic logistic controlling system model that focuses on the logistic aspects.

Chapter 4: The objective of the thesis was to establish a cybernetics system model, that facilitates the establishment of strategy setting processes, the identification of alternatives, priorities and development milestones and the creation of operating plans.

The logistic system is part of a well-defined economic process. It cannot be separated from it, the dependence from it, in line of data streaming, is noticeable.

Therefore during the development of logistic systems, one has to take into account the context and connections of the different elements (organisations, processes and structures) of the economic processes. I position the logistic system model in the Strategic System Model (SSM), a complex framework model that deals with the whole spectrum of the Ministry of Defence. I studied the connection system of logistics with regard to the complex system and the correlations of the logistic systems were also delimited in this complex system.

The SSM framework system facilitates process modelling and optimisation (restructuring) in strategic level. The optimization of processes could be realized because the data gained from the system makes it possible to examine, in details or in its complexity, the efficiency of processes, the contact points between processes and tasks, and the value stream and waste stream.

I kept in view that I wanted to embed the logistic system model into such a structure that is able to present the operational and regulatory system of logistic processes, and that facilitates the introduction of measurability of such processes. Consequently, I synchronized the operating structure and policy of the resource management information system with the principles of the controlling regulation system, and established the model of MoD's resource management information system accordingly. I presented the interconnection points and the disruption points of the logistic system through this model. Furthermore, I demonstrated in

this model both the data and information-flow that influence logistic processes, and the disruption points that occur during data-stream.

The SSM, in organizational level, enables the examination of data structures, the introduction of measurability of processes, the development and synchronization of strategic system models and the development of decision-making models. The logistic aspect of SSM and the exploration of its interconnecting points contribute to creating coherence between MoD and the logistic target strategy and to harmonizing the logistic target strategy with other MoD strategies.

In addition to the fact that there is a MoD wide expectation to create coherence between sub-strategies, GSMS also requires MoD to establish coherence between its own strategies and other national strategies. Since MoD is part of the Public Administration, its strategic system must fit to governmental (development) strategies, to the system of military and defence policy concepts, to national military strategy and to implementation processes. Consequently, creating unified strategies is not only organizational expectation, but also governmental order.

V. A SUMMARY OF THE SCIENTIFIC RESULTS

Network-based logistics exceeds organizational boundaries and emphasis is placed on global interrelations of participating elements and processes of supply chain, in the meantime system development becomes a strategic issue. It exceeds the theory that supply chain is only an integrated connection of logistic components. It gives priority to synergizing system elements and the requirement of widening and harmonizing management tools and methods.

The extension, the operation, the management and the tasks of organizational structure basically determine its logistic operational model and vice versa. Logistics also could significantly influence the organization's overall operational model. That is why, it is indispensable to determine the joining points of the logistic system operational model in the organizational system, and it is also indispensable to examine the related organizational, leadership, resource management, IT and strategic structures and their interrelations when optimizing logistic processes.

Taking into account that development tasks related to systems (organisations and processes) could be best approached along dataflow, since it affects all processes of the organization and covers the co-operational points, providing a transparent and full picture on its operations, in the thesis I placed information flow in the focal point of logistic system modelling and system development. I examined the harmonisation of system elements and analysed both interconnection points and disruption points along this information flow.

Optimisation and rethinking of ministry-wide logistic processes has been an actual topic for several years and is also an urgent request from high-level decision makers in the MoD. During my research, I examined the opportunity to implement a strategic logistic system model in the following two relevant and critical areas of development.

1. In the MoD, currently more than thirty different databases, IT application, data table provides supports for logistic processes. Data flows are irregular both space wise and time wise, furthermore provision of information and preparation of data content for reports supporting high level decision makers are cumbersome. Currently isolated information sources do not make it possible the implementation of coherence between processes; efficiency is determined only based on financial and accounting data, thus complex logistic efficiency-evaluation currently does not exist due to the lack of an integrated database. Information processing is paper-based work processes are recorded several times in multiple systems based on different considerations, leading to a system where partial data are not comparable. Dataflow of strategic and operational processes and their coherence is not ensured. Implementation of a logistic information sub-system and embedding it into MoD's resource management system could provide a solution to the above-mentioned difficulties. The establishment of a basis of logistics controlling and its technological background would facilitate the improvement of the connection between strategic and operational processes and the vertical and horizontal synchronisation of MoD's logistic system.
2. MoD's logistic system went through significant changes in the last decade. The structure and operation of the logistic supply system has changed, therefore MoD has to rethink the operating system of current processes and the relevance of related regulation background. Surveying of logistic processes and introduction of measuring

models could provide adequate basis for process optimization, identification of disruption points and their elimination. Regulatory principles must be placed along an efficient logistic process model in order to support the compliance of efficiency principles and quality criteria while not to obstruct the development of the system. Dynamic process models enable process optimization, the preservation of actuality of the regulatory system, and parallel and real-time recording of necessary modifications. This way process modelling and analysing procedures, measuring and monitoring systems, management decision-making support toolsets and centralized organizational knowledge base that integrates results, methods and tools must play a significant role in reforming logistic systems and logistic processes.

The thesis analyses the coherency of MoD's logistic system in a systematic approach, using controlling methods, strategic management and IT management tools, placing it into a strategic system model, with the aim to make the linkage points of the logistic system visible in space, in time, in the operational processes and in the management structure.

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VI. NEW SCIENTIFIC RESULTS

A. Determination of definitional connections, establishment of related system models

During my research study, I methodized and further developed those logistic basic definitions and related methodologies that basically determine the logical framework of the thesis. Based on this, I

1. prepared a redefinition for the division of the military logistic system;
2. identified the definition of logistics from a systematic point of view;
3. determined the qualitative criteria of logistic systems in a new R-Assessment model with the task of measuring, analysing and assessing logistics in its complex coherence;
4. established the complex system model of controlling;
5. identified the system specific conceptual contexts of logistics.

B. Establishment of a controlling system model fitted to MoD's current system

The objective of the thesis was to establish a cybernetics system model that facilitates the establishment of strategy setting processes, the identification of alternatives, priorities and development milestones and the creation of operating plans. The tasks of the controlling system that supports the above mentioned model are analysing the organizations' operational systems, examining insufficiencies and disruption points identified during the analysis, and providing solutions for them. Controlling is a complex system that covers the organisation's complete operational structure and its management spectrum, analyses the operational processes in a complex manner and therefore it could evaluate events in a complex way. Since the concept of SRM builds on controlling methodologies, I

6. established a controlling model fitted to MoD's current strategic system;
7. generated the Strategic Logistic Controlling model and
8. provided recommendations to the establishment of the Strategic Logistic Measurement (Index) System;

C. Establishment of a model for analysing the contexts of MoD's resource management system

The controlling system and the logistic system presented in the thesis are parts of the MoD's resource management system. The synthesis of the systems takes place in MoD's resource management information model system along dataflow. Efficient development of the resource management information system and its logistic system could be realized through the harmonization of the operational functions of the different system elements that would create balance between data and information flow for each element and level of the resource management model. In order to analyse dataflow and coherence, I

9. prepared MoD's resource management information system model;
10. identified joining interface of strategic controlling, planning and logistics and
11. determined disrupting points and operational anomalies residing in the resource management system;

D. Establishment of MoD's strategic system model (SSM) and determining its logistic projection

12. I formed the SSM concept based on the final conclusions of the different system models. The established cybernetics SSM enables the analysis of data structures and interfaces, the introduction of measurability of processes and the establishment of strategic logistic system models.
13. Although I consider the actual establishment of SSM a next research phase, in order to support its implementation, I composed a model for its development concept.

VII. THE APPLICABILITY OF THE SCIENTIFIC RESULTS

In the framework of the thesis a strategic system model has been set up, in which the pieces and the dimension of an MoD level logistic system became visible, and the areas of logistic system development became examinable in total.

- The strategic system model enables the hierarchical and functional synchronisation of logistic processes and the analysis of operational interactions.
- I applied economic-informatics and controlling methodologies and tools at the establishment of the model. With the use of these tools and methods, I could create a stable and transparent model that facilitates the foundation of measurability of logistic processes.
- Introduction of measurability and the establishment of a synthesised and transparent system model significantly enable the analysis of interrelations of logistic processes and the rethinking of processes based on factual data and the measurement and analysis of interaction of coherence originated from restructuring.
- I applied new analytical tools and methods, or tools that had not been used earlier in the strategy setting processes, in the examination of the different areas.
- I defined principles and policies for the establishment of a measurable and flexible strategic logistic system.
- Taking into account that I built into the thesis the policies, methodologies and new tools required by GSMS, furthermore I applied international military and

private sector practices, experiences and practical results, prospectively this thesis will support in great extent the preparation of strategic documents on logistics, the selection of related methodologies and the development of partial elements and correlations.

- An up-to-date educational base could be set up that includes new development tools and, in my opinion, could successfully be used in both BSc and MSc level education of military logistics.

During my research, the original objectives have been met, however it does not mean that all relevant research areas have been fully explored. There are numerous open research areas to be studied that could further contribute to the improvement of logistic processes. I identified a few without attempting to be comprehensive:

- fitting the strategic level economic and military system models, researching the adequate interface;
- establishment of a system model for strategic logistics and operational level logistics – analysis of frameworks of co-operation, fitting of tasks, processes, responsibilities and competencies;
- identification of controlling measurement points and indices in the strategic space;
- the connections of MoD level logistic model system and NATO model systems, establishment of measurement points and indices;
- the connections of governmental and international programmes and MoD's logistic system (e.g. Strategy on logistics, Strategy of Environment Protection, GSMS).

Researches in the above-mentioned areas could enable:

- the optimization of MoD level logistic processes;
- the analysis of the effects of future development plans;
- the efficient use of scarce resources;
- the harmonisation of MoD level strategies (e.g. development of the system development plan of the logistic information system).

VIII. List of related publications of the PhD candidate

A. PUBLICATIONS:

1. Dóra Cservenyi: Application of economical cybernertic methods for developing logistic systems, Military Logistics 20th year:(3rd) pp. 8-19. (2012)
2. Dóra Cservenyi: Integration points of supply chain information systems III. Logistical system organization and development applying controlling methods, Military Logistics 20th year:(2nd) pp. 19-35. (2012)
3. Dóra Cservenyi: Integration points of supply chain information systems II. - Approach of system and progress in ratio of material and informational trends, Military Logistics 20th year:(1st) pp. 32-42. (2012)
4. Dóra Cservenyi: Position and function of the product code in the system of material and informational trends, Military Logistics 19th year:(1st) pp. 20-36. (2011)
5. Dóra Cservenyi: Modeling of logistical processes in supply chain I., BOLYAI REVIEW 2010:(3rd) pp. 21-44. (2010)

B. TEACHING MATERIALS

1. Dóra Cservenyi, dr. habil. Béla Réger PhD, Technological planning for network modelling: project management, DVD, J1907 (2010)
2. Dóra Cservenyi, dr. habil. Béla Réger PhD: Modeling transportation planning in logistic chain, DVD (2010)
3. Dóra Cservenyi: Network planning systems by computer support - project management, DVD - Software - teaching material, J1908 (2010)
4. Dóra Cservenyi: Modeling of stock husbanding in supply chain - stock management, DVD - Software - teaching material, J1910 (2010)
5. Dóra Cservenyi: Modeling of logistical processes in supply chain - Teaching material - part II. - Project management, DVD - digital notes, EJ0034 (2010)

6. Dóra Cservenyi: Modeling of logistical processes in supply chain - Teaching material - part I. - Stock management WINQSB, DVD - digital notes, EJ0034 (2010)

C. CONFERENCES:

1. dr. Péter Lakatos, Dóra Cservenyi
Supply responsibility - logistical potential és capability: New results in economical and business sciences. Debrecen, 27th and 28th April 2012.
University of Debrecen - Department of economical sciences
1. Military logistics management – Introduction of a pilot project for a practical experience in the aspect of logistics officer training, Budapest, 28th and 30th September 2010, (VII.) Sciences 2010 7th International Scientific Conference Budapest.
2. Dóra Cservenyi, dr. habil. Béla Réger PhD: The role of synergic logistics knowledge management education in competitiveness: methods and results, Komarno, Slovakia, 19th June 2010, 12 p.
3. Dóra Cservenyi: Isolated logistical systems - Approach of system and progress in ratio of material and informational trends - Conference presentation, College of General Enterprising, 2011
4. College of Police Officers - 30th OTDK - Section of air force and logistics - 2nd place