INTEGRATION OF LOGISTICS PROCESSES AS A CONDITION FOR EFFICIENT OPERATION IN BUSINESSES

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Abstract: First part of the paper emphasizes fundamental concepts of logistics which facilitate course of business processes in enterprises and interrelations, which, in contemporary logistics, determine a new system approach. Further part underlines basic components of logistics system, with its tasks and functions, rules that should be used and factors which influence on integration of all the business processes, both in phase arrangement of an enterprise and between businesses on a domestic, international and global scale. Logistics costs, comprising 10-40% of total cost in companies, were also described. Proper planning of these costs brings new opportunities to generate profits and the levels of customer service and, in consequence, achievement of strategic goals. In next part, the importance of information to logistics information systems was emphasized. The necessity of in-depth analysis of the acquired information and its aggregation and deaggregation in terms of the demand at each level of organizational structure was highlighted. It undoubtedly affects functional integration in each information system in the company and thus on efficiency of the integrated information system. The importance of IT techniques and technologies was emphasized. They support performance of the functions within logistics information systems and thus main philosophy of procedure in logistics systems, whose concept is multilevel and multidirectional integration of the processes of flow in economic systems and overcoming all the difficulties in these flows. In order to underline the importance of information technology in logistics, place of logistics IT system in integrated IT systems was defined and their evolution was examined, pointing to the necessity of further development of IT technologies, which integrate companies with their environment. In last part of the paper, focus was on problems connected with integration and presentation of information for the purposes of logistics decision-makers and solutions proposed for these problems.

Keywords: logistics concepts, system approach in logistics, integrated information system, integrated IT management system, ERP system, database, data warehouse.

1. Introduction

Changes in the environment of economic organization stimulate managers to search for new solutions for management. Due to globalization and strong competition in all market sectors, the demand is growing for the methods and IT tools that support management through simplification of analysis of information necessary for decision-making processes.
The concept of logistics is playing in management increasingly greater role. In-depth understanding of the importance of logistics tasks and the concept and purpose of logistic management contribute to achievement of success in domestic and international markets. Realization of the concept of logistics in companies through application of proper measures, subordinated to functional, instrumental and institutional consequences and logistics thinking

leads to enhanced efficiency of operation, which is manifested in positive formation of efficiency, costs and inventory levels accompanied by rise of requirements of quality of the manufactured goods or services.
Considerable impact on development of logistics is from technology advances in IT systems. The need for efficient management of logistics processes creates particularly huge demand on reliable integrated IT systems. Computerization of logistics subsystems, connecting them by means of Intranet and Extranet with all the division within the company and striving for creation of an integrated IT system which is compatible with IT systems from environment is a precondition for efficient information management which supports the efforts towards satisfying of logistics customers' needs and thus towards improved cost effectiveness. Computer aided information systems are of strategic importance to companies. The used IT techniques and means, if skilfully implemented, allow for maximization, through gaining advantage over competitors, of profits in a particular link or the whole logistics system.

2. System Approach to Logistics Problems and Functions

In the beginning of 21 century, in the era of free competition and growing customers' expectations in terms of timely supplies and lower prices, the growing interest is observed for new logistics concepts. In consideration of the views expressed in definitions of logistics, one can highlight at least three fundamental concept of logistics [1. p: 18.]:

- logistics means processes of physical flow of goods, i.e. materials, raw materials, semi-finished goods and final products throughout the company and between the companies and flow of information streams which reflects the processes of physical flow, used for management of these flows,
- logistics is a philosophy and a concept of management of processes of physical flow of goods, based on an integrated system approach to these processes,
- logistics is a domain of economic knowledge, containing some regularities and behaviour patterns that occur during physical flow of goods and information through the whole economy and in individual enterprises.

The listed concepts are closely interrelated and complement each other. Logistics as a field of science ensures development of theoretical basis and the research methodologies which stimulate course of economic processes. As results from this fact, scientific logistics finds solutions in business practice and optimizes it on the basis of research, which results in enhanced efficiency o economic logistics.
Contemporary logistics requires new, systematic approach to the problems and logistics functions within the company and its environment.
Fundamental premises for adoption of system approach in logistics are its tasks, including [2. p: 13.]:

- creation, through logistics processes, of system structure in the form of elements and relations between each other,
- moving in time and space manifested in flow of goods between the points of sending and reception in logistics system,
- integration of two areas – flow of physical goods and regulation.

System approach requires thinking in logistics categories in three dimensions: flow phase, functional and institutional.
A consequence of system approach is the concept of logistic system, which is a prerequisite for creation of logistics IT systems. System approach in contemporary logistics ensures optimization of the system, since all the components of logistics system are subordinated to a

common general goal and are oriented toward the forms of cooperation which ensure positive assessment of the whole logistics system. In order for this approach to logistics to be set on improvement in efficiency of management, and, in consequence, on development of the concept of supply chain and network, the importance of information and the impact of its quality, intensity and the method of transfer on optimal flow of goods and rise in efficiency of operation should be underlined.
Logistics system in holistic approach, presented in Fig. 1, is composed of: warehousing, moving of materials and goods from raw materials through different stages of manufacturing of semi-finished goods, assembly of final product to packaging, warehousing, transport and deliveries to final recipient [3.] and the information integrating all the system segments.

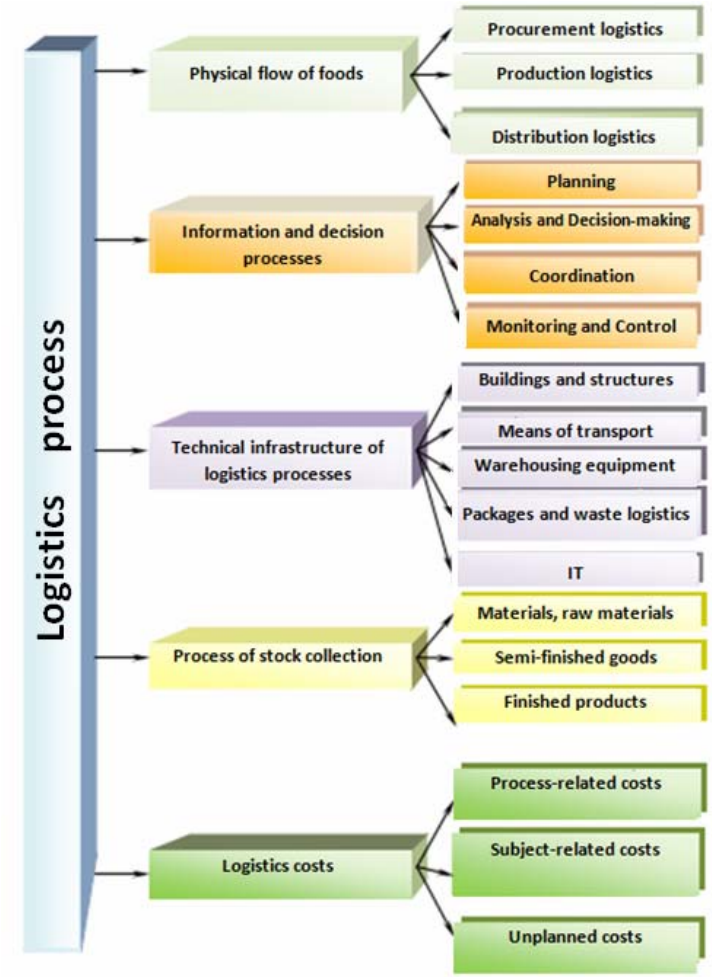

Figure 1. Fundamental components in logistics processes
Source: own study

An overriding goal of logistics system is to facilitate management of the processes of flow of any resources (materials, final products, financial resources, information, machinery, employees etc.) in order to satisfy the needs of each participant of logistics processes and customers.

Continuity of the physical flow, which involves unpredictable events, also of a random nature, is secured by building up the stock. Inventory levels and their type depend on the decisions. The decisions, on the other hand, similarly to other logistics processes, are connected with informational and decision processes. The most important functions of this process include [1. p: 394.]:

- planning of logistics processes, e.g. demand forecasting, planning of material needs in different cross-sections and time horizons,
- coordination of logistics processes, events and operations throughout the whole chain of flow of physical goods and services,
- monitoring and control of logistics operations in terms of purchase, sales and inventory,
- operational control of logistics processes, particularly of deliveries, transport, warehousing, physical distribution etc.

The listed elements of logistics system require use of proper technical resources, which can be defined as a logistics processes infrastructure.
The infrastructure should ensure, from technical point of view, fast and efficient physical flow, protection of stock from losing their functional properties and proper means and techniques that ensure collecting and processing of data and fast sending of the most essential and valuable information that allows for optimal control of logistics processes.
Logistics in companies should be treated as a system, giving up the narrow functional approach. It should focus on total integration of economic processes, both in phase arrangement of an enterprise (procurement, production and distribution logistics) and between businesses on a domestic, international and global scale. Integration in logistics systems should be understood as a maximal integration both in the object-oriented (flow of information, materials and logistics functions) and subject-oriented aspect (integration of logistics functions inside companies, logistics system with other systems, integration of cooperating enterprises) [5. p: 18.]. More and more often logistics is treated as a subsystem of an enterprise, however, the enterprise does not comprise a logistics system itself. The bigger scope of integration of the processes of flow of resources, the greater economic importance of logistics activities. Logistics system has open nature since its elements are in relation with the environment that forms the enterprise's operation.
System approach in logistics aims at integration of separate subsystems inside an enterprise within a new specialized logistics system, which becomes a base for development of logistics chains, and, in consequence, of supply networks. Integration of logistics systems ensures access to necessary information which, if properly visualized, might considerably simplify the process of logistics decision-making.

3. IT Support for Logistics System

3.1. Importance of Information to Logistics Information System

Ordering and separation of the structures of logistics systems and subsystems is necessary for creation of integrated information systems. The practice shows that in the case of complex business systems, the conflicts in transitions between subsystems appear, termed as intersections. There are a variety of reasons for conflicts, including [5.]:

- resulting from different understanding of the goals of activities, depending on a decision-maker level,
- appearing due to difference in opinion on importance of connections between the components of the system,

- resulting from domination of some subsystems, e.g. procurement, production and sales, conditions historically, also resulting from informal connections etc.

The goal of logistics is to solve, limit or to tone down these conflicts. Solving these problems is typically carried out gradually, with partial implementation of the modules of logistics systems.
In practice, components of logistics systems which help to get rid of these conflicts and which support performance of several essential functions include [5.]:

- integrated computer networks which allow for automated support for management (through e.g. barcodes, RFID), while IT is used only as a tool for realization of the goal, whose efficiency depends on system solutions in terms of organization, planning, finance, motivation, control etc. Quantity, quality and frequency of flow of information about material and financial turnover is also of great importance,
- technical means which allow for moving, reloading and warehousing of goods during delivery cycle (from manufacturing of the product to delivery to the consumer),
- decision-making services which manage physical movement of goods, making use of modern tools (multi-criteria optimization and simulation), organized in suitable units.

A key role for logistics information system is played by the quality of information. Nowadays, selection and assessment of the quality of information is becoming even harder due to availability of greater and greater number of data and information through use of contemporary IT structures and due to difficulties of selection and adaptation of proper methods and techniques of information management. Therefore, the efforts should be made to use such methods and techniques for selection, synthesis and presentation of information that information necessary for operational, tactical and strategic planning is obtained. On the basis of the knowledge of internal situation in an enterprise, they allow for making right decisions with lower risk level. Without necessary information, businesses can not efficiently operate. The importance of information can be realized by understanding that right decisions are based in 80% on information, 10% on inspiration (invention) and 10% on managers' intuition [6.].
Characteristics of information system which would support all the logistics processes was proposed by T. Skjott-Larsen [7. p: 8.]:

- data which are input and used in one subsystem should be available for other subsystems if necessary,
- there should be one common database available for all the interrelated subsystems,
- closely related activities e.g. in terms of execution of orders, should not be divided into many independent procedures but realized by means of one procedure, which simplifies performance of these tasks and prevents from repeating of operations,
- separation of information and IT infrastructure into individual subsystems should be abandoned; instead, the access to information resources through common database, central computer unit, communication network and common software should be ensured.

As can be concluded from previous considerations, main philosophy in logistics systems is an idea of multilevel and multidirectional integration of the processes of flow in business systems and overcoming of any difficulties and problems which disturb these flows. Logistics system oriented to customer service can be efficient if it supports on an integrated IT system. Efficiency of the system is evaluated through functionality and value of information obtained by users at the system output. There is a necessity to use analytical

information based on databases in logistics systems in order to perform all the presented functions of logistics information system.

3.2. Place of Logistics Information System in Integrated Information Systems for Management

The literature presents different classification of the systems which are incorporated in integrated information systems for management. For instance, E. Turban and E.J. Aronson [8. p: 31-32.] define the following types of information systems: transactional (*Transaction Processing Systems*), informational (*Management Information Systems*), supporting decisions (*Decision Support Systems*), informative for managers (*Executive Information Systems*), expert (*Expert Systems*) and neural networks (*Neural Nets*).
J. Kisielnicki, on the other hand, divided information systems according to the criterion of functionality into [9. p: 284.]:

- utility software, which simplifies using computers, including operational systems, antivirus and diagnostics software,
- systems for execution level, including office automation systems (OAS) and transaction processing systems (TPS),
- systems for organization management, encompassing management information systems (MIS) including data search systems, monitoring systems and advisory systems (decision support systems (DSS) and expert systems (ES)),
- complex systems, which encompass the area of the whole organization, e.g. enterprise resource planning (ERP).

In consideration of the components of IT systems which have critical importance for users, such as: information resources contained and processed within the system with different features and of different origins, available models and procedures of processing of information resources, technical means used for collecting and processing of data and information and complexity of the system, the author assumed the division of the systems into generations [9. p: 284.].
First generation encompasses transaction processing systems, supporting functioning of an organization in performance of individual functions, e.g. accounting and reporting, economic analysis in terms of accountancy, finance, human resources, logistics etc. and supporting decision-making on the basis of the obtained data. Second generations is formed by management information systems (MIS) and systems of data search and monitoring, working in ad hoc mode. Third generation was assigned systems of support for decision-making, comprising model bases and knowledge bases and software for management of these bases. Independently of these systems, expert systems appeared, number by the author among fourth generation of information systems. The systems of this type, through use of scientific achievements on artificial intelligence, include bases of knowledge acquired from a variety of the previously inaccessible sources, e.g. knowledge from experts and, still only theoretically, they have opportunities to expand the knowledge through self-learning. By means of expert systems one can solve the problems poorly or improperly structuralized. Each generation appears as a result of evolution and continuous improvement, accompanied by technological advances and opportunities to use cutting-edge achievements in other fields of science. Generations of information systems are still developing and completing each other, creating dependencies and correlations. In the near future, with assumption of a division of information systems presented by J. Kisielnicki, a fifth generation will appear, including intelligent advisory systems based on the systems for decision support and expert systems.

The listed information systems aim to integrate all the logistics processes and to coordinate flow of materials, information and finance. Each module of information system must cooperate, creating an integrated logistics information management systems, using, for performance of their tasks, internal information, information from environment and newest achievements of IT technology. Efficiency of operation of the system is ensured by: integrated database, base of models, methods, knowledge etc. equipped in suitable management system. Thus it will be possible to acquire and integrate data, consolidate software and procedures necessary for use of them, support for tackling complex economic problems.
A precondition for satisfying results from business activities is high requirements of information at the input of each logistics process. In order to obtain proper coordination of a particular process with other processes, the relationships between input and output of each process should be considered in order to predict the final effect in the form of a set of initial data for another logistics process. Therefore, the logistics system functions allow for analysis of the flow of information, defining of common elements, relationships between them and adaptation to hardware and software implementation.
It can be generally concluded that, in order to achieve integration and complex management of the processes of flow in logistics systems, the most important premises include [10. p: 28.]:

- integration of information systems,
- unification of partial functions in the systems,
- access to database for all organizational units,
- popularization of the methods of visualization of operational processes, application of visualization for support of the analysis of information and the process of decision-making.

An essence of logistics information system is collecting data and information, storage, suitable processing and distribution of information, presenting and making optimal decisions for coordination of logistics activities. The decisions made must concern all the elements and links in logistics system with consideration of phenomena that occur within the whole supply chain and changes that occur in the environment.
However, integrated information management system is aimed at creation of new, in terms of quality, system for management in companies, supported by IT tools, while its elements depend on each other and on the whole system and are connected by means of suitable relationships and connection in order to deliver information necessary for decision-making.
Integrated system of information management is the highest evolutionary form of application of IT technology for support of management processes in companies. Module structure of the system allows for stage-based implementation of necessary components.
The most important features of integrated information systems, whose most developed form is now enterprise resource planning system (ERP) [11. p: 33-34.]:

- complex functional nature – encompasses all the areas of enterprise's operations within a functional structure,
- high level of integration of data and processes. This concerns data exchange both inside the company, between the modules, as well as with market partners and the whole environment on macro scale and closest (competitive) environment,
- modular structure and openness – allows for stage-based implementation of the system, creation of relationships with external systems and is characterized by scalable architecture (typically client/server),
- structural and functional flexibility – ensures maximal adaptation of hardware/software solutions within technical and functional structure to enterprise's

needs at the moment of system implementation and it also allows for its modification and dynamic adjustment to changeable requirements and needs generated by the environment.
- content-related advancement – ensures total IT support for information and decision-making processes, using mechanisms of free extraction and aggregation of data, optimization, forecasting, analysis, diagnostics, variant selection, presentation and also practical resting of the system on the concepts of logistics management and fulfilment of ERP II requirements,
- technological advancement – guarantees use of leading-edge achievements of IT technology (hardware, software, operational systems, techniques of creation of comparisons, reports, presentation etc.) and ongoing modification, it offers graphical interface and use of a variety of databases, depending of the needs, with application of cutting-edge programming tools,
- compliance with Polish legislation, particularly in terms of accountancy.

Relationships and connections between each type of systems comprising ERP, with emphasis the place of logistics information system which integrates realization of all the processes is presented in Fig. 2.

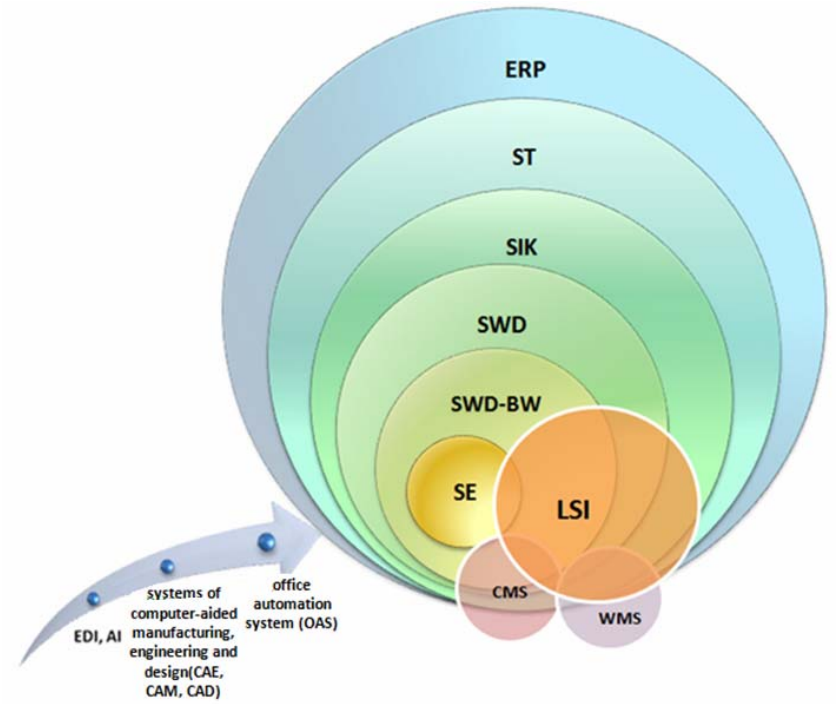

Figure 2. Place of Logistics Information System in ERP integrated information system
Source: own study

Proper relations between each type of system included in ERP affect efficient operation of enterprises, fast flow of information, successful competing, through e.g. cooperation with competitors, fast and right decision-making through the whole logistics chain. The aim of ERP system is to provide complex management of production and distribution processes, integration of all the areas of activity through facilitation o the flow of information critical

for its functioning, with response to changes in demand. It seems to be advantageous that all the changes are implemented in real time, at the moment when the particular decision is being made. Within enterprise resource planning system, it is possible to provide simulation of equivalent logistics actions and the system, if supported with CMS and WMS, supports planning and realization of logistics operational processes, ensuring suitable and fast flow of e.g. goods, human resources and information throughout all the economic processes of the company, delivering proper information on strategic level.

4. Problems of Integration of Information and Presentation for Logistics Decision-Makers

Logistics information systems, operating within the companies, allows for processing of the data which describe its environment, current situation and current operational activity on the condition that it is based on an efficient system of database management. The literature of the subject describes database as a model of a particular aspect of reality within an organization, containing a particular data set, whose goal is to present a particular area subject to analysis in a given time. In general, database is an abstract informational reflection of a selected part of physical and conceptual reality, containing logically coherent set of data with specific meaning [12. p: 13.] [13. p: 14-16.] [14.] [15.].
Databases can be very efficient and provide an extended knowledge, and the costs of creation, maintenance and use are returned very fast, if it is based on suitable system of database management. Efficient database management system facilitates the processes of:

- definition, consisting in specification of the types of stored data,
- data recording on carriers controlled by the system,
- database processing for different applications, consisting in generation of queries in order to search for particular data, generating reports and other forms of data presentation, modification of the base while updating data accordingly to changes that occurred in the given area.

Data collected in databases are typically organized according to the opportunities of presentation of the data in computer systems. The following categories of data models are emphasized: conceptual and implementation data models including hierarchical, network-based, relational, object, combined object and relational and temporal and physical data model, defining methods of data organization in external computer memory. In this model at the highest level of detail, the importance and address of individual bits stored in memory are considered, while the lowest level of detail uses concepts such as: record and file [9. p: 206.] [12. p: 58-79.] [14. p: 23.] [16. p: 164-165.].
Nowadays, the most popular model of data organization is a relational model. However, fast development of IT techniques and technologies, bringing opportunities to present information with more complex data structures, not only in the form of texts and tables but also as a picture, sound or a film, forces to implementation of different model of data representation. More and more often object and combined object and relational databases are employed. Perspectives for the future include temporal and deductive databases.
The disadvantages of the database systems include:

- distribution and dispersion of the data caused by a number of systems existing within a company, which are neither integrated nor even connected while the data originate from different sources, are stored in different databases and have different formats, which makes it difficult to understand the same concepts by different groups of persons,

- support of only economic processes that occur in the given enterprise, i.e. current organizational activities such as e.g. customer service, distribution, inventory management, financial and accounting system,
- efficient processing of only small data sets concerning certain operation combined with lack of opportunities of cross-sectional analysis of huge amount of data,
- storage of only data which reflect current status of the company in this arrangement so that they can be added and modified while historical data are stored by the system for a short time and history of data modification is completely unavailable,
- problems with access to history records from previous periods of activity, often coming from different sources and recorded by other systems.

Despite continuous improvement of database systems, information obtained from the collected data are not suitable for management of the whole enterprise and support for the process of strategic decision making. One of the solutions for this problem is application, at the strategic level of organization, of data warehouses or, in the future, intelligent databases.
Through features of data warehouses, such as: subject-related ordering of the data, integration of the data, invariability and time-marking for the collected data, the effects of their implementation can be observed, including [17. p: 82-88.]:

- fast access to information from highest to lowest level, i.e. viewing of both global comparisons and the littlest details through data-drilling encompassing drill-down analysis, providing details for all the data in the given area, aggregating (drill-up) analysis, and cross-sectional 'slicing & dicing' analysis, systems allows for viewing information contained in different reports supporting decision support systems,
- acquisition of knowledge from 'data mining', often referred to as intelligent data exploration [9. p: 174.] by means of a set of methods using a variety of techniques and algorithms in order to search, analyse and select data according to previously defined patterns and showing relationships between variables, which, in consequence leads to the model of data with the template in the form of previously prepared pattern including all the analyst's queries. This technology is basically used for automated searching for unknown dependencies and patterns which are mainly provided in the form of logical rules, decision trees and neural networks.

Main benefactors of data warehouses include managers, junior management and analysts who prepare a particular set of data for decision-makers at strategic level. It is them whose expectations should be first met by data warehouses.
Despite a number of benefits from use of data warehouses, the process of formation and structuring itself is not easy and is connected with considerable costs. Creation of data warehouse is successful only if a company, before realization of such plans, will consider, except for other significant factors, a methodology of creation of such databases, which is usually known only to implementation companies.
In order to reduce the risk of failure, one should, before starting on creation of data warehouse, carry out analysis of the enterprise structure and available data resources with opportunities of use, analysis of information needs at individual management levels and design of installation and implementation of the tools for creation of data warehouses and system of analysis.
On the basis of the results of the analytical works and financial status in an enterprise, the suitable model of data warehouse should be selected and proper attitude to the process of design, using proper criteria and procedures. Proper planning of architecture, which comprise a base for the whole system, allows for considerable improvement of efficiency during realization of each stage of creation of data warehouse. On the other hand, selection of

proper procedure of operation, e.g. cascade, evolution, incremental, spiral or combined, will allow for precise determination of costs and time of creation. In practice, the most frequently used procedure is the combined one, which allows for adoption of a particular strategy for the given situation. For the projects which have to be quickly implemented, combined diagnostics and cascade approach is adopted while for complex and difficult projects, a combined prognostic and spiral approach is recommended [9. p: 111.].

During design of architecture of data warehouses, the popular strategies are used: top-down, bottom-up, inside-out or mixed, appeared as a combination of these strategies. The architecture itself appears in two basic types. One of them contains centralized, corporate warehouse for data storage whereas the other, instead of one centralized warehouse, encourages to implementation of a number of many separated warehouses for a variety of areas of company's activity, using combined (top-down and bottom-up) strategy. There are a few variations of both fundamental types of architectural designs, the most popular being: data architecture with data marts of hub-and spoke type, architecture of corporate data warehouse with operational data marts ODS, architecture of distributed data warehouse. Selection of one of many architectural variant is presented in Fig. 3 and depends on enterprise specification, needs and financial resources.

Great importance to efficient operation of the whole system is from final phase-maintenance. This phase is mainly emphasized as one of the major reasons for failure in creation of data warehouses. It is responsible for modification and extension of the system with consideration of fast-developing IT techniques and technologies, integrations with changeable environment, removal of irregularities and failures during previous stages of implementation.

Most of errors are connected with improperly selected software, which, in final stage of implementation, does not fulfil users' expectations. In order to avoid this situation, it is important, as soon as possible, to chose, among a number of systems offered in the market, a computer system whose possibilities are demonstrated at each new stage of the implementation and can be compared to users' expectations.

Changes that occur in the environment of economic organizations should inspire managers to search for new solutions for management. Unfortunately, there are a number of barriers for implementation of integrated IT systems or achievement of the final success. The most frequent limitations include:

- economical – whose reason is not only lack of financial resources for purchase of suitable hardware and software, much more expensive due to implementation of IT systems, but also lack of idea for successful computerization in the enterprise using other methods and with lower costs and improper calculation of creation of IT infrastructure, which should be treated as an investment,
- lack of preparation of organizational structure to use of IT systems due to improperly functioning IT system and incompletely determined division of competences and responsibilities at each position, which is often a result of lack of determination of strategic goals,
- insufficient knowledge about the essence and functions of management systems,
- sociopsychological barriers to implementation of changes, which causes underestimation of scientific achievements which enhance efficiency of informational systems and unwillingness to expand knowledge in terms of newest techniques and technologies of collecting, processing, passing and presenting of information,
- lack of awareness and fluency of future users, who, without knowledge and assistance by professional external advisors, would be able to chose and assess the implemented system,

– non-conformance to the principles of IT systems implementation and underestimation of final stage – maintenance of the system, which consumes the biggest part of the costs.

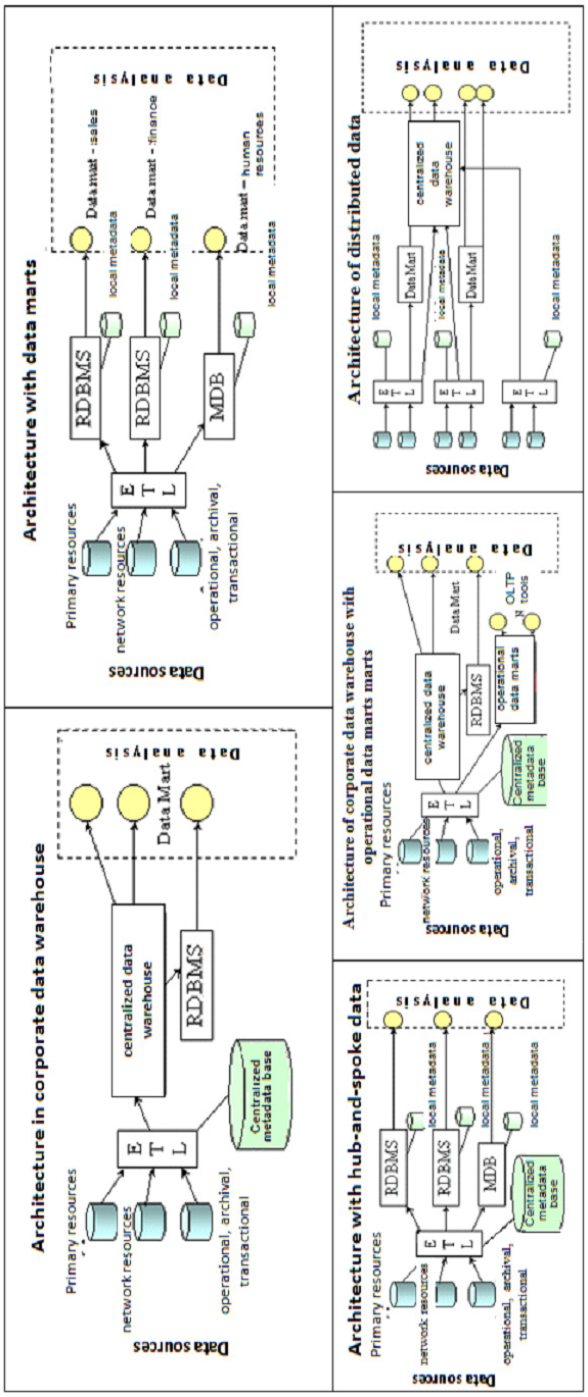

Figure 3. Basic types of architecture of data warehouse
Source: on the basis of Sen A. Sinha A.P.: Comparison of Data Warehousing Methodologies, Communications of the ACM, Vol. 48, No. 3, March 2005.

Summary

To recap the considerations contained in this paper, it is remarkable that fast technological advances which have taken place in the 20th and in the beginning of the 21st century, provided a number of tools for support of design of integrated information systems and creation of data warehouses. Due to the pace of transitions and rapid development of such sciences as economy, mathematics, statistics and information technology the oared tools are imperfect and can not be used in practise without consideration, in an unlimited and expensive way. It is essential that the implemented IT system is successful, i.e. it performs its functions in certain time, at particular costs.

A fundamental goal for IT systems is to solve the problems concerning collecting, processing and sending data and information in a way suitable for all levels of management in order to facilitate the processes of decision-making and to improve their efficiency. Properly implemented information system, with suitable databases and data warehouses, should support decision-makers' understanding, leading to finding best solutions for partial structuralized and unstructured problems. The enterprises, forced to dynamic development and restructuring of operation, must cope with a number of problems, connected not only with incessantly growing number of customers, increased production, number of services or growing internal and external traffic, but also with problems which have not been solved by governments yet. In order for the enterprise to be able to compete with foreign companies, it must have access to efficient and fast moving information. Nowadays, the scale and range of sent information streams, necessary for efficient operation is still on the increase.

Problems of databases and data warehouses are accompanied by difficulties connected with preparation of managers to use of the obtained information. The emphasis should be here on proper knowledge of economy and methods of analysis and aggregation of data in order to obtain information of highest quality for formulation of transparent, right conclusions, ability to select tools for presentation of diagnostics knowledge, using achievements of data visualization and information.

In Polish enterprises, application of most useful computer simulation tools for logistics is still very rare. In other European countries, computer simulations, making use of speed of calculations made by means of computer, realize simulation in a multi-variant way, based on a model designed by means of real data from the environment. The results of these experiments allow for selection of optimal variant of solutions. In logistics systems, simulation can support decisions concerning transport, execution of technological processes or warehousing and should also support the most important strategic decisions.

Logistics concept of management plays increasingly more important role for improving competitiveness. Proper understanding of importance of logistics tasks as well as the essence and goals of logistics management contributes to being successful in both domestic and international market.

Rising importance of logistics was accompanied with switching to thinking in logistics categories, which is associated with a number of problems, especially with functional, instrumental and institutional consequences. Realization of logistics concepts in companies through application of suitable measures, subordinated to these consequences of logistics thinking, leads to improvement in efficiency of operation. It is manifested by positive formation of productivity, costs and inventory levels with increased requirements of quality of manufactured goods of services [18.].

Essential impact on developments in logistics is from technological advances in information systems. The need for efficient management of logistics processes creates particularly huge demand for efficient integrated information systems. Computerization of logistics systems, connections made by Intranet and Extranet networks for all divisions in companies and

striving for creation of integrated information system which cooperates, through the network, with other systems from other branches of industry, is a precondition for efficient information management, supporting company's efforts towards meeting logistics demand of their customers and thus for enhanced cost effectiveness. Computer support for information system is of strategic importance for enterprises. The applied techniques and information measures, if skilfully implemented and used, allow, through taking advantage over competitors, for maximization of profits in both logistics chain link and throughout the whole chain.

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