Problems of container terminal management systems automation

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Abstract. The problem of goods turnover containerization is considered. The structure of existing container terminal management systems, their advantages and disadvantages are described. The benefits of these systems deployment are described. The further development of container terminal management systems is suggested.

Keywords – container terminal management systems, management automation, decision making support systems.

I. INTRODUCTION

Container transportations obtain more recognition all over the world as convenient and reliable way of cargo transportation and their volume steadily grows. The market of container transportations is not simply capacious it’s a business where huge capitals turn. In the world market container transportations take 60% of all cargo transportation except for loose, bulk cargoes, and also cargoes, which are transported by means of pipelines [1].

The Russian container market is one the fastest developing in the entire world. In the course of the past 5 years the annual growth of the processed Russian outbound container cargo is 20-23%. [2]. “The National Container Company” predicts that such rates of increase will lead to that by 2015 the volume of the container traffic with the Russian foreign trade cargoes will make from11 to 13 million TEU (an equivalent of one standard 20-funt container). Such increase in the traffic of the Russian container cargo is warranted not only by the fast growth of the commerce but also by the increase in cargo containerization.

Considerable deficiency of port and warehouse capacities, and also qualitative services in processing of containers is thus observed. The Companies-carriers declare shortage of container terminals in the country. The increase in the terminal capacity a management of terminals usually sees in acceleration and optimization of the cargo process through the modernization of manufacture and development of modern technologies. Such important tasks for activity of any container terminal as an exception of loss of the information about containers, optimization of their search, possibility of reception of the information on a terminal condition in a mode of real time, the choice of the most rational use of loading techniques, information interchange with navigable lines and cargo owners demand the operative decision.

II. SOLUTIONS REVIEW

At present the set of the corporate management systems are developed and successfully introduced on the enterprises of large container terminals. As a rule, at the majority of management systems the following subsystems are present a container warehouse [3]:

- The Subsystem of management of the container platform, carrying out of a problem of automatic definition of an optimum site of containers with a view of minimization of their moving at the expense of rational placing in territory of the container terminal;
- The Subsystem of planning of loading/unloading of the vessels, used for loading of vessels more economic, fast and effective way of loading taking into account necessary factors;
- The Subsystem of positioning for tracing of movement of loaders and containers on terminal territory;
- The Radio equipment necessary for maintenance of a dialogue mode between a management system and the personnel for reception of the operative information on the beginning and ending of the task or about problems, interfering its performance.

Such subsystems are realized in introduced in the largest Russian container terminal (the First Container Terminal of St.-Petersburg with the throughput equal 1 100 000 TEU/year) Solvo CTMS [4]. Besides at this project there are subsystems of management of processing automobile and a railway transportation, management of processing of containers on a customs platform and deliveries of tasks for radio terminals. One of the most important functions of system Solvo CTMS is graphic representation of the terminal (topology), it is the module of system allowing visually to display on the screen the terminal, zones, passes, a site of the personnel, techniques and other information to a mode of real time.

There are also some more management systems of container terminals with similar functionality. But, for example, possibilities Flexsim Container Terminal Library [5] do not include positioning through radio equipment and the account of document circulation of the enterprise. The basic accent is made on construction of detailed three-dimensional topological model of a warehouse about arrangement tracing keeping containers, optimization of productivity of the warehouse equipment and the analysis of distribution of industrial planes of the terminal.

System Container Terminal Vision [6] realizes all base functionality under the account and planning of placing of containers, but only on “the dry” terminal, i.e. completely is absent sea and railway logistical components. It limits use of this system on terminals with presence of moorings or tracks.
In Consid CTMS [7] management of receipt of containers with automobile and railway transportation is automated. In addition to standard functionality in this system it is necessary to note possibility of use of schemes of motivation of employees and gathering billing data and their transfer to corporate information system for the further processing and formation of the account for the rendered services.

System «Container terminal» [8] specializes exclusively on the account of storage and repair of containers, and also demands for their placing. There are no subsystems of planning, positioning and management of radio equipment.

System Depot CMS [9] includes modules on tracing of a condition of traction transport on the terminal, management of mobile terminals, management of demands, remote access for monitoring of statuses of client containers, and also billing system and complex visual toolkit which allows to carry out monitoring of a site, statuses and moving of containers on a platform.

III. CONCLUSIONS

Introduction of a typical management system by the terminal on any enterprise will allow increasing quality of servicing essentially. The basic economic results received from introduction of management systems by container terminals are [10]:
1) rational placing, an exception of losses and acceleration of processing of containers;
2) decrease in working costs of the terminal, their optimization and a transparency;
3) optimization of the equipment use and the loading engineering;
4) increase in speed process of motor transport, railway transport, vessels;
5) reduction of expenses by operation of loading engineering;
6) decrease in single run at the expense of use of algorithms of optimization at issue of works;
7) increase effective management by staff;
8) time savings on registration of accompanying notes;
9) access to necessary documents in a real-time.

However in existing management systems of container terminals the problem of operative distribution of vessels under processing between berths is not decided. Technologists should plan vessels expected to the approach between berths, without being based on the statistics of their processing in the past, and also on current placing of the containers planned on corresponding trip. The decision of this problem in the form of an expert system will lead to the maximum satisfaction of demand for port services by means of an effective use of concrete capacities of port with allowance for conditions really developing in port. Accordingly, through satisfaction of demand for port services port incomes increase, and its competitiveness is increased.

The branch of my further researches is working out of an expert subsystem on calculation of the optimum plan of arrangement of vessels between berths from the point of view of expenditures of labour on processing within the limits of already existing automated management system of one of container terminals of Vladivostok.

REFERENCES

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