## INTRODUCTION

The ESCAP region has been the focus of attention for the operational improvement of the dryport logistics industry. The application of digital solutions for the operations of dryports has been the subject of extensive research, and this document presents a comprehensive analysis of the various solutions that are of practical use. The implementation of digital solutions in the logistics industry is characterized by an increased focus on transparency, operational efficiency, and environmental sustainability.

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## CONCLUSION

The successful implementation of digital solutions in the dryport logistics industry requires a comprehensive understanding of the various solutions and their practical applications. This document provides a detailed analysis of the digital solutions that are of practical use for the operation of dryports in the ESCAP region, along with practical proposals for their implementation. The limitations for digital solutions' application and recommendations for their use in the dryport logistics industry are also discussed.
INTRODUCTION

Development of modern logistical facilities calls for the application of up-to-date information and communication technologies, digital solutions and innovative business models, as it is aimed at increasing the attractiveness of intermodal and multimodal transport operations, as well as to developing a region-wide strategic vision of digital transport corridors. As for the well-known digital solutions, first of all it is the application of real-time containers and other cargo tracking systems based on information technology that can increase reliability and security of goods transport operations between dry ports and seaports, thus allowing simplification of customs and other control formalities at dry ports. Gradually, all the transport and logistical centers should undergo transformation into digital cargo/container terminals in the near future.

The lack of accurate and timely information often results in additional effort, errors, delays and time-consuming additional work. Tracks closed for maintenance reduce throughput and production and can affect the entire transport chain. Furthermore, appropriate documentation and authorizations must be deposited where the supervisory authority has access to it any time. Especially in the operation of connecting track systems with few tracks there is a significant effort on the part of the person responsible. Nowadays a large number of different players are involved in the terminal and railway operations, which must be informed and coordinated accordingly. So, for example, maintenance work must be carefully coordinated with all the partners involved. Information about equipment failures and their consequences, such as track unavailability, must be passed on to internal staff and external partners immediately to minimize any negative impact and restore full availability and performance as soon as possible. Today, important information is often still and only available in the written form, hidden in office cabinets, hard to find and last not least difficult to keep up to date, and available.

Digitalization of transport documents and various phytosanitary and veterinary certificates and acceptance of such in dry ports are considered as the key challenges to further logistical operationalization. In fact, over the past several years many studies by the world leader consultant companies and research institutes were devoted to transport and logistics digitalization. It shows the importance of this kind of development.

Application of real-time container and other cargo tracking systems based on the information technologies can increase reliability and security of goods’ transport operations between dry ports and seaports, thus allowing simplification of customs and other control formalities at dry ports. It will be essential that the containers and cargo entry, exit and placement into storage can be tracked by a real-time computer system, so that it will be possible to locate any container or cargo consignment since the time of its departure from a seaport, or from a shipper’s premises, until its arrival at the dry port and placement into storage there.

In addition, a computerized yard control system should be used to determine with precision where a container is to be placed in the stack.

dry port planners or operators should consider deployment of IT systems identifying location of containers or other consignments to be shipped to a dry port from a seaport in real-time mode, as well as computerized container yard management systems.

The dry ports environments have become intricate partner networks that include the authorities, terminals, shipping lines, trucking and logistics companies, and off-dock storage providers. To stay effective, stakeholders have to do more than simply adopt these technologies on their own. Instead, they must embrace platforms and services that make it easier for stakeholders to work together to promote the efficiency of the overall ecosystem. These same platforms and services let individual partners expand their businesses without adding substantial new infrastructure or equipment. In some cases, the multi-stakeholder platforms also create digital-based services that can be used as new revenue sources.
In relation with transport and logistical systems, the focus unit in the logistics chain is not the object (logistics operator) any more, but the integrated digital platform managing transport and cargo flows, uniting all the stakeholders and providing a high degree of the supply chain clearness and traceability.

Digitization is now the first step towards improving the situation with operating a dry port by transforming all relevant information into digital form, making it available centralized use and management and opening new opportunities.

In this case the main direction of the ESCAP region dry ports network digitalization is the production and integration of the regional digital logistics platform as the system for all the cargo transportation process stakeholders, that should be accompanied by the standardized implementation of cargo marking.

1. AN INVENTORY OF DIGITAL AND INNOVATIVE SOLUTIONS WHICH ARE OF PRACTICAL USE FOR THE OPERATION OF DRY PORTS

Modern digital technologies that can be applied at dry ports and other types of transport and logistical terminals, including dry ports include systems that support basic infrastructure, as well as tools for handling cargo, managing traffic, dealing with customs, assuring safety, and monitoring energy use.

The existing solutions can be divided into several fields of application, notably:

- dry port infrastructure,
- cargo handling,
- intermodal traffic and trans-shipment,
- customs,
- security,
- maintenance,
- energy and the environment,
- autonomous vehicles,
- warehouse robots,
- artificial intelligence.

A. Infrastructure

Smart sensors are the key element of the dry port digital infrastructure. Such a sensors are embedded in container yards, roads, railways, and can transmit real-time data about operating conditions of berths and other infrastructure.

Figure 1. Smart sensors

Source: https://sitmag.ru/article/10566-put-k-prichalu-novye-tehnologii-v-portovyh-terminalah-mira
Used in this way, sensors can reduce the need for annual inspections and provide data that helps owners schedule preventive maintenance more precisely. Many sensor-based structural-health-monitoring systems cost a fraction of the structures themselves, and this can mean a relatively fast return on investment (ROI) in countries with the high labor cost.

**B. Cargo Handling**

Every dry port needs its cranes and other cargo-handling gear operate at peak efficiency and to be properly maintained, helping terminal operators handle increased volumes and improving productivity. In this case the Reliable monitoring systems can ensure that connected cargo-handling equipment does this work in real time. "Black boxes" that are installed in one of the containers terminals on 200 cranes straddle carriers, trucks, and forklifts in the terminal, collecting information on location, status of operations, and energy consumption. The system analyzes the information in real time and shares it with terminal staff to identify operating bottlenecks and initiate appropriate action. The prototype's developers estimate that it could shave up to 10% from operating costs by reducing equipment idle time and minimizing energy use.

**C. Intermodal Traffic and Transshipment**

Modern dry ports need the effective options for directing trucks and trains through frequently congested areas as quickly as possible. The solution is the adoption of the Terminal appointment systems, that can let trucking carriers reserve specific times for dropping off or picking up freight. By booking time slots in advance, appointment systems help minimize turn times, reducing the time that truckers spend clogging port arterial roads or sitting idle and contributing to poor air quality. Some of the terminal-logistics centers are testing a GPS-based traffic-monitoring system that tracks truck movements, notifies terminals when vehicles are approaching key facilities, and provides directions on how to proceed. In another application, it is embedded traffic-monitoring sensors along major port roads being tested.

**D. Safety and Security**

Dry ports are required to meet minimum safety and security levels for the facilities and assets they manage. They are responsible for monitoring physical infrastructure and ensuring that only personnel with proper authorization and clearance gain entrance to restricted areas. Among the array of smart technologies that dry ports can adopt to improve security: surveillance systems that use advanced video analytics to detect intrusions on the basis of movement and pattern recognition and then alert security personnel to potential threats. Many container terminals are upgrading from gate entry systems, adding more protection by requiring employees, truck drivers, and visitors to log in through systems that use networked biometric scanners. To address worker safety concerns, ports are installing sensor-based systems that enforce safe working procedures. For example, they use sensor networks that alert truck drivers traveling on dry port property to remain within road lines. Similar networks can keep cranes properly aligned during loading and unloading.

**E. Maintenance**

Maintaining of the track facilities is central to ensuring availability and proper dry port functioning. Maintenance can be assigned to any object in the existing digital tools. Planning
and monitoring are centralized and visible in tables and on the site's graphical map. Rail and truck partners can be granted selective direct access and thus overview of the (non-availability) of tracks. Pickup trips can be adopted to the current situation and being performed more efficiently than before. Last but not least, maintenance work for several locations can be summarized in a "maintenance calendar" and maintenance partners can be informed electronically or have insight via the web interface. The approval and confirmation of the work carried out is available immediately after being entered in the system and is immediately available to the employees and partners. This minimizes maintenance and downtime.

F. Energy and the Environment

Connected technologies help terminals reduce energy consumption and waste. One option is a motion-based terminal illumination system that lights up only when vehicles are in the vicinity. A prototype motion-sensitive lighting system installed at one of the terminals cut energy consumption by 80%, paying for itself in less than two years. The others are deploying similar smart lighting on port roads to minimize energy use. Some dry ports use drones as a low-cost option for inspecting equipment, patrolling waterways for oil spills, and checking on cleanup efforts.

G. Autonomous vehicles

Driverless trucks, cranes and other terminal equipment are now being tested. Combined with the type of control systems that transport and logistical companies have introduced, a clear picture is emerging of how cargo will increasingly be moved inside the container terminal without human intervention.

H. Warehouse robots

There are also examples of companies using small robots for the dry port processes. This field is rapidly developing. The testing of robotics on the warehouses is increasing 18% per year. The mobile warehouse robots are operating on the entirely autonomous compact devices that get an access to all the tight places possessing the expanded viewing area. Such a robots are able to provide quick cargo overload from trucks, wagons, handle the pallets and move the containers and boxes all over the warehouse.

Figure 2. Warehouse robot

Source: https://sitmag.ru/article/10566-put-k-prichalu-novye-tehnologii-v-portovyh-terminalah-mira
Moreover, the effectiveness and speed of the warehouse operations can be increased both by device technologies and pilotless vehicles and multifunctional robots. Due to the machinery learning technologies and sensors, providing the extreme accuracy and simplicity of traceability, a large amount of autonomous robot will be implemented into the warehouse’s operations all over the world.

I. Artificial intelligence

The artificial intelligence systems enable the cargo handling market participants to handle unprecedented amounts of logistical information.

Inevitably, this will impact on the traditional 3PL (third party logistics) transport operators – the operators offering outsourced logistics services, which encompass anything that involves management of one or more facets of procurement and fulfillment activities. The companies have already started to take back much of the work traditionally outsourced to large 3PLs because these new systems are now doing it for them. So, the contemporary transport and logistics market requires the appearance of 5PL (fifth party logistics - a virtual logistics – the modified and automated forth party logistics logistics) market players.

The contemporary digital solutions for transport and logistical centers focus on efficiency improvements like traffic management systems, improving flow throughout the terminal area, automation, reducing costs or digital invoicing (customs) by improving lead time. However, the need for internet of things and digital platforms is driven not only from business perspective, but also from the perspective of dry ports shaping their environment instead of reacting to market fluctuations.

Moving towards a true digital dry port, using the full potential of an internet of things network and smart data solutions, it will be able to identify and take advantage of new business models within the larger ecosystem. The nature of the business makes this challenging, since it requires integration between the supply and demand side, assimilating not only logistics firms and suppliers and distributors but also their clients like industrial producers.

J. Digital copies of dry ports

One more aspect of the dry ports’ digitalization is the unification of physical and digital worlds. This makes it possible for the client to cooperate with the physical object’s digital copy in the way it was done traditionally.

The potential possibilities for the digital duplicate in logistics and endless for data collection and weak points investigation.

Warehouses and the enterprises use this technology to make the exact 3D-models of its centers and experiment with the changes in the configuration, or the implementation of new technical equipment in order to see its cooperation. Moreover, the logistics centers are able to create a digital twin and use it for the goals of testing different scenarios and effectiveness rise.

2. PRACTICAL PROPOSALS OF IMPLEMENTATION OF DIGITAL SOLUTIONS BY THE LOGISTICS INDUSTRY

Modern logistics sector lags in the point of digitalization behind the telecommunication, mass media, bank and retail business sectors. The majority of traditional transport and logistical centers still use a lot of “handmade” work, and their assets are not used effectively (in average, half of all the trucks are going back empty after the cargo delivery). The lack of flexibility and clearness of the operations is an obstacle for the logistics processes integration.
At present, there is a tangible trend in optimization of handling and logistics operation costs, that comes along with the other things, formed by finding a successful compromise between speed and reliability on one hand, and the cost on the other.

A lot of standard logistics operations are already taken into account by the digital systems of large transport and logistical companies in digital solutions of the Russian Railways, if we speak about the Russian transport logistics system. But still, each of these existing informational systems deals with the specific list of separate operations and not aimed to the integration with the other digital products. The current fragmentary transport and logistical market digitalization led to the disunity of standards and data structure. There also no united documentarized interfaces of digital systems interaction.

Moving to practical proposals of digital solutions implementation by the logistics industry, all these solutions, described in the first chapter, can be most effectively integrated in the joint transport logistics digital platform of the region, as it can form online the best market proposal for the customer, based on the accumulated data, to achieve the optimization of the purchases, assets, production processes, logistic chains and financial calculations for the key trade operations and supply schemes, should cardinally change the approach of finding logistics solutions and transform the logistics market structure. Such platforms can also solve the problems of operational management, optimize the transport assets usage and financial calculations for the cargo holders, carriers and the forwarders.

The expected innovativeness and value of the digital logistics platform is consisting in the fundamentally new approach to the algorithms of multi-modal logistics chains modelling, taking into account the unique characteristics of each of its elements.

A. Digital logistics platform

This digital instrument is able to:

▪ automate the business processes, analyze the consumers behavior and offer the optimal solutions to organize the transport flows;
▪ take into account the specifics of railway, auto, water and air transport;
▪ simplify the agreement work between the logistics processes participants;
▪ accumulate, structure and analyze a large volume of data, predict events and minimize risks for participants in logistics processes;
▪ optimize transport and terminal assets utilization, improve its profitability and decrease the logistics expenditures.

The digital logistics platform is able to provide the optimal logistics and manage the distributive warehouses with the minimum amount of staff (the digital terminal).

While managing transport operations the digital logistics platform:

▪ searches the optimal routes using the technologies of machine learning;
▪ uses the comfortable interfaces for the forwarders and the clients;
▪ provides the integration with the governmental informational and clients supply chain systems, organizes the digital document circulation and cooperation with the customs.

While managing the digital warehouse the digital logistics platform:

▪ minimizes the terminals infrastructure and staff expenditures by creating smart loaders using the computer vision technologies;
▪ manages the inner warehouse flows;
▪ form the digital warehouse – a virtual twin (copy) of the warehouse with more than 40 technical parameters of the condition.
B. Digital container terminal

In context of the digital/smart container terminal it is worth describing this concept in detail, as it is a perspective practical instrument to be implemented in the dry ports network operation and increase the effectiveness of the whole ESCAP region logistics industry.

1. The concept of digital container terminal

The digital/smart container terminal is the concept that is based on IT-solutions and can manage the terminal’s business processes, its technical and technological cooperation with all the cargo logistics process participants:

- The approach to the terminal services on the principle of “singe window” and the possibility of terminal services reservation as a part of complex logistics door-to-door service;
- Monitoring of the actual and documentary cargo condition and the equipment on the terminal;
- Centralized/distributed electronic document circulation;
- Containers/wagons transfer;
- Cargo presentation for customs registration and monitoring of the customs clearance process;
- Centralized control of the powers of attorney;
- Formalization of the transportation and accompanying documents (railway and transport consignments).

The elements of the digital/smart container terminal structure are divided into services of management and services of cooperation.
The areas to be managed include container yard, railway front, automobile transport operations, customs zone. The services of cooperation are aimed to cargo owners, railway administration, railway operators, port operators, customs authorities, auto transport enterprises, forwarders, control authorities and others. And the links between the mentioned elements are over-crossed.

All these functions are directed to the multipurposed support of any configuration. While applying digital workflows at terminals, their specific roles (the terminal for sea cargo handling operations, the terminal at the boundary station, the terminal of the industrial enterprise, or the container terminal for the general access inside the country) and respective features should be taken into account.

At the same time, most of the processes on such terminals coincide with each other, but still the specialization calls for supplementary requirements to legislation acts and the peculiarities of the certain type of cargo handling.

Usually, the transport and logistical centers are being constructed gradually: railway infrastructure accesses network is being spread, additional areas for automobile transport operations and being equipped, loading machinery and equipment is being modernized, new warehouses are being built. Due to these processes the cargo handling processes at the terminal are also being changed in its digital model. Like a toy brick construction set, the digital system has to be adjustable in correlation with the physical changes at the terminal, visually depicting the current actual role of the terminal, its functions and capacities.

2. Dry port areas and zones to be digitalized

(a) The loading/unloading railway zone

The terminal operations at the railway front should be planned, brought to the executors and be real-time controlled. The railway front peculiarity is operation with groups of wagons, containers and integration with the railway carrier automation systems, which are planning and managing the railway station.

(b) The loading/unloading truck zone

Same as the railway zone, all the terminal truck front area operations must be planned and digitalized. The automobile transport peculiarity is the required time-slotting of the trucks’ terminal entry and exit for the aim of avoiding traffic jams and peaks of the loading machineries throughout the day.

(c) The parking area

As the result of the requirement to manage the truck loading area with a strict schedule of entry-exit at the terminal, the entry gates have to be managed automatically, forwarding the trucks either to the loading area, or to the waiting list at the parking, if the truck had arrived outside its time slot. The automobile parking should be equipped with electronic queue system to regularize the process.

Besides the management of dry port’s areas and objects, digitalization has to provide the correct information to all the logistics process stakeholders, that cross at the terminal.

3. Elements of the terminal management system

The important elements of the terminal management system are:
▪ Cooperation with the clients and its digitalized systems while collecting the orders for handling and monitoring;
▪ Cooperation with the railway infrastructure (railway carrier and its management systems), port infrastructure (seaport administration and its management systems);
▪ Cooperation with government authorities (customs, phytosanitary, border controls) and their systems of control and accounting;
▪ Digital legislative document circulation with the truck companies, forwarders, railway operators, stevedore and other companies;
▪ Preparation of the accounting and tax statements of the dry port operation, cooperation with tax authorities.

Nowadays a large number of digitalization programs and a pool of IT-projects is being realized by railway administrations all over the world and the ESCAP region is not an exception. Such projects are uniting digital services of transportations and infrastructure management with mobile devices for coordination with the customers.

4. Dry port digitalization basic services

The dry port digitalization processes can be divided into the following basic services:

▪ loading equipment management;
▪ truck handling;
▪ train handling;
▪ warehouse (including temporary storage warehouse - TWS) management
▪ and client services of cooperation with:
  ✓ cargo owners;
  ✓ forwarders;
  ✓ truck operators.

At the same time the basic services of the digital railway and the terminal can’t exist separately, as the multimodal transportation that is often started and ended by the automobile leg is dealing with not less than two terminals for handling and includes railway and sea legs. This is the joint logistics process and its digitalization has to be complexed.

The client services of the transportation legs of the multimodal logistics chain are also interesting for the client of the transportation (cargo owner or cargo forwarder) not separately, but as a single window for order and control of the transportation fulfillment on the whole multimodal route: the load terminal, railway, port, unload terminal, truck leg.

That is why, it is the fact that not dry port digitalization can exist separately from the railway, auto roads and other infrastructure elements digitalization processes.

The digital/smart container terminal paves the way for a complete digital transformation of important processes and workflows in the management and operation of access lanes and dry ports. The connecting track / terminal is provided in a digital track model with all relevant facilities for operation as a central data model. All the processes and actions necessary for operation are based on this data structure. All relevant information is stored in real time and made available to the affected stakeholders up-to-date and accurately. The access and exchange of information can take place both via mobile applications and via standard web browsers and, if necessary, by means of automated secure data interfaces. Collaboration among the actors involved in the overall process is maximized to a digital level, minimizing the burden of sharing information and maximizing reliability and efficiency. The application can be used for both low-track access lanes and
highly complex loading / unloading / transfer terminals. The application can be expanded at any time and adapted to growing requirements as well as customized.

C. The limitations for digital solutions’ application

Although there is a plenty of modern technical solutions, there are factors limiting their application. In particular, the following matters should be addressed in order to ensure efficient and full-scale operations in digital format:

- elaboration of common approaches and clear definitions of transport services, both by the market actors and regulatory authorities;
  - Formal definition of every process in the logistical chain is required (cargo transshipment, providing wagon for loading, providing the container for loading) with the exact frames of the process, the formalization of the transfer of liability for cargo being transported. The latter is especially important for smooth connection of “links” in the “chain” of an intermodal operation involving several operators
- unification of documents accompanying cargo and confirming the provision of a transport/logistical service;
- providing for compatible cargo nomenclature guidebooks and coherent systems identifying locations of transported cargo points of origin and destination; and.
- development of unified legal frameworks covering relationships of the actors of digitalized transportation, both at international and domestic levels.

In this connection, the matter of potential establishment of an international certifying centre for digital transportation and logistics, as well as development of an international legal instrument on digital signature which could provide for mutual acceptance of electronic documents confirming the provision of transport/logistical services, may become crucially important in the near future for efficient digital transformation of transport and logistical industry (including dry pots).

3. RECOMMENDATIONS ON APPLICATION OF DIGITAL SOLUTIONS FOR DRY PORTS IN THE ESCAP REGION

A. Main dry port digitalization cornerstones

The recommendations on digital solutions’ implementation into the operations of dry ports are based on 3 main cornerstones:

- **Dry ports usually specialize on handling particular types of goods and have certain geographic and logistic peculiarities, which have to be taken into account while creating the terminals processes digitalization systems.**
- **Dry port are points of interaction of different material and information flows of several actors of logistical processes (cargo owners, forwarders, linear operators, carriers, state authorities, etc.).**
At the same time there are both directly terminal processes and the processes of all the other participants. That is why the dry port processes digitalization system should have its own management service (terminal and temporary storage warehouse work load, the work of automobile and railway fronts, handling equipment) as well as to perform on behalf of the multipurposed tool of the other participants and state authorities’ processes integration.

- **In perspective, the multipurposed systems that will be integrated with the other logistics chain participants IT-systems will be the winners of the dry ports digitalization market – not the IT-systems of the separate terminals.**

Such an integration with many communicating systems will provide the support and establishment of the industrial standards of data exchange and cooperation.

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**B. Distributed control system (DCS)**

The most effective way to apply digital solutions, described in Chapter 2, is to base it on the special distributed control system. Also, it is worth taking into the mentioned above cornerstones and factors. The DCS can become a key system of the dry port technological infrastructure network.

1. **The DCS description**

The dry port’s DCS is aimed to provide all the basic functions of the logistics services delivery as well, as a set of additional functions, connected with the transportation process, control requirements and the optimization of inner processes of the dry port or the network of dry ports. The basement of the dry port’s DCS is an architecture of the system that is meeting the following requirements:

- availability of a wide list of potential stakeholders’ categories (inner and external), the possibility of users’ categories list expansion (independent designers, system integrators), the potentially large number of external users;
- separateness and independence of dry port’s DCS from the status of external IT systems, security and cyber-attacks sustainability;
- the availability of a variety of integral services and the increase of its amount as far as the dry ports network and logistics services market develops;
- the requirement for integration with the internal management systems, providing the commercial activity of dry ports, its financial processes and operation functions;
- the exposure of architecture for further integration with the existing and perspective analytics platforms;
- the availability of interfaces for the establishing of cooperation with the state and private analytical platforms of the potential foreign partners.

The determination of the IT-platform perspectivity is based on the following requirements and factors:

- the possibility of flippy customizing the parameters of business analytics, scenarios modeling and transport and logistical processes planning;
- the possibility of scaling the territory borders of the system, its guidebooks, the widespread sub allocating of the dry port’s infrastructure and the possibility of the distributed data storage.
Upon deciding on the architecture of the system and the choice of the platform it is possible to turn to the hardware stage realization of the DCS.

2. The DCS core principles of calculations and data processing

The technological and commercial solutions of the dry ports network are realized in DCS. The core principle of calculations and data processing inside DCS are classifiers. To provide the sustainable dry ports network operation the DCS should include and look ahead the following:

- classification and scaling of the service types, including the dry port's operators' services, the dynamic pricing system for different services, classification and scaling of the list of system stakeholders;
- classification of the transported cargo types (including perishables and cargo, requiring special transportation conditions and temperature regime) and the reconcilability of these cargo types;
- classification of the transport vehicles due to its variety while doing multimodal cargo transport operations;
- classifications of the customs regimes of the transportation (including export, import, transit).

Classification of each of the types mentioned above is the basement for creation the systems of guidebooks to become the intellectual technologic core for the data processing in order to provide the effective procedural and commercial processes, dispatching of the transport and cargo flows with the lowest level of mistakes.

It is worth mentioning that DCS provides the data processing and analyzing the whole range of dry ports network basic services, including the diversified dry ports operators' services.

3. DCS services

The types of the services for the external consumers consist of:

- transport and logistics services in the frames of regional inner routes and international transport corridors cargo flows (in addition to the basic logistics services, such as cargo tracking, cargo searching, monitoring of transportation temperature regime and others);
- accompanying services for the cargo transportation customers (the cargo insurance, crediting, payment holiday and other financial facilities, customs formalities and procedures);
- IT services: operators check in order to reveal and to exclude the unreliable ones, the providing of maintaining the register and an electronic document turnover;
- the proving of the secured information exchange;
- informational-technological services, including the real-time authorized access to the data in the frames of standard request correlating with the security requirements.

It is perceived that dry ports are expected to provide a wide range of customer services. Thus, the dry ports operators' IT systems integration is highly requested to form a region-wide platform. This issue is the only way for the dry ports operators to be able to provide services, supposed by the DCS and for the carriers to be liable for cargo owners and counterparties (infrastructure, wagons and container owners).

Of course, pilotless technique and equipment should be used for the load-unload operations (terminal truck-tractors, loaders) in combination with intellectual algorithms
of cargo flows management in order to increase the security and reliability level of technological processes.

DCS has to be aimed at providing the customers the information regarding the standard services and the conditions of its disposal, the information about tariffs, traffic schedule and the availability of the empty spaces on the routes. Based on this information cargo shippers will get the possibility to book this or that transport and logistical services or a suite of services with the help of dry port’s DCS, to form the order for cargo transportation and to sign an electronic agreement with the further possibility of providing digital payment in the frame of this agreement.

While establishing the orders and agreements and the calculations, connected with the railway transport services the dry port’s DCS has to provide the cooperation with the digital systems of the railways to form and fulfil all the required documental and financial operations through these systems. DCS is supposed to be the concentrator of the payments in the logistics chain.

And after all the orders and the signed agreements are launched, the DCS main function is to get the multimodal transport and logistical chains cargo flows planned. While fulfilling the orders DCS provides the monitoring of the cargo shipping depicting all the basic transport and logistical operations and provides the authorized users the information in the frames of their access rights.

Thus, the synergy of dry port’s DCS cooperation with different existing IT-systems is really able to provide a new quality kind of digital service – transparent extensible of the high-speed cargo transportations and this will lead to the appearance of the digital multimodal cargo marketplace both on the inner ESCAP routes and world-wide routes, including the international transport corridors.

As the result of design, creation and development of the DCS of the dry ports, integrated into the railway digital systems, road traffic IT-systems and others, the majority of cargo transport market participants unite in one reliable informational space. At the same time, it will be accompanied with the decrease of time and financial expenditures for cargo transportations organization.

C. Logistics transparency

Cargo transportations intend to become more effective due to the personified digital services and facilities, transparency of the cargo flows and in combination with the grown-up effectiveness will reduce the market share of the uncontrolled transportations in the full volume of the cargo turnover.

It is quite difficult to get a high level of transparency, because it does require both technical difficulty and a limited human intervention. Still at that very moment it is achieved, the benefits appear to be significant and are not limited by saving inventory and planning improving.

The sources for the logistics transparency structure are:

- data from internal and external sources, such as transport tracking devices and social interception, are being transferred to the single platform;
- data is consolidated and enriched by cross links, such as supply chains influencing the deliveries. This information is formed by weather, traffic and news analysis. Even social networks are being monitored – for example the companies that pay attention to the activity in Twitter, Facebook, Instagram can predict the social tensions, financial turbulence, political changes in advance;
- this information applies to the digital platform and is being tested additionally in analytical and simulation modes, that makes it possible to hold different levels of strategic optimization, routes network improving and operators’ productivity analysis. The information has to be sent to the management center that is monitoring and
managing the logistics operations and implement the latest analytical and regulation algorithms of equation to make it useful;

- the single “source of truth” helps the companies to optimize its choice according to different conditions, using the information to aware the factories, warehouses and the customers regarding the arrival time and to take part in warning actions. Such an information about the transport condition, the expected external impacts and the possibility to become flexible in connection with the plans will be useful for the companies, that are aimed to use its supply chains to get competitive advantages and to manage risks effectively.

CONCLUSION

The complete digital transformation of the dry port terminal management is accompanied by the digitized information that can be centrally available in digital platform, paving the way for true digital collaboration between all concerned players. Workflows and communication can be optimized, costs can be reduced, errors can be minimized / avoided and thus the efficiency and reliability of the connecting track resp. the terminal can be secured and increased. Management, update, backup and provision now take place centrally from one point via clearly defined and secure access. Time consuming searching and comparison of information should be eliminated. Each piece of information must be available digitally to any interested party at any time in the most appropriate form.

Reviewing all the mentioned above, digital solutions and smart technologies for dry ports operations have to be based on the systems that support basic infrastructure, as well as, for example, tools for handling cargo, managing traffic, dealing with customs, assuring safety, and monitoring energy use. Some benefit the gamut of dry port partners while others support specific partnerships between, for example, a port authority and terminal operators.

To be the leader on the transport and logistical centers market the operator must tie multiple individual systems into a single interconnected region-wide platform. This type of platform integrates data from such sources as sensors, mobile devices, and various stakeholders’ databases. Platforms with geolocation functions can pinpoint incoming containers, trains, trucks and optimize planning for traffic volumes.

The vision of a digital dry port is, so far, not formed practically. As a target image, a digital platform would cover all activities in both the spot and contracted business segments and make intelligent decisions in an automated, optimal and fast way – either based on real-time data or with the help of refined analytics. Furthermore, this provider would have global reach and access to all transport modes. It would support shippers and other stakeholders of the process in strategic logistics questions and continuous improvement to the same extent and quality as it would execute the day-to-day operations. Even though progress has been made in recent years, there are still some functional gaps to be covered and technical limitations to overcome.