

The Development Model of Dispatching Wagons from Stations

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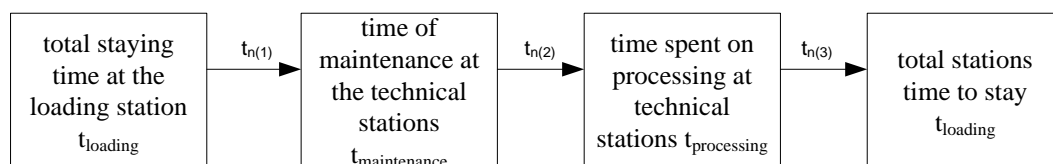
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ABSTRACT: In this article to connect the wagons loaded to the trains shortening the staying time in process of their collection and recycling delivers freight wagons accelerates the selection and use of shunting equipment, sends wagons to the station at the right time. Is listed below in railway transport on delivery freight wagons, international and local wagons staying time the main quality indicators in station. As well as developed scheme of the algorithm for the timing of staying in the wagons at the station.

KEYWORDS: train composition, technical station, cargo cabin and shuttle, shunting operations, technical and commercial inspection, technological operations, cargo delivery.

I. INTRODUCTION

At present, problems in railway transport are as follows: inefficient cargoes are not eliminated, non-delivery of cargoes is not observed, the speed of freight and commercialization is not sufficient, legal norms in the interaction with the railways with customers require a considerable improvement. Lack of cargo handling has a great impact on the timely delivery of cargoes.



Pic.1. Technological scheme of cargo deliveries

In the course of the consignment of the technical and cargo, commercial operations in the course of the rail transport can be done by order, consequently, their location shall be changed - from the cargo area to the consumer area, the passenger and his baggage will be delivered to the needed address.

At technical stations it is necessary to carry out such tasks as distribution and creation of the submersible, transmitting, transmitting and diverting trains, maintenance and maintenance of locomotive exchanges, technical and commercial inspection of wagons, loading and unloading of cargoes in freight wagons and lorries, maintenance of passengers. In accordance with the scheme of such stations, the parks are divided into crossed, semi-length and longitudinal types [1].

At the railway stations, the cargo plan for loading and unloading of wagons is determined by the calendar plan. For example, according to the schedule of some stations, the average number of minimal wagons is sufficient for train trains within 3-4 days. As a rule, the freight wagons will be informed by the consignor after the goods are delivered to the wagons and the wagons loaded with the shunting locomotive will be taken to the station from the bushes or cargo yards.

Delivery time: for the type of shipment (carriages, containers, refrigerator containers, sender's marches and so on); Transportation of freights (cargo, passengers and passengers); depending on the type of flights (direct, direct, mixed, international).

II. SYSTEM ANALYSIS

Delivery time is determined by the following formula:

$$T_{e.m.} = t_{\text{shipment}} + L_{\text{distance}} / v_{\text{ratespeed}} + \sum t_{\text{extra operations}} \quad (1)$$

here by $t_{sh,r}$ - the time at which is assigned to operations of related to the shipment and receipt of goods, hour;

L_{goods} - the distance between shipping and receiving stations, km;

v_{day} - The designated freight rate speed in the Cargo Routine, km/day;

$t_{ex.op}$ - time when extra operations are scheduled, hour.

The time taken for the operation of the shipment and acceptance operations, the assigned speeds and the time taken for additional operations shall be taken from the Shipping Rules.

Taking into account the railroad transportation directions, delivery of freight, as well as free wagons, which are owned or rented by the organization and physical persons, is calculated at the railway station, which is based on the distance to which the fee is charged. In accordance with the rules of calculating the terms of delivery of goods by railway, the time limit for the carriage of goods shall be set at 00-00 of the next day of the day of the day, which is documented in the documents and delivered in the shipping documents. Calculation of terms of delivery of goods is carried out in full time, in full day.

III. INPUT DESIGN

The terms of delivery of goods are the time of delivery and acceptance of cargoes, time of carriage of cargoes and time of accompanying operations, as specified in the travel, as well as availability of cases provided for in the Charter (for example, customs authorities and other government agencies, suspension of cargo, etc.) the time allowed to extend the validity period.

It is assumed that the carriage of goods by railway vehicle was delivered at the designated railway station, or if the wagon (container) was transported by the loader on the truck (Article 63 of the Charter of the Republic of Uzbekistan Railway, Section 5). The date of delivery of the cargo to the consignee and the customs authority (the goods under the customs control) on the arrival of the railway at the designated station shall be acknowledged as the actual date of the arrival of the cargo at the designated station. In this case, the railway will not be liable for stopping of the freight due to customs clearance at the designated station.

It is considered to be delivered at the time of carriage upon stopping the carriage of cargoes for the discharge of the cargo crane or for other reasons connected with the consignee, if it has been delivered to the designated railway station until the end of its delivery period (the Uzbekistan Railways Charter Article 63, Section 6), and the general form of the act (GU-23 form) will be formed.

The empty wagon, which is owned or leased by the organization and the physical persons, shall be considered delivered in the period of delivery to the designated station, until the end of the delivery period, and to the receiver or to the owner of the railway station, by giving notice of the railroad.

Railway is responsible for the delays of deliveries of cargoes and empty wagons, which are in the possession or lease of organizations and individuals. According to Article 128 of the Railway Charter, "The railroad will pay a fine for the freight forwarder because of the delay in the delivery of the goods, unless the delay proves that it is not a fault [2].

For delayed delivery, every day of delay is calculated as a full amount of a penalty of 6% of the rental fee, but not more than 30% of the rent.

Railway charges are levied at the expense of the delay of the empty carriageway, which charge is the the property of the organization or private persons.

In order to comply with the terms of delivery of goods: to send the accepted cargo not later than the day of acceptance and at least the following day; comprehensive reduction of stopping of wagons in technical and freight stations; increase the speed of train movement; special attention should be given to improving the interaction of railway transport with other types of transport in the movement of combined routes and the timely implementation of other technological operations.

Delivery time after the acceptance of cargo by railway transport Railway transportation is calculated according to Section 14 of the Rules. In these rules the normal duration of deliveries to the wagons is 330 km per day. At the same time, it is planned to extend the terms of delivery for operations with acceptance and dispatch of cargoes for 1 day. In some cases, it is possible to see that the shipping time is more than 1 day for operations related to the delivery and shipment of goods upon acceptance of the goods from the consignor [3]. The shortcomings in this situation are the

inadequacy of shunting operations, the long-term stay of freight wagons and station tracks, and the absence of wagons after the technical and commercial inspection of train stations.

This article discusses the technological operations and the time spent at the station before departure of the technical stations to the train.

Authors suggests to find out the general value of wagons' stay on the roads and the luggage compartment by the following formula:

$$t_{\text{lokal}} = t_{\text{delivery}} + \sum t_{\text{collecting}} + t_{\text{departure}} \quad (2)$$

here is t_{delivery} - delivery time of the wagons to the bushes or cargo yards, hours;

$\sum t_{\text{collecting}}$ - the time of collecting wagons from the bushes or cargo yards, hours;

$t_{\text{departure}}$ - time of departure of wagons from the bushes or cargo yards, hours.

Technical and commercial inspection is carried out after the wagons arrive at the intermediate stops and when taken out of the luggage and ditch roads [5].

We consider the waiting wagons as the time of the commercial inspection by the cargo handling staff. We shall define the wagons' commercial examination by the following fomula:

$$t_{\text{commercial}} = t_{\text{waiting.commercial}} + \sum N_i \cdot t_{\text{commercialinspection}} \quad (3)$$

here is $t_{\text{waiting.commercial}}$ - waiting time is to wait for a commercial inspection of carriages' cargo handling personnel, wagon-hours;

$\sum N_i \cdot t_{\text{commercialinspection}}$ - time of commercial inspection of wagons, hours.

We refer to the wagons' technical inspection times using the following fomula.

$$t_{\text{technicians}} = t_{\text{waiting.technicians}} + \sum N_i \cdot t_{\text{technical}} \quad (4)$$

here is $t_{\text{waiting.technicians}}$ - hours for waiting of wagons technicians on station tracks, hours;

$\sum N_i \cdot t_{\text{technical}}$ - wagons technical inspection, wagon-hour.

If wagons are identified after a technical and commercial inspection of the wagons, then the station must be dispatched to the road leading to the defective wagon. We also take into account the time spent on technological operations with wagons that are processed and not processed according to the train schedule. At the time of train handling we send local wagons along the route of the wagons.

At the station, we will consider the process of organizing technological processes, namely, wagons' pickups at the Pickup Park during the shunting operations. - time of processing of wagons in direction, hour [6,7].

$$t_{\text{defectivewagon}} = t_{\text{departure.park}} + t_{\text{distribution}} + t_{\text{collecting}} + t_{\text{lots.departure}} + t_{\text{standing.additional}} \quad (5)$$

here is $t_{\text{departure.park}}$ - departure of wagons to the pick-up park at the reception park, hours;

$t_{\text{distribution}}$ - wagons distribution time, hour;

$t_{\text{collecting}}$ - time of collecting in the direction of wagons, hours;

$t_{\text{lots.departure}}$ -lots time of departure of the wagons in the parking ;

$t_{\text{standing.additional}}$ - the time for the wagons standing for additional procedures.

The standard values of all the indicators are included in the technological process of the station.

$$t_{\text{compose}} = \sum N_i \cdot t_{\text{collectionof wagons}} \quad (6)$$

$$\sum N_i \cdot t_i^{\text{collection}} = N_1 \cdot t_1^{\text{collection}} + N_2 \cdot t_2^{\text{collection}} + \dots + N_n \cdot t_n^{\text{collection}}$$

here is $t_{\text{collection of wagons}}$ - time norms of collection of wagons with shunting locomotives in the pick-up carriageway is given,

$\sum N_i$ - number of wagons, wagons.

$$t_{\text{collection of wagons}} = t_{\text{shunting locomotive}} + t_{t_{\text{departure}}} + t_{\text{collection}} + t_{\text{shunting locomotive}} \tag{7}$$

here is $t_{\text{shunting locomotive}}$ - hours of shunting locomotive, hours;

$t_{\text{departure}}$ - time of departure of wagons to the pick-up carriageway;

$t_{\text{collection}}$ - collection time of wagons, hours;

$t_{\text{shunting locomotive}}$ - time of shunting locomotive, hour.

It is necessary to bring the ready-made content to the Pick-up Park.

$$t_{\text{sending park}} = t_{\text{shunting locomotive waiting}} + t_{\text{sent}} \tag{8}$$

here is $t_{\text{shunting locomotive waiting}}$ - the time of the shunting locomotive waiting time when the train is ready to be sent to the sending post, hours;

t_{sent} - the time at which the content is ready to be sent to the sending park [9].

$$t_{t_{\text{technical inspection}}} = t_{\text{waiting time}} + t_{\text{technical}} \tag{9}$$

here is $t_{\text{waiting time}}$ - waiting time for content inspection (PTOV), hours;

$t_{\text{technical inspection}}$ - wagons technical inspection time (WPV), hour.

The train must comply with the timetable and the train schedule in strict accordance with the plan. The directions and the weight and length of freight trains on each section shall be determined in accordance with the schedule of train movement and the schedule of the train, in accordance with the locomotive type, the train station and the useful length of the receiving-and-departure stops located on that section. L_y total train length, L normal length of the train on the plot $L_y \leq L$, q_B total train mass, normative mass of the train on the plot Q .

$$\left. \begin{aligned} q_B &\leq Q \\ L_y &\leq L \end{aligned} \right\} \tag{10}$$

We shall consider the following indicators when sending trains:

$$t_{\text{dispatch}} = t_{\text{waiting}} + t_{\text{brake equipment}} + t_{\text{waiting send}} + t_{\text{dispatch}} \tag{11}$$

here is t_{waiting} - waiting time of train locomotive, hours;

$t_{\text{brake equipment}}$ - check of train brake equipment, hours;

$t_{\text{waiting send}}$ - waiting time for train to send, hours;

t_{dispatch} - dispatch time of train, hours.

IV. RESULTS

The authors determine the total amount of transactions of goods shipment from the station related to the following formula:

$$t_{\text{shipment}} = \left(t_{\text{lokal}} + t_{\text{commercial}} + t_{\text{technicians}} + t_{\text{compose}} + t_{\text{defectivewagon}} + \right. \\ \left. + t_{\text{sending park}} + t_{\text{technicalinspection}} + t_{\text{dispatch}} \right) \quad (12)$$

Actual point switches and opening of outlet stoplights are checked according to the instructions of corresponding control devices and the train is sent according to the established procedure.

We offer the scheme of rational use of dispatching wagons from technical stations.

In the developed methodology, it is necessary to summarize the time dimensions of the technological operation of the technical station and eliminate the deficiencies in them.

In the 2nd picture: 1-4 – import and export of wagons from the railway station and cargo garage of the technical station;

5-7 – technical and commercial inspection of wagons;

8, 12 – the option of wagon direction;

9-11 – to bring national, transmission and outgoing trains to technical stations, to implement technical and commercial inspection;

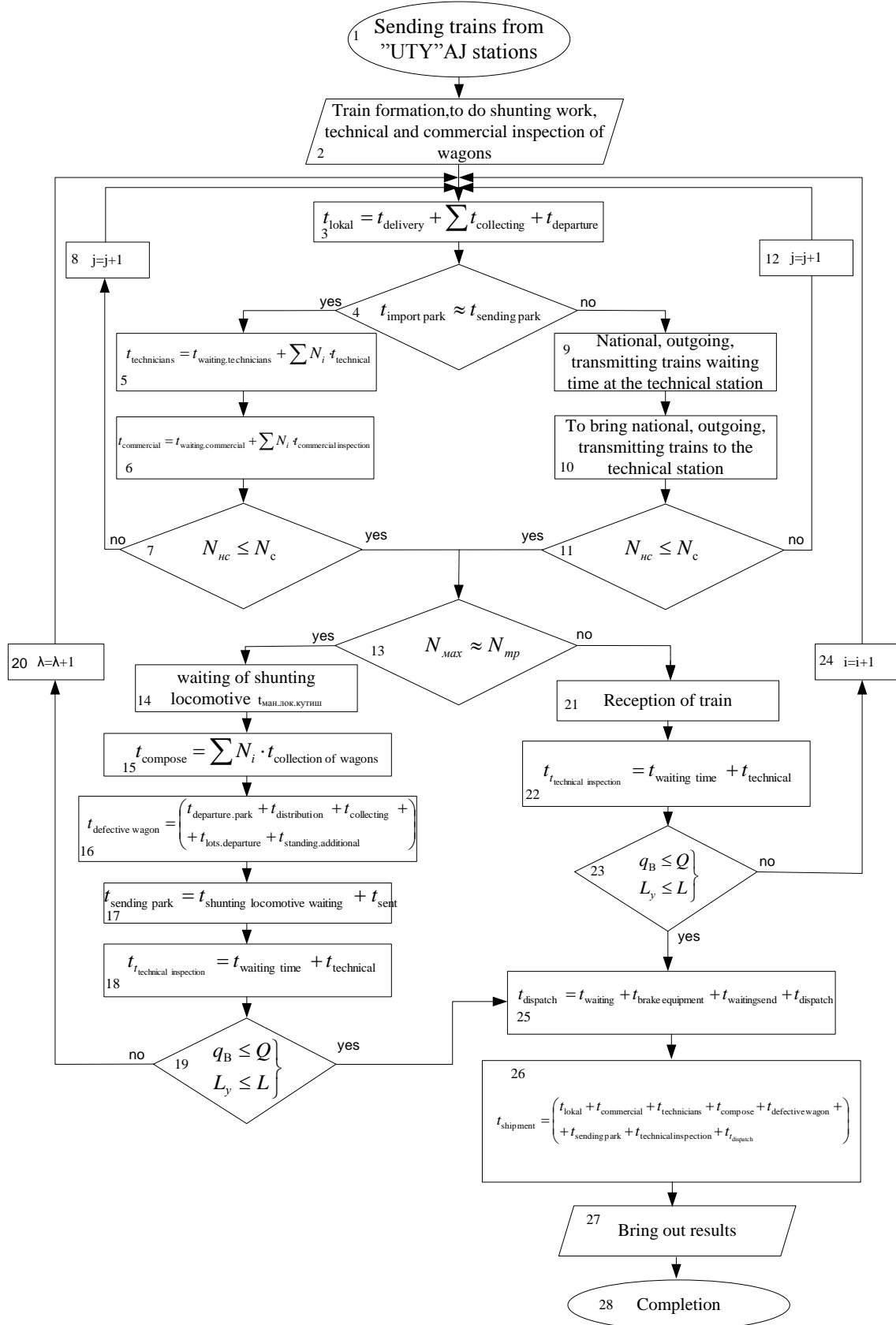
13 – working with trains that are recycled and not recycled;

14 – waiting for shunting locomotives;

15-16 – creating plan of trains;

17 – carriage of wagons to the fleet;

18 – technical inspection of wagons;





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Picture 2. Algorithm scheme of freight wagons dispatching from stations.

- 19-23 – taking into account the length and weight of the train, options for creating the train ;
- 20, 24 – option for wagons on route;
- 21 – reception of transit trains;
- 22 – technical inspection of transit trains;
- 25-27– dispatch of prepared traffic;
- 28 – completion of train dispatch options according to time standards.

V. CONCLUSION

According to the formula for the determination of the total number of operations (tj) for the shipment of goods from the station, proposed by the authors, if the time of dispatch of trains at the station by the time of sending the wagons to 00-00 is less than the time limit (formula 12) shall not be included in the total time of delivery and the delivery date shall be calculated from the next day.

This arrangement ensures timely execution of technological operations in case of defects of time norms in the method of basic rational use of wagons on stations. That is, long-standing wagons on station tracks, when the shunting operations are not performed properly, will help ensure that load wagons do not exceed the time limits for performing technological operations when they are technically and commercially available at train stations.

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