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TRANSPORT UNIVERSITETI**

Tashkent state
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Articles are published in Uzbek, Russian, and English, ensuring a wide-reaching audience and fostering cross-cultural academic exchange. As a beacon of academic excellence, the "Journal of Transport" continues to serve as a vital conduit for knowledge dissemination, collaboration, and innovation in the transport sector and related fields.

The impact of working time on improving the efficiency of the shipping process

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Abstract:

In this article, the importance of working time restrictions in improving the efficiency of the shipping process was studied. An example was given as the distance from the three freight Junkers to the three freight cars and their cargo receiving points. Taking into account the carrying capacity and speed of movement of each car, the times spent on carrying the cargo were calculated. The results showed that it is necessary to take into account working time restrictions in order to effectively distribute loads among cars. This analysis helps to improve the importance of working time and efficiency in the transport sector in optimizing the shipping process. The results of the work, practical recommendations for the effective management of time and resources in the process of cargo planning are given.

The influence of working time is of great importance in increasing the efficiency of the shipping process. The article is very relevant in the areas of transport and logistics and is becoming more relevant, especially with the day-to-day increase in the requirements for fast and efficient delivery of goods. The optimal organization of working time increases the speed, safety and economic efficiency of the shipping process. This article analyzes the impact of working hours, the importance of introducing time management methods to improve the efficiency of the shipping process. With the help of an efficient system of working time management, the efficiency of the use of Labor and vehicles is increased, costs are reduced and improvements in the quality of Service are achieved.

Keywords:

shipping, efficiency, working time limit, car, carrying capacity, movement speed, transportation process, transportation optimization, freight receiving point

Yuk tashish jarayonining samaradorligini oshirishga ish vaqtining ta'siri

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Annotatsiya:

Mazkur maqolada yuk tashish jarayonining samaradorligini oshirishda ish vaqti bo'yicha cheklovlarining ahamiyati o'rganildi. Uchta yuk junatuvchidan uchta yuk tashuvchi avtomobil va ularning yuk qabul qiluvchi punktlariga bo'lgan masofalari misol sifatida keltirildi. Har bir avtomobilning yuk ko'tarish qobiliyati va harakat tezligi hisobga olinib, yukni tashish uchun sarflanadigan vaqtlar hisoblandi. Natijalar shuni ko'rsatdiki, avtomobillar orasida yuklarni samarali taqsimlash uchun ish vaqti cheklovlarini inobatga olish zarur. Ushbu tahlil, yuk tashish jarayonini optimallashtirishda ish vaqtining muhimligini va transport sohasida samaradorlikni oshirishga yordam beradi. Ish natijalari, yuk tashish rejalashtirish jarayonida vaqtni va resurslarni samarali boshqarish uchun amaliy tavsiyalar berilgan.

Yuk tashish jarayonining samaradorligini oshirishda ish vaqtining ta'siri katta ahamiyatga ega. Maqolada transport va logistika sohalarida juda dolzarb bo'lib, ayniqsa, yuklarni tez va samarali yetkazib berish talablarining kundan-kunga ortishi bilan yanada ahamiyat kasb etmoqda. Ish vaqtining optimal tashkil etilishi yuk tashish jarayonining tezligini, xavfsizligini va iqtisodiy samaradorligini oshiradi. Ushbu maqolada yuk tashish jarayonining samaradorligini oshirish uchun ish vaqtining ta'siri, vaqtni boshqarish usullarini joriy etishning ahamiyati tahlil qilinadi. Ish vaqti boshqaruvining samarali tizimi yordamida ishchi kuchi va transport vositalaridan foydalanish samaradorligi oshib, xarajatlar kamayadi va xizmat ko'rsatish sifatini yaxshilashga erishiladi.

Kalit so'zlar:

yuk tashish, samaradorlik, ish vaqti cheklovi, avtomobil, yuk ko'tarish qobiliyati, harakat tezligi, tashish jarayoni, transport optimallashtirish, yuk qabul qiluvchi punkt

vositalarining ishlashini tavsiflashda asosiy xarakteristikalaridan biri ekanligini anglatadi.

Avtomobil transportida yuk tashish faoliyatining qonuniyatlari va asosiy prinsiplari [1, 3, 4] ishlarda aniqlangan va ularning keyingi rivojlanishi va to'liqroq tavsifi [2] ishda aks etgan. [1, 8] mualliflarning ishlarida avtomobil transporti vositalarida yuk tashish yo'nalishida avtomobillarning aylanishi tushunchasi o'z ma'nosini

1. Kirish

Avtomobil transportida yuk tashish ma'lumotlarini tavsiflashda aylanish vaqti, bir aylanishdagi qatnovlar soni, yo'nalishda ishlash vaqti kabi tushunchalar sifatida uchraydi. Amalda bu, ya'ni aylanish ayni transport

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yo'qotgan, chunki avtomobillar ish smenasi davrida yopiq takrorlanadigan aylanishda harakat qilmaydi. Ish vaqtining bir qismida ular bir obyektida, keyingi qismida esa boshqa obyektlarda ishlashi mumkin [1, 8].

Yuqorida keltirilgan barcha avtomobil transportida yuk tashish uchun ish ritmi (muntazamligi) tushunchasi umumiy hisoblanadi. Avtomobil transporti vositalarida yuk tashish ishi ritmidan avtomobillarni ishga chiqarishini tashkil qilishini hisobga olish kerak, aks holda avtomobil transportida yuk tashishda yuk junatuvchi punktlarida xizmat ko'rsatilayotgan avtomobillarning qo'shimcha turish vaqtlari yuzaga keladi [4, 11]. Avtomobillarning harakat oralig'i avtomobil transporti vositalarida yuk tashish ish ritmiga teng bo'lganda, unumsiz turishlarsiz ishlaydi, ya'ni avtomobil ish vaqtidan samarali foydalanadi hamda yuk qabul qiluvchi punktga yukni yetkazib beradi [4, 5, 6, 11].

2. Tadqiqot metodologiyasi

Yuklarini tashish jarayonining matematik modeli, transport jarayonini optimal rejalashtirish uchun zarur bo'lgan ko'rsatkichlarni aniqlashda yordam beradi [7, 8, 9, 10]. Ushbu model quyidagi asosiy elementlarni o'z ichiga oladi:

-yuk tashish jarayonlarini samarali tashkil etish uchun bir qator ko'rsatkichlarni inobatga olish lozim, ular quyidagilar:

q_i – har bir yuk tashuvchi avtomobilning yuk ko'tarish qobiliyati (tonna); b_j – har bir yuk qabul qiluvchi punktning yukni qabul qilish qobiliyati (tonna); l_{ij} – yukni tashish masofasi (km) yuk hosil qiluvchi punktdan (A_i) yuk tashuvchi avtomobildan yuk qabul qiluvchi punktga (B_j); V_i – har bir yuk tashuvchi avtomobilning harakat tezligi (km/soat); C – yuk tashish xarajatlari (so'm).

-yuk tashish jarayonlarini samarali tashkil etish uchun maqsad funksiyasini (1) ifodadan aniqlaymiz.

$$\sum_{i=1}^n \sum_{j=1}^m C_{ij} \cdot q_i \cdot l_{ij} = C \Rightarrow \min \quad (1)$$

buyrda, C_{ij} – yukni tashish xarajatlari.

-yuqoridagi maqsadga erishish uchun cheklovlar qabul qilamiz:

a. Yukning qabul qilinishi cheklovi.

$$\sum_{i=1}^n q_i \leq \sum_{j=1}^m b_j \quad (2)$$

b. Yuk tashuvchi avtomobillar soni cheklovi.

$$q_i \leq Q_{max} \quad \forall i \quad (3)$$

c. Yuk qabul qiluvchi punktlarning yuk qabul qilishi qobiliyati cheklovi.

$$\sum_{j=1}^m b_j \leq B_{max} \quad (4)$$

d. Yuk tashishda yuk qabul qiluvchi punktning ish vaqti cheklovi.

$$T_{ish} = \frac{l_{ij}}{V_i} \leq T_{max} \quad (5)$$

Bu model orqali yuk tashish jarayonini optimallashtirish, xarajatlarni kamaytirish va resurslardan samarali foydalanish mumkin.

Yuk tashishda yuk qabul qiluvchi punktning ish vaqti cheklovini ko'rib chiqamiz. Ish vaqti bo'yicha cheklov, yuk tashish jarayonining samaradorligini oshirish va resurslardan to'g'ri foydalanish maqsadida belgilangan vaqt chegarasidir. Bu cheklov, yuk tashuvchi avtomobillar yoki transport vositalarining harakat qilish vaqtini nazorat qilishga qaratilgan. Avtomobillar yoki transport vositalarining harakat tezligi (V_i) -har bir yuk tashuvchi avtomobilning harakat tezligi (km/soat). Bu ko'rsatkich

yukni qabul qilish punktiga yetib borish uchun sarflanadigan vaqtni belgilaydi. Masofa (l_{ij}) - yukni tashish masofasi (km) yuk tashuvchi avtomobildan yuk nuqtasigacha. Masofa, yukni tashish jarayonida vaqtni belgilovchi asosiy omillardan biridir. Maksimal ish vaqti (T_{max}) -yuk tashuvchi avtomobilning biror yukni tashish uchun sarflashi mumkin bo'lgan maksimal vaqt. Bu vaqt chegarasi yuk tashish jarayonining samaradorligini oshirish va transport vositalarining ortiqcha yuklanishini oldini olish uchun belgilangan.

Mazkur masalani vaqt cheklov quyidagicha ifodalanadi:

$$\frac{l_{ij}}{V_i} \leq T_{max} \quad (6)$$

buyrda, l_{ij}/V_i – yukni tashish uchun sarflanadigan vaqt; T_{max} belgilangan maksimal ish vaqti.

Ish vaqti cheklovi, yukni tez va samarali tashish imkonini beradi. Agar yukni tashish jarayoni belgilangan vaqt ichida amalga oshmasa, bu xarajatlarni oshirishi va resurslardan samarali foydalanishni kamaytirishi mumkin [2, 7, 10].

Yuk tashish jarayonini rejalashtirishda vaqt cheklovlari muhim rol o'ynaydi. Bu, yuk tashuvchi avtomobillarni to'g'ri rejalashtirish va yuk nuqtalarini belgilashda yordam beradi.

Vaqt cheklovlari, yukni qaysi avtomobil bilan tashish kerakligini va qaysi yo'nalishlar bo'yicha harakat qilishni aniqlashda yordam beradi.

Umuman olganda, ish vaqti bo'yicha cheklov yuk tashish jarayonining samaradorligini oshirish va transport resurslaridan to'g'ri foydalanishni ta'minlash uchun zaruriy omil hisoblanadi.

Misol: Uchta yuk junatuvchidan (A_1, A_2, A_3) uchta tashuvchi avtomobillar va uchta yuk qabul qiluvchi punkt (B_1, B_2, B_3) mavjud (1-rasm). Har bir avtomobilning yuk ko'tarish qobiliyati (q_1, q_2, q_3), masofalar, va harakat tezliklari (V_1, V_2, V_3) quyidagicha:

A_1 –yuk ko'tarish qobiliyati $q_1 = 10$ tonna, $V_1 = 60$ km/soat.

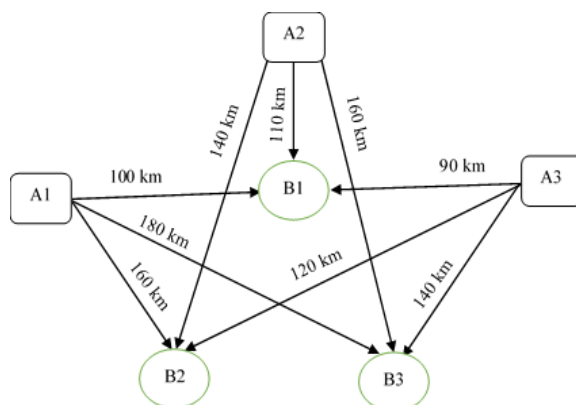
A_2 –yuk ko'tarish qobiliyati $q_2 = 15$ tonna, $V_2 = 50$ km/soat.

A_3 –yuk ko'tarish qobiliyati $q_3 = 20$ tonna, $V_3 = 40$ km/soat.

B_1 –yuk qabul qilish qobiliyati $b_1 = 20$ tonna.

B_2 –yuk qabul qilish qobiliyati $b_2 = 30$ tonna.

B_3 –yuk qabul qilish qobiliyati $b_3 = 40$ tonna.



1-rasm. Yuk junatuvchi (A_1, A_2, A_3) va yuk qabul qiluvchi punkt (B_1, B_2, B_3) larning o'zaro masofasi

Yuk junatuvchi punktlar va yuk qabul qiluvchi punktlarning masofalari matritsasi 1-jadvalda keltirilgan.

Yuk junatuvchi punktlar va yuk qabul qiluvchi punktlarning masofalari matritsasi

Yuk junatuvchi punktlar (A_i)	Yuk qabul qiluvchi punktlar (B_j)			Belgilangan maksimal ish vaqti (T_{max} , soat)	Avtotransport vositasining yuk ko'tarish qobiliyati (q_i , tonna)	Avtotransport vositasining tezligi (V_i , km/soat) B_1
	B_1	B_1	B_1			
A_1	100	160	180	3	A_1	100
A_2	110	140	160	3	A_2	110
A_3	80	110	120	3	A_3	80

Avtomobillar uchun yuk tashish vaqti har bir yuk tashuvchi avtomobilning yukni tashish uchun sarflanadigan vaqtini hisoblaymiz.

$$T_{ish} = \frac{l_{ij}}{V_i} \quad (7)$$

Yuk ko'tarish qobiliyati 10 tonna bo'lgan avtomobil orqali tashilganda quydagicha:

$$1. T_{ish}^5 = \frac{l_{ij}}{V_i} = \frac{100}{60} = 1,7soat$$

$$2. T_{ish}^5 = \frac{160}{60} = 2,7soat$$

$$3. T_{ish}^5 = \frac{180}{60} = 3,0soat$$

Yuk ko'tarish qobiliyati 15 tonna bo'lgan avtomobil orqali tashilganda quydagicha:

$$1. T_{ish}^8 = \frac{110}{50} = 2,2soat$$

$$2. T_{ish}^8 = \frac{140}{50} = 2,8soat$$

$$3. T_{ish}^8 = \frac{160}{50} = 3,2soat$$

Yuk ko'tarish qobiliyati 6 tonna bo'lgan avtomobil orqali tashilganda quydagicha:

$$1. T_{ish}^6 = \frac{80}{40} = 2,0soat$$

$$2. T_{ish}^6 = \frac{110}{40} = 2,75soat$$

$$3. T_{ish}^6 = \frac{120}{40} = 3,0soat$$

Har bir yuk tashuvchi avtomobil uchun yukni tashish vaqti maksimal ish vaqtidan $T_{max}=3$ soat ichida bo'lishi kerakligi tekshiriladi.

$q_1 = 10$ tonna yuk ko'tardigan avtomobillar barcha yuklarni 3 soat ichida tashib ulgurdi.

$q_2 = 15$ tonna yuk ko'tardigan avtomobil B_1 va B_2 punktdagi yuklarini tashib ulgurdi, B_3 punktdagi yukini esa belgilangan vaqtda yukni tashib ulguradi chunki yuk qabul qiluvchining ish vaqti doirasidan chiqdi (3,2 soat). Bunda yuk qabul qiluvchi punktning maksimal ish vaqtidan oshib ketadi.

$q_3 = 30$ tonna yuk ko'tardigan avtomobil esa barcha punktlarga yuklarni 3 soat ichida tashishni amalga oshirdi.

3. Xulosa

Bu misolda, yuk tashuvchi avtotransport vositalarni tanlashda ish vaqti cheklovini hisobga olish zarur. $q_2 = 15$ tonna yuk ko'tardigan avtomobillar B_3 punktdagi yukini tashiy olmaydi, shuning uchun uni boshqa avtomobil bilan almashtirish yoki boshqa reja tuzish kerak.

Umuman olganda, bu jarayon yuklarni samarali va vaqt ichida tashish uchun muhimdir. Bunday hisob-kitoblarni yordamida yuk tashish jarayonini optimallashtirish mumkin.

Ish vaqti bo'yicha cheklov, yuk tashish jarayonining samaradorligini oshirish va resurslardan to'g'ri foydalanishni ta'minlash uchun zaruriy omil hisoblanadi. Misolda, uchta yuk junatuvchi hamda uchta yuk tashuvchi avtomobillar va ularning yuk qabul qiluvchi punktlariga bo'lgan masofalari ko'rib chiqildi. Har bir avtomobil uchun yukni tashish vaqti hisoblandi va maksimal ish vaqti (3 soat) bilan taqqoslandi.

Foydalangan adabiyotlar / References

[1] Войтенков С.С. Совершенствование оперативного планирования перевозок грузов помашинными отправлениями в городах. Авт. диссертации на соискание ученой степени кандидата технических наук. – Иркутск, 2011. –20 с.

[2] Мочалин М.С., Кухарев Е.А. Совершенствование оперативного планирования перевозок грузов в автотранспортных системах: новый подход // Международный журнал перспективных исследований, –Т. 9, №1, 2019. –7-25 с.

[3] Muratov A.X., Kuziyev A.U. Qurilish yuklarini avtotransportda yetkazib berish usulini takomillashtirish // "Logistika va iqtisodiyot" ilmiy elektron jurnali. –2021. №4, –196-204 b. http://economyjournal.uz/maqola/Maqolalar_4_soni_2021.pdf

[4] Xo'jayev B.A. Avtomobillarda yuk va passajirlarni tashish asoslari // Darslik. –Toshkent, "O'zbekiston", 2002. – 240 b.

[5] Butayev Sh.A., Sidiknazarov K.M., Murodov A.S., Kuziyev A.U. Logistika (Yetkazib berish zanjirida oqimlarni boshqarish). –Toshkent: "Ekstremum Press", 2012.–577 b.

[6] Muratov A.Kh. Increasing The Efficiency of Cargo Delivery to Consumers. Eurasian Journal of Engineering and Technology, 12, 20–23. Retrieved from <https://www.geniusjournals.org/index.php/ejet/article/view/2688>

[7] Muratov A.X. Statement and Mathematical Model of the Problem of General Service in the Transportation of Cargo by Motor Vehicle. European Multidisciplinary Journal of Modern Science, 6, 288–291. Retrieved from <https://emjms.academicjournal.io/index.php/emjms/article/view/392>

[8] Muratov A., Kuziev A. Improving the efficiency of cargo delivery by automobile vehicles. AIP Conference ProceedingsТом 3268, Выпуск 124 February 2025 Номер



статья 0500174th International Conference on Advances in Science, Engineering, and Digital Education, ASEDU 2024, Navoi, 29 May 2024 до 31 May 2024 Код 207140. <https://www.scopus.com/record/display.uri?eid=2-s2.0-86000803753&origin=recordpage>

[9] Muratov Abobakr Kholikberdievich. (2023). Mathematical Model of the Process of Transportation of Construction Goods by Automobiles. Eurasian Journal of Engineering and Technology, 24, 38–41. Retrieved from <https://geniusjournals.org/index.php/ejet/article/view/5275>

[10] Muratov, A. (2025). Avtomobil transporti vositalari oqimi va xizmat ko'rsatish vaqtining taqsimlanish qonunlari. Вестник транспорта - Transport Xabarnomasi, 2(2), 196-200. <https://doi.org/10.56143/jot-journal.v2i2.289>

[11] Горев А.Э. Грузовые автомобильные перевозки: учеб. пособие для студ. высш. учеб.

Заведений / А.Э.Горев. – М: Издательский центр «Академия», 2013. – 304 с.

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---	---



U. Samatov

Dependence of transport costs on the volume of container delivery by road transport with quadratic approximation.....220

S. Turdibekov

The role of special road vehicles in the spreading of anti-icing technological materials (salt-sand mixture).....225

A. Muratov

The impact of working time on improving the efficiency of the shipping process.....229

J. Tolipov, A. Saidov

Reliability of power grids with integrated distributed generation sources.....233

F. Amirkulov

Methods for identifying factors influencing the complexity of urban bus routes.....237

G. Ruzimatova

Ways to determine and optimize traffic flow speeds under the real conditions of the street-road network.....242

J. Ziyamukhamedov, M. Wani

Tribotechnical analysis of tungsten carbide additives in mining drilling practice.....246

Sh. Umrzokova

Improvement of technologies for the technical inspection of locomotives in TS-2.....252

U. Abdurazzokov, B. Khasanova

The key directions for integrating micromobility into the public transport.....257