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CONTEXT / MUNDARIJA

Evaluation of the impact of manual transmission vehicles on intersection capacity on urban arterial streets

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Abstract:

This study focuses on examining the impact of vehicles with manual transmissions on the intersection capacity of urban arterial streets. Vehicles with manual transmissions are widely used in traffic, but their impact on traffic flow is under-researched. The main goal of the study is to evaluate the delay times and fuel consumption of vehicles with manual transmissions during the initiation of movement within a traffic flow composed of such vehicles. The relevance of the research is due to the need for effective management of the growing traffic flow in cities and improving its efficiency. Notably, the prolonged reaction time of vehicles with manual transmissions at intersections leads to a slowdown in traffic flow and a decrease in intersection capacity. The study employs methods from transportation engineering, traffic theory, and statistical analysis. Specifically, the delay times and fuel consumption of vehicles with manual transmissions at intersections were assessed. The results show that vehicles with manual transmissions significantly impact traffic flow, particularly in the process of clearing intersections, leading to reduced capacity. These findings can be applied to improve traffic management systems and organize efficient movement at intersections. In conclusion, this study can help develop practical recommendations for reducing delay times and fuel consumption in cities with a high presence of vehicles with manual transmissions, contributing to increased intersection capacity and improved urban traffic flow. The study's findings have significant practical applications in transportation engineering and traffic management and can contribute to the development of urban infrastructure.

Keywords:

Arterial street, intersection capacity, manual transmission, vehicle, traffic flow, traffic management

Shahar magistral ko'chalarida mexanik transmissiyali avtotransport vositalarining chorrahalar o'tkazuvchanligiga ta'sirini baholash

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Annotatsiya:

Mazkur tadqiqot shahar magistral ko'chalarida mexanik transmissiyali avtotransport vositalarining chorrahalar o'tkazuvchanligiga ta'sirini o'rganishga qaratilgan. Mexanik transmissiyali transport vositalari yo'l harakatida keng qo'llaniladi, ammo ularning transport harakat oqimiga ta'siri kam o'rganilgan. Tadqiqotning asosiy maqsadi harakat tarkibi mexanik transmissiyali transport vositalaridan iborat bo'lgan transport oqimining harakatlanishni boshlash jarayonida avtomobillar orasidagi oraliq qo'zg'alish reaksiya vaqtlarining avtotransport vositalarining kechikish vaqti va yoqilg'i isrofini baholashdan iborat. Tadqiqotning dolzarbligi shaharlarda jadallik bilan o'sib borayotgan transport oqimini boshqarish va uning samaradorligini oshirish zarurati bilan belgilanadi. Ayniqsa, mexanik transmissiyali avtotransport vositalarining chorrahalarda qo'zg'alishdagi uzoq davom etadigan reaksiya vaqti transport oqimining sustlashishiga va chorraha o'tkazuvchanligining pasayishiga sabab bo'luvchi muammo hisoblanadi. Tadqiqotda transport muhandisligi, yo'l harakati nazariyasi va statistik tahlil usullari qo'llanildi. Shu jumladan, chorrahalarda mexanik transmissiyali avtotransport vositalarining kechikish vaqti va yoqilg'i isrofi baholandi. Olingan natijalar shuni ko'rsatdiki, mexanik transmissiyali avtotransport vositalar, ayniqsa, chorrahalardagi harakat jarayonida transport harakat oqimiga sezilarli ta'sir o'tkazdi, bu esa transport oqimining chorrahani bo'shatish jarayonining sustlashishiga va o'tkazuvchanlikning kamayishiga olib keladi. Natijalar transport oqimini boshqarish tizimlarini takomillashtirishda, chorrahalarda harakatni samarali tashkillashtirishda qo'llanilishi mumkin. Xulosa qilib aytish mumkinki, ushbu tadqiqot mexanik transmissiyali avtotransport vositalari ishtiroki ko'p bo'lgan shaharlarda kechikish vaqti va yoqilg'i isrofini samarali kamaytirish bo'yicha amaliy tavsiyalar ishlab chiqishga yordam beradi. Bu esa yo'l o'tkazuvchanligini oshirish va shaharlardagi transport oqimini yaxshilashga xizmat qiladi. Tadqiqot natijalari transport muhandisligi va yo'l harakatini boshqarish sohasida muhim amaliy qo'llanishga ega bo'lib, ular shahar infratuzilmasini rivojlantirishga o'z hissasini qo'shishi mumkin.

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1. Kirish

Shaharlarda transport oqimini boshqarish va chorrahalarning o'tkazuvchanligini optimallashtirish zamonaviy shaharsozlik va transport muhandisligida muhim masalalardan biridir. Shu jumladan "Avtomobil transportini boshqarish tizimini yanada takomillashtirish chora-tadbirlari to'g'risida" O'zbekiston Respublikasi Prezidentining 2018-yil 6-martdagi PQ-3589-son qarori tadqiqotning dolzarbligini oshiradi [1]. Jadal rivojlanayotgan shaharlarda transport oqimining ko'payishi, chorrahalarda yuqori hajmdagi transport vositalari bilan bog'liq muammolarni keltirib chiqarishi mumkin. Mexanik transmissiyali avtotransport vositalari shahar yo'llarida keng qo'llaniladi, ammo ularning transport oqimining kechikish vaqtiga va atrof muhitga chiqaradigan ortiqcha chiqindi gazlar miqdorining oshishiga bo'lgan ta'siri aniq va to'liq tadqiq qilinmagan. Ushbu tadqiqot, mexanik transmissiyali avtomobillarning chorrahalardagi o'tkazuvchanlikka qanday ta'sir ko'rsatishini o'rganish va tahlil qilish bilan shug'ullanadi, bu esa shaharlardagi transport oqimini samarali boshqarish va ishlab chiqish uchun muhim ahamiyatga ega.

Mexanik transmissiyali avtotransport vositalari va ularning transport oqimiga ta'siri bo'yicha bir qancha tadqiqotlar olib borilgan. Masalan, mexanik transmissiyali avtomobillarning tormozlanish va tezlanishning transport oqimiga ta'sirini (J.Lee, K.Heo, 2016), mexanik transmissiya va haydovchi xatti-harakatining o'zaro bog'liqligini (S.P.Hoogendoorn, W.Daamen, 2017), mexanik transmissiyali avtomobillar shahar chorrahalarida transport oqimi zichligini oshirishini (A.Habib, A.K.Tiwari, 2017), mexanik transmissiyali avtomobillarning uzatmalar qutisi o'rnini tahlili (Y.Nakayama, T.Arakawa, 2018) va (Fayzullaev E.Z., Abduraxmanov R.A., Raxmonov A.S., 2019), (A.Khodaii, H.Shamshirband, 2015) (L.Sun, X.Liu, 2018), (T.Ohta, H.Nakano, 2019), (M. Kutzbach, R.Wang, 2019), (H.Mahmassani, S.Vlahogianni, 2020), (K.Iryo-Asano, T.Yoshii, 2020), (R.Gartner, C.Wagner, 2021), (D.Parker, J.Ward, 2021), (F.Chiaradia, L.Dell'Olio, 2022), (E.Taniguchi, A.Shimazaki, 2022), (B.A.Diop, S.Y.Kim, 2022), (A.P.Bayen, G.Gomes, 2023), (C.Hall, M.Greenfield, 2023), (P.Wagner, A.Borkowski, 2023), (N.G.Shaddock, R.S.Forbes, 2024), (L.Bessler, H.Weidenfeld, 2024) kabi tadqiqotchilar transport oqimini modellashtirishda simulyasiya usullarini, transport harakatini tahlil qilishda statistik va eksperimental uslublarni qo'llagan. Shunday bo'lsa-da, mexanik transmissiyali avtotransport vositalariga xususiy ta'riflangan tadqiqotlar yetarli darajada mavjud emas. Ba'zi tadqiqotlarda, mexanik transmissiyali transport vositalarning ta'siri umumiy transport oqimining tahlili orqali baholangan, ammo ularning chorrahalardagi xususiy ta'siri kam o'rganilgan.

Adabiyotlarni tahlil qilish natijasida aniqlangan kamchiliklarning ba'zilari mana shunday: mexanik transmissiyali transport vositalari chorrahada turgan vaqtda xarakatni boshlagunga qadar sarflagan reaksiya vaqtlarining transport oqimining kechikish vaqti va yoqilg'i isrofi miqdorlarini oshishiga ta'sirini baholash bo'yicha tadqiqotlar olib borilmagan. O'rganilmagan muammolar orasida, mexanik transmissiyali transport vositalarining chorrahalardagi harakat jarayoniga ta'siri va ularning transport oqimini qanday buzishi, shuningdek, bu holatning transport infratuzilmasidagi salbiy ta'sirlari to'liq o'rganilmaganligi mavjud. Shuning uchun, mavjud tadqiqotlar asosida ishlab chiqilgan yechimlarning samaradorligi va ularning amaliy qo'llanilishi to'liq ko'rib chiqilmagan.

Aniqlangan muammolar asosida tadqiqotning asosiy maqsadi mexanik transmissiyali avtotransport vositalarining shahar magistral ko'chalaridagi chorrahalarda turgan holda ularning harakatni boshlagunga qadar haydovchilarning sarflagan reaksiya vaqtlarining transport oqimining kechikish vaqti va yoqilg'i isrofi miqdorining oshishini baholashdan iborat. Bu maqsadga erishish uchun tadqiqotda mexanizmlarni va metodologiyalarni ishlab chiqish, ularning samaradorligini baholash va amaliy tavsiyalarni taklif qilish nazarda tutiladi. Tadqiqot natijalari shaharlarda transport oqimi vujudga keltiradigan tirbandliklar darajasini kamaytirish choralarini, chorrahalardagi o'tkazuvchanlikni yaxshilash va atrof-muhitga beradigan ekologik zararini kamaytirishga xizmat qiladi. Shu bilan birga, tadqiqot transport muhandisligi va yo'l harakatini boshqarish sohasida qo'llanilishi mumkin bo'lgan amaliy tavsiyalarni ishlab chiqishga yordam beradi.

2. Tadqiqot metodikasi

Tadqiqot shuningdek, mexanik transmissiyali avtotransport vositalarining chorrahalardagi o'tkazuvchanlikka ta'sirini aniqlash, transport oqimining kechikish vaqti va yoqilg'i isrofi miqdorini baholash maqsadida amalga oshirildi. Tadqiqot 2023 yilning sentyabr oyida, Qarshi shahar magistral ko'chalaridagi chorrahalarda o'tkazildi.

Tadqiqotning amalga oshirilishi davomida, shahar miqyosida harakatlanuvchi transport vositalari va chorrahalardagi transport oqimining miqdori o'rganildi (1-rasm).
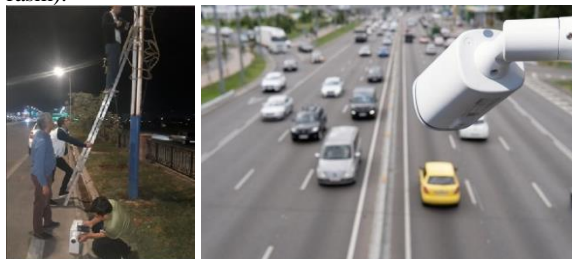
1-rasm. Transport oqimi miqdorini o'rganish uchun o'lchov kameralarini o'rnatish jarayoni

Tadqiqotlar aniqlangan chorrahalarda tadqiqot uchun belgilab olingan va texnik xizmat ko'rsatish bo'yicha professional kadrlar va transport muhandislari tomonidan amalga oshirildi.

Tadqiqot natijalarini tahlil qilish uchun statistik metodlardan foydalanildi. Olingan ma'lumotlar asosida tadqiqotning ob'yekti bo'lgan 23 ta chorrahalardagi transport oqimi parametrlari o'rganildi va tahlil qilindi, ular asosida transport oqimining samaradorligini baholash uchun usullar ishlab chiqildi. Boshqa tadqiqotlardan o'rganilgan

ma'lumotlar bilan solishtirilib, mexanik transmissiyali transport vositalarining chorrahalardagi ta'siri hisoblandi.

Birinchi navbatda chorrahaning svetofor qizil chirog'ida turgan transport oqimining bitta yo'l bo'lagi qatorida turgan n-chi transport vositasining svetofor yashil chirog'i yongan vaqtdan boshlab kechikish vaqti quyidagi formula orqali hisoblandi:

$$T_n = (n-1) \cdot t_r \text{ (1)}$$

Bu yerda: T_n – n-chi mexanik transport vositasining svetofor yashil chirog'i yongan vaqtdan boshlab kechikish vaqti, n – n-chi o'rindagi mexanik transport vositasi, t_r – mexanik transport vositasining harakatni boshlash uchun ketgan haydovchining reaksiya vaqti.

Transport oqimining bitta yo'l bo'lagida turgan transport vositalarining umumiy kechikish vaqti quyidagi formula orqali hisoblandi:

$$T_P = \sum_{T_n}^{T_1} \frac{(n-1)\cdot n\cdot t_r^2}{2} = \sum_{T_n}^{T_1} \frac{T_n \cdot n \cdot t_r}{2} \text{ (2)}$$

Bu erda: T_P – transport oqimining bitta yo'l bo'lagida turgan transport vositalarining umumiy kechikish vaqti, n – n-chi o'rindagi mexanik transmissiyali transport vositasi, t_r – mexanik transmissiyali transport vositasining harakatni boshlash uchun ketgan haydovchining reaksiya vaqti.

Bitta chorrahaning bir svetofor sikli davomida transport oqimining umumiy kechikish vaqti quyidagi formula orqali hisoblandi:

$$W = \sum_{T_{P_m}}^{T_{P_1}} \left(\sum_{T_{n_{P_m}} \cdot n_{P_m}}^{T_{n_{P_1}} \cdot n_{P_1}} \cdot \frac{t_r}{2} \right) \text{(3)}$$

Bu yerda: W – bitta chorrahaning bir svetofor sikli davomida transport oqimining umumiy kechikish vaqti, T_P – transport oqimining bitta yo'l bo'lagida turgan transport vositalarining umumiy kechikish vaqti, m – bitta chorrahaning jami yo'l bo'laklari soni, t_r – mexanik transmissiyali transport vositasining harakatni boshlash uchun ketgan haydovchining reaksiya vaqti, n – n-chi o'rindagi mexanik transmissiyali transport vositasi.

Yuqorida keltirilgan formulalar tadqiqot ob'yekti bo'lgan 23 ta chorrahalardan olingan transport oqimi parametrlarining mos qiymatlari (1-jadval) orqali qo'llanildi.

1-jadval

Chorrahalardagi transport oqimi parametrlari

T/r	Chorraha nomi	m – yo'l bo'laklari soni	$n_{P_1}...n_{P_m}$ – har-bir yo'l bo'lagidagi transport vositalari miqdori
1	I.Karimov-Jayhun-Beyneu-Guzar avtotrassasi kesishmasi	6	4, 6, 5, 14, 8, 16
2	I.Karimov-Nasaf Xonobod ko'chalari kesishmasi	13	10, 10, 6, 7, 8, 7, 11, 10, 7, 8, 11, 12, 6
3	I.Karimov-A.Timur ko'chalari kesishmasi	12	8, 9, 8, 12, 10, 11, 10, 12, 11, 6, 7, 7
4	I.Karimov-Bunyodkor ko'chalari kesishmasi	9	15, 15, 9, 7, 14, 8, 10, 13, 10
5	I.Karimov-Mustaqilliq ko'chalari kesishmasi	14	15, 13, 15, 14, 10, 11, 14, 11, 13, 12, 13, 14, 14, 15
6	I.Karimov-Xonobod ko'chalari kesishmasi	11	3, 10, 5, 8, 14, 6, 7, 4, 8, 10, 6
7	I.Karimov-Nasaf ko'chalari kesishmasi	15	4, 5, 7, 3, 13, 12, 14, 4, 4, 5, 6, 4, 4, 4, 5
8	I.Karimov-Mashab ko'chalari kesishmasi	7	0, 0, 0, 0, 0, 0, 0
9	Nasaf-Kamandi ko'chalari kesishmasi	8	10, 10, 11, 4, 4, 6, 6, 4
10	Nasaf-A.Timur ko'chalari kesishmasi	8	1, 2, 4, 10, 3, 4, 7, 4
11	Nasaf-Bunyodkor ko'chalari kesishmasi	14	4, 2, 1, 3, 5, 6, 4, 3, 4, 4, 6, 5, 5, 4
12	Nasaf-Mustaqilliq ko'chalari kesishmasi	19	4, 7, 8, 10, 12, 10, 12, 10, 12, 5, 5, 8, 8, 8, 3, 3, 7, 4, 5
13	Nasaf-G'uzor ko'chalari kesishmasi	5	6, 3, 3, 8, 7
14	Nasaf-A.Navoiy ko'chalari kesishmasi	12	3, 2, 1, 1, 4, 2, 1, 3, 3, 2, 1, 1
15	Xonobod-A.Navoiy ko'chalari kesishmasi	12	0, 3, 1, 3, 7, 2, 5, 5, 3, 4, 7, 6
16	Mustaqilliq-A.Navoiy ko'chalari kesishmasi	16	4, 8, 7, 3, 2, 9, 10, 12, 7, 7, 8, 4, 5, 7, 6, 7,
17	Olimlar-A.Navoiy ko'chalari kesishmasi	7	9, 8, 5, 5, 8, 7, 7
18	Mashab-G'uzor ko'chalari kesishmasi	6	6, 2, 3, 4, 4, 5
19	Jayhun-Nasaf-A.Timur ko'chalari kesishmasi	13	7, 10, 14, 8, 13, 13, 11, 15, 13, 5, 7, 6, 7
20	Jayhun-Olimlar ko'chalari kesishmasi	8	9, 8, 2, 5, 7, 9, 10, 6
21	Jayhun-Mustaqilliq ko'chalari kesishmasi	9	9, 10, 7, 4, 6, 4, 7, 8, 2

22	Jayhun-Nasaf ko'chalari kesishmasi	6	4, 2, 4, 8, 8, 3
23	Jayhun-Xonobod ko'chalari kesishmasi	9	4, 7, 7, 8, 6, 9, 5, 8, 3

Ob'yekt sifatida tanlab olingan chorrahalarning xaritadagi manzillari belgilandi (2-rasm).
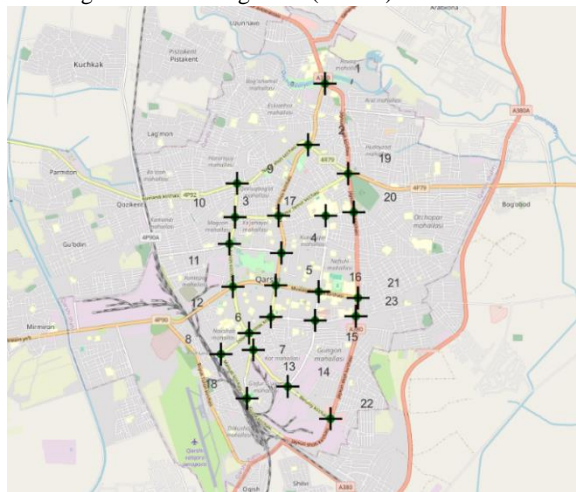
2-rasm. Qarshi shahar magistral ko'chalaridagi chorrahalar

Shuningdek tadqiqotning ob'yektlaridan biri sifatida mexanik transmissiyali transport vositalari ham kiritildi. Ushbu transport vositalari haydovchilarining o'rtacha reaksiya vaqti t_r – 2 soniyani tashkil etadi [3].

3. Tadqiqot natijalari

Tadqiqot davomida to'plangan ma'lumotlar mexanik transmissiyali avtotransport vositalarining chorrahalarda qo'zg'alishdagi kechikish vaqti sezilarli darajada yuqori ekanligini ko'rsatdi. Quyidagi natijalar qayd etildi:

Birinchi bo'lib yuqorida keltirilgan (1)-formula orqali bir yo'l bo'lagidagi mos ketma-ketlikda turgan mexanik trasmissiyali transport vositalarining kechikish vaqtlari hisoblandi (2-jadval).

2-jadval
Bir yo'l bo'lagidagi mos ketma-ketlikda turgan mexanik transmissiyali transport vositalarining kechikish vaqtlari

T/r	n – bir yo'l bo'lagida mos ketma-ketlikda turgan mexanik trasmissiyali transport vositasi	T_n – bir yo'l bo'lagida mos ketma-ketlikda turgan mexanik trasmissiyali transport vositasining kechikish vaqti (soniya)
1	1	0
2	2	2
3	3	4
4	4	6
5	5	8
6	6	10
7	7	12
8	8	14

9	9	16
10	10	18
11	11	20
12	12	22
13	13	24
14	14	26
15	15	28
16	16	30
17	17	32
18	18	34
19	19	36
20	20	38

Yuqorida keltirilgan jadvaldagi qiymatlardan bir yo'l bo'lagida turgan mexanik transmissiyali transport vositalarining umumiy kechikish vaqtini hisoblashda foydalanildi (2).

3-jadval
Bir yo'l bo'lagida turgan mexanik transmissiyali transport vositalarining umumiy kechikish vaqti

T/r	P_m – bir yo'l bo'lagida mos ketma-ketlikda turgan mexanik trasmissiyali transport vositalari miqdori	T_P – bir yo'l bo'lagida turgan mexanik trasmissiyali transport vositalarining umumiy kechikish vaqti (soniya)
1	1	0
2	2	4
3	3	12
4	4	24
5	5	40
6	6	60
7	7	84
8	8	112
9	9	144
10	10	180
11	11	220
12	12	264
13	13	312
14	14	364
15	15	420
16	16	480
17	17	544
18	18	612
19	19	684
20	20	760

Tadqiqot ob'yekti bo'lgan 23 ta chorrahalar uchun alohida svetoforning bir sikli davomidagi vaqt ichida yig'ilib qolgan mexanik transmissiyali transport vositalarining umumiy kechikish vaqtlari hisoblandi. Bunda bitta chorrahaga tegishli har-bir yo'l bo'laklaridagi mexanik transmissiyali transport vositalarining umumiy kechikish vaqtlari yig'indisi hisoblandi (3).

4-jadval
Har-bir chorraha uchun hisoblangan mexanik transmissiyali transport vositalarining umumiy kechikish vaqtlari

T/r	Chorraha nomi	m – yo'l bo'laklari soni	W – bitta chorrahaning bir svetofor sikli davomida transport oqimining umumiy

			kechikish vaqti (daqiqa)
1	I.Karimov-Jayhun-Beyneu-Guzar avtotrassasi kesishmasi	6	18
2	I.Karimov-Nasaf Xonobod ko'chalari kesishmasi	13	30,67
3	I.Karimov-A.Timur ko'chalari kesishmasi	12	32,07
4	I.Karimov-Bunyodkor ko'chalari kesishmasi	9	36,93
5	I.Karimov-Mustaqilliq ko'chalari kesishmasi	14	75,60
6	I.Karimov-Xonobod ko'chalari kesishmasi	11	20,47
7	I.Karimov-Nasaf ko'chalari kesishmasi	15	22,67
8	I.Karimov-Mashab ko'chalari kesishmasi	7	0
9	Nasaf-Kamandi ko'chalari kesishmasi	8	12,87
10	Nasaf-A.Timur ko'chalari kesishmasi	8	5,87
11	Nasaf-Bunyodkor ko'chalari kesishmasi	14	6,47
12	Nasaf-Mustaqilliq ko'chalari kesishmasi	19	35,67
13	Nasaf-G'uzor ko'chalari kesishmasi	5	4,67
14	Nasaf-A.Navoiy ko'chalari kesishmasi	12	1,20
15	Xonobod-A.Navoiy ko'chalari kesishmasi	12	6,20
16	Mustaqilliq-A.Navoiy ko'chalari kesishmasi	16	23,27
17	Olimlar-A.Navoiy ko'chalari kesishmasi	7	10,27
18	Mashab-G'uzor ko'chalari kesishmasi	6	2,73
19	Jayhun-Nasaf-A.Timur ko'chalari kesishmasi	13	43,07
20	Jayhun-Olimlar ko'chalari kesishmasi	8	12,80
21	Jayhun-Mustaqilliq ko'chalari kesishmasi	9	11,93
22	Jayhun-Nasaf ko'chalari kesishmasi	6	4,80
23	Jayhun-Xonobod ko'chalari kesishmasi	9	11,20

Olingan natijalar mexanik transmissiyali avtotransport vositalarining chorrahalardagi harakat samaradorligiga bo'lgan ta'sirini aniq ko'rsatdi. Yo'l bo'laklari soni va transport oqimi o'rtasidagi muvozanatsizliklar kechikish vaqtini sezilarli darajada oshirdi. Bu natijalar shahar transport infratuzilmasini takomillashtirish va harakat oqimini optimallashtirish bo'yicha chora-tadbirlarni ishlab chiqishda muhim ahamiyat kasb etadi. Mexanik transmissiyali avtomobillarning kechikish vaqti ko'paytirilishi transport harakatidagi nazoratini qiyinlashtiradi va umumiy o'tkazuvchanlikni pasaytirishi mumkinligini ko'rsatdi.

Tadqiqotda qo'llanilgan metodologiya va o'lchov usullari natijalarning haqqoniyligini ta'minladi. Eksperimental usullar orqali yig'ilgan ma'lumotlar aniq va ob'yektiv bo'lib, ular transport oqimi va kechikish vaqti o'rtasidagi bog'liqlikni to'g'ri aks ettirdi. Statistik tahlil natijalarning ahamiyatliligini tasdiqladi, bu esa xulosalarning ishonchliligini oshirdi.

Bunday tadqiqotlardagi asosiy chegaralardan biri ma'lumotlarni yig'ish jarayonidagi ehtimoliy xatolar va tanlovning cheklanganligi bo'lishi mumkin. Masalan, jadvaldagi ba'zi chorrahalarda kechikish vaqti nol ko'rsatilgan, bu ma'lumotlarning noaniqligi yoki o'lchovdagi xato natijasi bo'lishi mumkin. Shuning uchun, kelgusi tadqiqotlarda ma'lumotlarning aniqligini oshirish va imkoniyat boricha kengroq chorrahalarni qamrab olish tavsiya etiladi.

4. Tadqiqot natijalari tahlili

Tadqiqot davomida olingan natijalardan kelib chiqib, mexanik transmissiyali avtotransport vositalarining chorrahalar o'tkazuvchanligiga ta'siri aniq ko'rsatildi. Masalan, tadqiqotdan ayon bo'ldiki, mexanik transmissiyali

avtotransport vositalardagi kechikish vaqti, ayniqsa, ko'p yo'l bo'laklariga ega chorrahalarda sezilarli darajada uzoq bo'ladi. Bu holat transport oqimining sustlashishiga va yo'l o'tkazuvchanligining pasayishiga olib keladi. Birgina I.Karimov-Mustaqillik ko'chalari kesishmasida jami 14 ta yo'l bo'lagi bo'lsa svetoforning bir siklida yig'ilgan 184 ta transport vositalari har birining kechikish vaqtlari yig'indisi 1 soatu 15 daqiqadan ko'proq vaqtni tashkil etdi. Transport oqimini yaxshilash uchun mexanik transmissiyali avtotransport vositalarining ishtiroki kamaytirilishi zarur.

Tadqiqot natijalari orqali muammoning iqtisodiy zarari ham hisoblandi. Tanlab olingan 23 ta chorrahada bir svetofor sikli davomida jami 1627 ta transport vositasining har birining kechikish vaqtlari yig'indisi 429 daqiqa (7.15 soat)ni tashkil etdi. Quyidagi 5-jadvalda kechikish vaqti natijasida yoqilg'i isrofi miqdorining iqtisodiy zarari keltirilgan.

5-jadval
Kechikish vaqtining yoqilg'i isrofi natijasida keltirgan iqtisodiy zarari

T/r	Yoqilg'i turi	Yoqilg'i narxi (so'm/litr)	Yoqilg'i isrofi (litr)	O'rtacha iqtisodiy zarar (so'm)
1	Metan	3,500 - 4,000 сўм/м³	19,3	72 375
2	Propan	5,500 - 6,500	15	90 000
3	Ai-80 benzini	6,500 - 7,500	17,16	120 120
4	Ai-91 benzini	10,500 - 12,000	17,16	193 050
5	Ai-95 benzini	13,500 - 15,000	21,45	305 662
6	Dizel yoqilg'isi	12,000 - 14,000	17,16	223 080

Yuqoridagi iqtisodiy zarar faqatgina svetoforning bir sikli davomida hosil bo'lgan. Endi bu qiymatlarni bir soat, kun, hafta va oylar kesimida hisoblab chiqadigan bo'lsak qanchalik ulkan summa kelib chiqishini tasavvur qilish qiyin emas. Undan tashqari yoqilg'i isrofi tufayli atmosferaga chiqayotgan zaxarli gazlarni ham ekologiyaga zarar etkazishini, ayniqsa birgina Toshkent shahrining havo ifloligi bo'yicha dunyo shaharlari reytingida yuqoriligini aytib o'tish lozim.

5. Xulosa

Mazkur tadqiqot shahar magistral ko'chalarida mexanik transmissiyali avtotransport vositalarining chorrahalar o'tkazuvchanligiga ta'sirini o'rganishga qaratildi va bu boradagi ilmiy ishlar uchun muhim asos bo'lib xizmat qiladi. Olingan natijalar shaharlardagi transport oqimi samaradorligini oshirishdagi muhim muammolarni hal etishga yordam berishi mumkin. Xususan, mexanik transmissiyali transport vositalarining kechikish vaqti va ularning yoqilg'i isrofiga ta'siri aniqlanib, bu jarayonning iqtisodiy zarari baholandi. Tadqiqotda aniqlangan muammolar, xususan, chorrahalarda transport vositalarining kechikish vaqti, ularning transport oqimiga salbiy ta'sir ko'rsatishi va bu holat shaharlarda yo'l o'tkazuvchanligini sezilarli darajada pasaytirishi mumkinligi ko'rsatib o'tildi. Bu muammolarni hal etish, shahar transport tizimini yanada takomillashtirish uchun amaliy tavsiyalar ishlab chiqishga imkon beradi. Shuningdek, tadqiqot natijalari, transport muhandisligi va yo'l harakatini boshqarish sohalarida amaliy qo'llanilishi mumkin. Mazkur izlanish shahar infratuzilmasini rivojlantirish va transport oqimini samarali boshqarishga qo'shadigan hissasi bilan ahamiyatlidir. Natijalar asosida amalga oshirilgan tavsiyalar transport vositalarining kechikish vaqti va yoqilg'i isrofini kamaytirishga, shuningdek, yo'l o'tkazuvchanligini oshirishga xizmat qilishi mumkin.

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