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EVALUATION OF THE EFFICIENCY INDICATORS OF FIRE AND RESCUE DEPARTMENTS BASED ON STATISTICAL ANALYSIS OF THE FLOW OF CALLS ARRIVING TO FIRE AND RESCUE DEPARTMENTS

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Abstract

This article presents the determination of the required number of fire and rescue units for the city of Termez and Denov districts of Surkhandarya region based on the intensity of the flow of calls. Currently, the criteria for determining the number of fire and rescue units and divisions are given in SHNQ 2.07.01-03* “Development and construction planning of urban and rural population centers” and SHNQ 2.09.21-13 “Fire fighting depots”. Calculation indicators are given in Table 30 of SHNQ 2.07.01-03*. The service area is set at 3000 m.

According to these regulatory documents, there should be 27 fire and rescue units in Termez city and 18 in Denov district. These figures do not reflect real reality. This standard does not take into account the intensity of the flow of calls received by fire and rescue units (RFU) (the average number of calls received by the RFU per unit of time).

Keywords: Fire and rescue unit, flow intensity, theory of mass service, combat unit, optimal number of fire and rescue units, statistical analysis, efficiency indicators, Poisson distribution, service time, service.

Introduction

YONG‘IN-QUTARUV QISMLARINING SAMARADORLIK KO‘RSATKICHLARINI, YONG‘IN-QUTARUV QISMLARIGA KELIB TUSHGAN CHAQIRUVLAR OQIMINING STATISTIK TAHLILI ASOSIDA BAHOLASH

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Annotatsiya
Mazkur maqolada Surxondaryo viloyati Termiz shahri va Denov tumanlari uchun yong‘in-qutqaruv qismlarining zaruriy sonini chaqiruvlar oqimi intensivligi asosida aniqlash keltirilgan. Hozirgi kunda yong‘in-qutqaruv qismlari, bo‘linmalari sonini belgilovchi meyorlar SHNQ 2.07.01-03* “Shahar va qishloq aholi punkitlari hududlarini rivojlantirish va qurilishni rejalashtirish” va SHNQ 2.09.21-13 “Yong‘in o‘chirish depolari”larda keltirilgan. Hisob ko‘rsatkichlari SHNQ 2.07.01-03* ning 30- jadvalida keltirilgan. Xizmat ko‘rsatish doirasi 3000 m qilib belgilangan.
Bu meyoriy hujjatlarga muvofiq Termiz shahrida 27 ta, Denov tumanida 18 ta yong‘in-qutqaruv bo‘linmalari bo‘lishi lozim. Bu raqamlar real voqelikni aks ettirmaydi. Ushbu meyorda yong‘in-qutqaruv qismlar (YQQ)ga kelib tushgan chaqiruvlar oqimi intensivligi (birlik vaqt ichida YQQga kelib tushgan chaqiruvlar o‘rtacha soni) inobatga olinmagan.

Kalit so‘zlar: yong‘in-qutqaruv qismi, oqimi intensivligi, ommaviy xizmat ko‘rsatish nazariyasi, jangovar bo‘linma, yong‘in-qutqaruv bo‘linmalarining optimal soni, statistik tahlil, samaradorlik ko‘rsatkichlari, Puasson taqsimoti, xizmat ko‘rsatish vaqti, xizmat ko‘rsatish.

Hozirgi kunda yong‘in-qutqaruv qismlari, bo‘linmalari sonini belgilovchi meyorlar SHNQ 2.07.01-03* “Shahar va qishloq aholi punkitlari hududlarini rivojlantirish va qurilishni rejalashtirish” va SHNQ 2.09.21-13 “Yong‘in o‘chirish depolari”larda keltirilgan. Hisob ko‘rsatkichlari SHNQ 2.07.01-03* ning 30- jadvalida keltirilgan. Xizmat ko‘rsatish doirasi 3000 m qilib belgilangan.

Aholi soni	Avtomobil (bo‘linma)lar soni
5 000 gacha	1 ta
5001 dan 50 000 gacha	Har 5 000 kishiga 1 ta
51 000 dan 100 000 gacha	Har 6 000 kishiga 1 ta
101 000 dan 200 000 gacha	Har 7 000 kishiga 1 ta
201 000 dan 500 000 gacha	Har 8 000 kishiga 1 ta
500 000 dan ortiq	Loyihalash topshirig‘i bo‘yicha

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Ushbu meyorda yong‘in-qutqaruv qismlar (YQQ)ga kelib tushgan chaqiruvlar oqimi intensivligi (birlik vaqt ichida YQQga kelib tushgan chaqiruvlar o‘rtacha soni) inobatga olinmagan.

Muayyan hudud uchun zaruriy YQQlar sonini aniqlash uchun Ommaviy xizmat ko‘rsatish nazariyasining natijalari va formulalarini tadbiq etishga asoslangan yangicha ilmiy yondashuv taklif etilmoqda. Misol uchun:

Termiz shahridagi YQQ bo‘linmalarining optimal sonini aniqlash. Chaqiruvlar oqimi intensivligi λ=0,068 chaqiruv/soat xizmat ko‘rsatishning o‘rtacha vaqti $\tau_{o'r.}$=1,2 soat

$$P_\kappa = \frac{\lambda \tau_{o'r.}}{\kappa} \sum_{i=0}^{\kappa-1} (\kappa - i) a_{\kappa-i} P_i$$

formuladan bir vaqtning o‘zida κ ta bo‘linmaning chaqiruvlarga xizmat ko‘rsatish bilan band bo‘lishi ehtimoli P_k (k= 0,1,2,3,4,5,6,7) hisoblangan. Termiz shahrida xozirda 6 ta bo‘linma mavjud.

κ	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**>6**
P_κ^{nazar}	**0,9215**	**0,0155**	**0,0377**	**0,0143**	**0,0077**	**0,0016**	**0,001**	**0,0007**

Yong‘inlarni bartaraf etish uchun bir vaqtning o‘zida 6 tadan ko‘p jangovar bo‘linma zarur bo‘lishi ehtimoli

$$P_{>6} = 1 - \sum_{j=0}^{6} P_j = 1 - 0{,}9993 = 0{,}0007$$

Demak, 6 ta bo‘linma o‘rtacha har $\frac{10000}{7}$ =1428 ta chaqiruvdan bittasiga ulgirmaydi.

Bu xolat o‘rtacha har $\frac{1428}{595}$ =**2**,**4** yilda bir marta yuzaga keladi.

Termiz shahridagi yong‘in-qutqaruv bo‘linmalari soni o‘ziga biriktirilgan hududdagi yong‘in-qutqaruv ishlarini bajarish uchun yetarli.

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Qo‘shimcha qism qurish zaruriyati yo‘q.

Denov shahridagi YOQ bo‘linmalarining optimal sonini aniqlash.
Denov shaxrida 4 ta jangovar bo‘linma mavjud. Chaqiruvlar oqimi intensivligi (λ=0,03 chaqiruv/soat xizmat ko‘rsatishning o‘rtacha vaqti ($\tau_{o'r.}$=1,3 soat

$$P_\kappa = \frac{\lambda \tau_{o'r.}}{\kappa} \sum_{i=0}^{\kappa-1} (\kappa - i) a_{\kappa-i} P_i$$

formuladan bir vaqtning o‘zida κ ta tezkor bo‘linmaning xizmat ko‘rsatish bilan band bo‘lishi ehtimollari

κ	**0**	**1**	**2**	**3**	**4**	**>4**
P_κ^{nazar}	**0,9563**	**0,0098**	**0,0148**	**0,009**	**0,0055**	**0,0046**

Yong‘inlarni bartaraf etish uchun bir vaqtning o‘zida 4 tadan ko‘p jangovar bo‘linma zarur bo‘ladigan vaziyat yuzaga kelishi ehtimoli -

$$P_{>4} = 1 - \sum_{j=0}^{4} P_j = 1 - 0{,}9954 = 0{,}0046$$

Demak 4 ta bo‘linma o‘rtacha xar 10000/46=216,98 ta chaqiruvdan bittasiga ulgurmaydi.
Bu holat o‘rtacha har 216,98/264=0,8 yilda (300 kun)da bir marta yuzaga keladi.
Bu holatda qo‘shni qism bo‘linmalari yordamga keladi, ularning yetib kelguniga qadar ko‘p vaqt (eng yaqini 20-30 daqiqa) sarflanadi. Yordamchi bo‘linmalarning hududni yaxshi bilmasligi yong‘inlar bartaraf etishga salbiy ta’sir ko‘rsatadi. Insonlar hayoti xavf ostida qolishi va moddiy zarar oshib ketishi mumkin.

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2020-yilda Surxondaryo viloyatida sodir bo‘lgan yong‘inlarning 190 tasi 31 - 60 daqiqa, 96 tasi 61 - 120 daqiqa, 15 tasi 120 daqiqadan ko‘p bo‘lgan vaqt ichida bartaraf etilganligining sabablaridan biri ham aynan shu holatdir.
Taklif: Denov shahari uchun horzirda mavjud 4 ta bo‘linma yetarli emas.
Denov shahriga yana bitta Yong‘in-qutaruv qismi qurish taklif etiladi.

FOYDALANILGAN ADABIYOTLAR

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