ABOUT THE OPTIMIZATION OF THE STRUCTURE OF JOB POSITIONS

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ABSTRACT
The article is devoted to optimization of the staff and workforce within the units of automatics and telemechanics of regional directions of the infrastructure department of JSC Russian Railways. The authors computed indices that are characteristic of need in personnel in general, as well as regarding positions and occupations. The study presents an algorithm which considers span of control, structure ratio, equations expressing correlation of number of employees in staff lists with core factors that reflect differences in technical equipment, labor productivity. The study also analyzed deviations of real staff strength from optimum calculated rates.

ENGLISH SUMMARY

Background. *Reasonable optimization of costs of personnel is one of the main issues in the agenda of most companies. It is reason why it is so important to have a reliable technique of monitoring and optimization of the staff and workforce.*

Objective. *The main objective of the study was to substantiate rational structure of positions and occupations of an organization using an example of a distance (sector) of automatic and telemechanics unit of regional directions of infrastructure department of JSC Russian Railways.*

Methods. *The study used specific methods of human resources management, statistical and comparative analysis, as well as mathematical methods of correlation equations and least-squares method.*
But the whole article is devoted to development of a method to attain the declared objective.

Results.
In order to substantiate rational structure (by professions and positions) of an organization the authors of the study developed a system of structure factors and spans of control (administrative management). The system is illustrated by table 1 below. A span of control reflects number of employees that can be effectively managed by a relevant manager. The study chose the example of distances (units) of signaling, centralization and blocking of automatics and telemechanics sector of regional directions of infrastructure department of JSC Russian Railways.
In order to shape a model of rational structure of organization structure of a distance of signaling and communication the authors analyzed and calculated average structure factors, spans of control for each regional direction and arithmetical mean values there-of for all directions.
Factors K_1-K_{16} determine following the method described in previous paragraph different correlations within the structure of personnel (e. g. K_1 is a specific weight of managerial staff in total number of employees; K_5 is a percentage of electricians in total number of employees; K_{13} – number of employees as compared to managers (number of employees relative to one manager) and so on.
Using the above factors the authors studied correlations between the values of the factors (function) and the values of other factors that influence them (argument), e. g. volume of work, number of switches (which are maintained by direction within electric centralized system). When a function was analyzed through different arguments, the choice was made in favor of a variant with higher value of determination factor. As the result some equations were selected in order to develop an algorithm of organization structure (e. g. dependency of total number of employees on job volume with mean factor of determination is of 0,91), but some dependencies were confirmed with exception for some directions and with some admissions.
The authors by analyzing misbalance between staff list of employees and number of employees, calculated on the basis of equations of correlation between the number of employees and volume of works, established indices of deficiency or of an excess of employed personnel. The authors give some examples concerning railways.
They argue that before proceeding with recruiting or reducing personnel on the basis of calculations obtained through proposed algorithm, it is necessary to take into account labor productivity and quality of work, as the quality of activities of all directions is assessed.

Conclusions. *The authors applied their method to regional directions and revealed that only one direction needs to recruit personnel while the others can reduce the number of employees.*

Key words: railway, personnel, staff, organization structure, structure factors, span of management, correlation dependency, job volume, labor productivity, staff list, optimization of personnel.

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Table 1

Ranges of deviation of maximum values of spans of control from minimum values and factors of excess of maximum span of control over its minimum value for directions

Indices	Directions														
	Kuibyshevskaya	South-Eastern	East-Siberian	Privolzhskaya	Northern	Gorkovskaya	West-Siberian	Far-Eastern	Oktyabrskaya	Northern-Caucasian	Trans-Baikal	Southern-Urals	Krasnoyarsk	Sverdlovsk region	Moscow
1	2	3	4	5	6	7	8	9	10	11	12	13	**14**	**15**	**16**
Range of minimum and maximum values K_1	0,1–0,16	0,09–0,2	0,12–0,16	0,1–0,2	0,08–0,19	0,12–0,15	0,09–0,17	0,1–0,16	0,12–0,25	0,09–0,22	0,11–0,18	0,1–0,17	0,12–0,17	0,1–0,21	0,1–0,16
Range of minimum and maximum values K_2	1,2–2,4	0,8–2	1,1–1,6	0–1,31	0,8–2,4	1,55–2,16	1,23–2,33	0,7–1,7	1–3,3	0,49–1,52	0,9–2	1,15–2,2	1–2,3	0–1,6	1,15–2,43
Range of minimum and maximum values K_3	8,1–9,8	8,3–9,9	7,9–11	8,2–10,5	7,8–11,8	7,3–9,7	6,8–10,8	7,3–8,9	7,3–12	6,45–12,3	7,8–10,4	7,6–10,3	8,3–10,1	7–10,7	8,07–10,8
Range of minimum and maximum values K_4	42,9–52,5	44,3–53,9	52,5–60,4	46,2–55,6	49,2–58	48,6–54,4	46,5–57,7	42–56,2	37,5–54,5	39,7–54,6	45,1–52	43,5–54,9	46–55,5	43,8–61,4	46–58,2
Range of minimum and maximum values K_5	16,5–25,6	15–22,7	8,4–16,6	15,5–24,1	6–19,5	15,3–19,5	11–20,9	11,9–18,3	10,3–21,3	17,1–32,3	10,4–21,6	14,3–28,2	14,6–21,1	9,2–26,8	13,45–22,4
Range of minimum and maximum values K_6	4,6–15,9	5,7–15	5,2–14,1	4,4–11,9	5,7–11,4	3,8–12	6,1–16,7	9,9–21,7	2,1–23,3	4,9–19,6	6,5–18,6	6,1–15,6	6,7–13,5	6,1–15	3,6–13,7
Range of minimum and maximum values K_7	24,3–34,3	20,6–35,0	11,7–24,6	18,3–33,5	12–27,6	20,7–28,2	16,6–31,1	21–34,6	12,4–36,4	24,5–39,2	19,8–31,4	22,7–34	29,2–21	14,4–31,5	19,1–31,7
Range of minimum and maximum values K_8	65,7–75,7	65–79,4	75,4–88,3	66,5–81,7	72,4–88	71,8–79,3	68,9–83,4	65,5–77,3	63,6–87,6	60,8–75,5	68,6–80,2	66–76,5	70,9–79,8	68,5–85,6	71,9–80,9
Range of minimum and maximum values K_9	4,6–6,2	4,7–6	5,4–7,0	4,6–5,9	4,6–7	5,2–6,6	4,8–7,6	5,2–6,7	3,7–6,1	3,7–7	4,8–6,7	4,4–6,8	4,4–6,1	4,2–6,6	4,4–6,2
Range of minimum and maximum values K_{10}	1,6–5,3	4,3–17	1,8–4,3	1,4–3,8	4-15	1,6–5	1,6–5,5	1,3–16	0,9–20	1–13	3,3–13	1,6–11	1,3–12	1,6–5,5	1,25–7,5
Range of minimum and maximum values K_{11}	2–5	2–4	2–5	2–4	2–6	4–6	2–4	2–5	2–5	1–5	2–4	2–5	2–2	2–5	2–4
Range of minimum and maximum values K_{12}	0,34–0,56	0,31–0,51	0,14–0,34	0,28–0,52	0,12–0,41	0,3–0,42	0,19–0,45	0,2–0,4	0,21–0,54	0,36–0,62	0,2–0,46	0,28–0,64	0,26–0,49	0,16–0,6	0,25–0,44
Range of minimum and maximum values K_{13}	16–28,8	19.3–29,5	18,9–29	22,7–52	17,3–31,5	16–22,8	20,4–29,1	24–35,6	15,2–24,8	14,5–39	19,4–26,5	18,8–30,2	16,4–30,1	20,2–31,3	18,2–28,7
Range of minimum and maximum values K_{14}	0,6–1,4	0,33–1,0	0,5–0,8	0–0,6	0,3–1,3	0,6–1,3	0,5–1,25	0,25–1	0,33–1,7	0–1	0,3–1	0,3–2	0,3–1	0–1	0,5–1,25
Range of minimum and maximum values K_{15}	6,4–8,8	6,75–8,1	6,2–8,7	6,4–8,7	5,7–9,2	7,1–9,2	6,2–10,4	7,14–8,9	5,3–8,4	5,4–11,5	5,9–9,4	6–8,7	6,5–8,2	5,8–9,1	6,1–8,2
Range of minimum and maximum values K_{16}	22,3–49,7	28,5–74	38,8–55,5	45–119	22,7–78	27,4–40,3	24,3–54,5	31,3–75	15,6–59	34,3–128	27,5–64	26,4–49	24–55	31,2–61	25,2–57,5

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