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**HUMAN WORK MODE BASED ON HIS NATURAL BIOLOGICAL
CAPABILITIES**

Abstract. Based on the analysis of the rhythm of alternating work and rest of hunter-gatherers, as well as primitive farmers engaged in slash-and-burn agriculture, the maximum number of hours that a person can work has been determined. The cost of his time on the way from home to his workplace must also be included in the total cost of working time. Two forms of the working week are derived, consisting of alternating working days and days off.

Keywords: working hours, rest time, labor, four-day work week

§1. Initial data

The main source of numerical data is Marshall Sahlins' book "Stone Age Economics" [1], which describes how people of the Stone Age worked, that is, to what intensity of labor people are adapted by their entire biological nature, which was formed during millions of years of evolution of the genus Homo.

Block 1. Hunter-gatherers

Labor costs for the aborigines of Western Australia are for the first group: women – 3 hours 44 minutes and men – 3 hours 50 minutes [1, p. 32], and for the second group: women – 5 hours 09 minutes and men – 5 hours 07 minutes [1, p. 33].

Labor costs for South African bushmen, working days per week – from 1.2 and up to 3.2 for different groups, and an average of 2.5 days [1, p. 37].

Block 2. Primitive farmers engaged in slash-and-burn agriculture

The average time spent on labor in the Bemba tribe (Zambia) is 4 hours per day [1, p. 66].

The average time spent on labor in the Kapauku tribe (Papua of New Guinea) is 6 hours [1, p. 66].

Kapauku "has the idea that "everything in life should be balanced": if they work hard one day, they rest the next day" [1, p. 66].

The Toupori tribe (farmers from Northern Cameroon) work as follows: they rest about 161 days a year (men) and 164 days a year (women); in addition, due to illness, men do not work 9 days a year, and women - 3 days a year [5, p. 73].

§2. Calculations of working hours among hunter-gatherers and primitive farmers

The calculations below are copied from my article "The city as a biological trap. Working hours and the number of people." [2, p. 21].

With this data, it is possible to calculate the average amount of working time per year for hunter-gatherers and primitive farmers.:

5 working hours per day * 2.5 days * 52 weeks per year = 650 working hours per year for hunter-gatherers;

5 hours a day * (365 days a year – 162 days of rest – 5 days of treatment) =
= 5 hours per day * 198 working days = 990 working hours per year for primitive farmers.

Thus, it can be seen that the transition from hunting and gathering to primitive slash-and-burn agriculture increased human labor costs by $990/650 = 1.5$ times.

§3. Travel time to work

Hunter-gatherers begin their work from the doorstep of their homes; primitive farmers also have fields near their homes; therefore, the time they all work actually includes the time to travel to their workplace.

Moving a modern employee from home to his workplace should also be included in the length of his working hours, however, in practice, this is difficult to do: some people live within walking distance from their work, and some have to spend up to 1.5 hours on the way to their workplace (such people spend 3 hours daily just moving from from home to work and back).

The journey of a modern person from home to a workplace is not difficult – usually this path is overcome by an employee on personal or public transport.

For further calculations, travel costs from home to work are assumed to be 0.5 hours, which means that a modern employee will spend 1 hour traveling from home to work and back.

§4. Fundamentals for creating a working time system for modern people

In section 2, the biological capabilities of a person for work were defined – they are approximately equal to 1,000 hours per year for physical agricultural labor.

With a 12-hour working day and a 6-day working week, people can work (along with the time spent on the way to and from the workplace) over 4,000 hours a year; but this fact does not mean that human biology is adapted to such excessive work intensity: human society cannot sustainably exist for thousands of years. If people constantly work 2000 or more hours a year.

Hunting and conducting primitive slash-and-burn agriculture are energy-intensive activities, since in both cases the work is mainly muscular and takes place outdoors, which means it is affected by adverse weather conditions.

Office work related to organizational, managerial, and information processes is more nerve-racking than physical labor, but less energy-intensive.

Considering work at the workplace, along with the difficult way to the workplace, it is possible to distinguish office, physical and light types of labor activity.

Thus, the basis for building a biologically natural system of working hours is a physical mode of operation, approximately equal to 1000-1100 hours per year, which results in an office mode of operation, approximately equal to 1200-1300 hours per year.

§5. The working week for modern people

There are 365 (366) days in a year.

15 (16) days are allocated for all kinds of holidays when people are not working.

The remaining 350 days are divided into working days and weekends.

For work lasting 1,000 hours per year, five-day and six-day workweeks look redundant, so a four-day workweek is adopted: 4 working days and 3 days off.

By designating the working day as W and R (from the words "work" and "rest" in English, denoting work and rest, respectively), you can create short formulas for two forms of working weeks:

1. The first form of a four-day working week: four consecutive working days, followed by three consecutive days off: $4W+3R$.

2. The second form of a four-day working week: two working days in a row, then one day off, then two more working days in a row, and then two days off in a row: $2W+1R+2W+3R$.

With a four-day working week, a 355-day year consists of 15 holidays, 150 days off, and 200 business days.

§6. Working hours for modern people

1. Office work schedule: 200 working days per year, 5 or 5.5 working hours per day, plus 1 hour on the way to and from work – in this case, the total time spent by the employee is equal to 1200 hours or 1300 hours, respectively.

2. Physical working hours: 200 working days per year, 4 or 4.5 working hours per day, plus 1 hour on the way to and from work – in this case, the total time spent by the employee is equal to 1000 hours or 1100 hours, respectively.

2. Light working hours: 200 working days a year, 3 working hours a day, plus 1 hour on the way to and from work – in this case, the total time spent by the employee is equal to 800 hours, respectively.

Conclusions:

1. Based on the analysis of the rhythm of work and recreation of hunter-gatherers, as well as primitive farmers engaged in slash-and-burn agriculture, it was determined that a person can work a maximum of 1000-1100 hours per year in physical work and 1200-1300 hours per year in office work; moreover, the time spent on the employee's journey from home to workplace should be included in the total cost of working time.

2. Two forms of the working week are displayed:

2.1. Four consecutive working days, followed by three consecutive days off.

2.2. Two working days in a row, then one day off, then two more working days in a row, and then two days off in a row.

3. The duration of the working day for one hour spent by an employee on the way from home to the workplace and back is:

3.1. For office work – 5 or 5.5 hours per day.

3.2. When working physically – 4 or 4.5 hours a day.

3.3. With a light mode of operation – 3 working hours per day.

References

1. Sahlins M. Stone Age Economics. Moscow: OGI Publ., 1999 (in Russian).

2. Shchemelinin K. S. City as a biological trap. Working time and number of humanity. // Scientific Journal NovaUm.Ru. 2024. No. 47 (in Russian).