

STUDY OF IMPACT OF THE SEASONALITY OF FORESTRY WORK ON THE DEMAND FOR EMPLOYEES OF FORESTRY SERVICE COMPANIES (FSC)

Urszula Błuszkowska, Tomasz Nurek

Warsaw University of Life Sciences – SGGW

Abstract. One of the characteristic features of forestry work is its seasonality. Most of forestry work comprises simple activities not requiring any special preparation from the workers who do it. However, the current state of forest technology makes it possible to perform many operations, using machines and technical equipment. In Poland, the type of work that is used most often is manual work. It is still relatively cheap and available. Most of the companies providing services for forest management departments just use this simplest form of performing tasks and hire so-called seasonal employees to perform them. Thanks to this solution, the costs of keeping employees in the event there is a seasonal fall in demand for their services, is eliminated. The principal purpose of the research undertaken is to propose technological and organizational solutions that would diminish the impact of natural seasonality of forestry work on the level and structure of employment in the forestry service companies. The initial analyses show that by increasing the degree of work mechanization the demand for employees performing tasks in a forest management department may be reduced even by several tens of persons per month.

Key words: seasonality of work, labour-intensity in forestry, forestry service companies, mechanization of technological processes in forestry

INTRODUCTION

The implementation of production processes in certain branches of the national economy is determined by specific external conditions. This is of special significance in such areas as, for instance, forestry. For most of technological processes in forestry are carried out in the open air and the deadlines for their completion usually do not result from the current demand, but from so-called agro-technical time limits directly connected with vegetation periods. Seasonality of work requires an adequate, specific form of organizing its performance and one of the most important aspects is the structure and

organization of undertakings engaged in the performance of the work. Another characteristic feature of forestry work is the possibility to perform it at a low level of mechanization and, in certain situations, even the existence of major difficulties in mechanizing it. This means the expenditure of a great number of man-hours for the carrying out of the work, on the one part, and the possibility to use workers with low qualifications, on the other. These two facts have a very strong impact on the operation of undertakings performing the works [Więsik and Wójcik 2008].

In the forest industry, an overwhelming majority of work is currently performed by private firms – forestry service companies, which assume the duty of realisation of any tasks falling within the scope of forestry production (breeding, forest protection, fire-protection, maintenance operations, logging) and also of the tasks accompanying such production (e.g. road construction). According to various sources [Kocel 2000], nearly 100% of the logging works are performed by private contractors. Forestry service companies engage in carrying out nursery work or forest protection work to a slightly lesser degree. As already mentioned, the works to be performed include the works which require highly specialist qualifications as well as such works the performance of which requires not more than several hours of instruction. This situation, along with the economic factors taken into consideration, makes the owners of the firms performing forestry work chose to perform the work at the low level of technology, using for it employees with low qualifications.

The above-described phenomena result in, as regards the sector of the firms performing forestry work, high seasonality of employment. Wishing to minimize the costs of operation of their undertakings, the owners of the firms resign from keeping permanent employees and very often, temporarily hire seasonal employees instead. It can be questioned if the solution is really good. Its greatest advantage are, no doubt, low costs. The owner of a company bears the costs connected with an employee only during the time such employee is hired, very often without the necessity of bearing the social insurance costs. This solution is also advantageous to the principal, i.e. the forestry management department, because it allows to achieve low prices for the service performed. Hiring seasonal workers, however, may result in lowering the quality of works carried out. Accidental seasonal employees, especially those engaged for the first time, even if trained, often make mistakes and they lack incentive to work diligently due to the fact that they do not see their future in a particular firm. Also, it often happens that not being highly skilled at doing specific activities, seasonal workers expose themselves and their colleagues to the risk of an accident.

A modern, well-operating company providing services, including the company co-operating with the State Forests National Forest Holding, should aim at employing as large a group of permanent employees as possible – the number of whom should correspond to the number of expected mandates. Hiring permanent employees can be very advantageous to the forestry service company. A stable, trained and well-equipped group of employees ensures to a greater extent a proper implementation of tasks. This arises from a greater inclination of the owners to invest in people and to raise their qualifications. Such employees are usually better motivated, and fulfill their duties better.

The effect of seasonality of employment arises also from the tender policy of the forestry management department. The solutions applied (signing contracts for a relatively short term) do not foster investment by and development of forestry service companies. It is difficult to take bold investment decisions or the decisions that aim at increasing employment when the continuity of mandates in a long run is not certain. Forestry

management departments still (but less frequently) organize tenders covering a single specific financial year. This fact only strengthens the above-described trend of FSC owners' using the services of seasonal workers.

The phenomena described above were the reason for which the employees of the Faculty of Agricultural and Forestry Machines initiated the research primarily with the view of searching for the way to minimize the impact of natural seasonality of the works on the employment structure in forestry service companies. Raising the level of mechanisation of certain works can, or rather should, be one of the solutions.

However, since the engagement of permanent employees generates high fixed costs, attempts should be made to eliminate adverse aspects arising from the seasonality of the works. In the Department of Forestry Mechanisation, Warsaw University of Life Sciences, research has been started on the seasonality of works and the related unstable demand for labour [Błuszkowska and Nurek 2010].

PURPOSE AND SCOPE OF THE STUDY

The purpose of the initiated research is to make a detailed analysis of the realisation of tasks in the selected area. The analysis will take into consideration the labour input in particular classes of works, also with regard to the level of mechanization of successive operations. As a result, the actual demand for employees with specified qualifications in respect of particular months will be known. The analyses will be concluded with recommendations of organisational solutions aimed at reducing adverse impact of the seasonality of the works on the employment of forestry workers.

The research covered two forestry management districts in the area managed by the State Forests Regional Directorship in Szczecinek. The subject of the analysis were the data concerning logging and maintenance works in two successive agricultural years – 2007 and 2008.

RESEARCH METHODOLOGY

The information used in these analyses was obtained from the database of the IT System of the State Forests. The data concern the demand for labour in the two selected forest management departments of the State Forests Regional Directorship in Szczecin in two successive agricultural years. In this study we will focus on two categories of works only: those connected with timber logging and those connected with forest stand maintenance. The data taken from the SILP databases will be compared with the labour intensity values for particular activities as stated in the Catalogue of Labour Intensity of Forestry Works. Making use of the fact that the catalogue specifies labour intensity of particular activities depending on their implementation at different levels of mechanisation, a calculation has been made as to the demand for labour in respect of the activities to be performed in the selected forestry management departments in the event such works have been mechanised. As a result of these operations the authors determined new values of the demand for labour required to perform actual tasks in the forestry management departments. The purpose of the initiated research comprised also the calculation of the number of employees (jobs) necessary to carry out tasks with regard

to the assumed two levels of mechanisation. For the purpose of calculation it has been assumed that one employee may work 200 man-hours per month. The demand for employees has been calculated according to the following formula:

$$N = \frac{P_g}{p}$$

where: N – number of employees, P_g – labour intensity of the category of works, in man-hours, p – number of man-hours per employee in a month, in man-hours.

RESULTS OF THE STUDY – DISCUSSION

Figure 1 and 2 show the demand for man-hours in respect of forestry management department A and forestry management department B, obtained from the SILP databases in the two selected years.

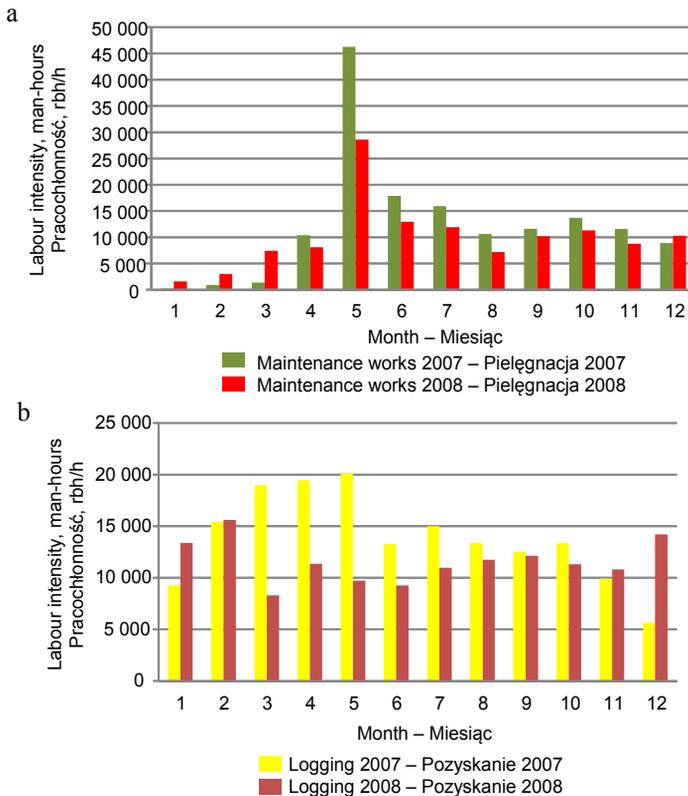


Fig. 1. Monthly demand for labour in forestry management department A: a) in respect of maintenance works, b) in respect of logging works

Rys. 1. Miesięczne zapotrzebowanie na robociznę w nadleśnictwie A: a) do prac pielęgnacyjnych, b) do prac pozyskaniowych

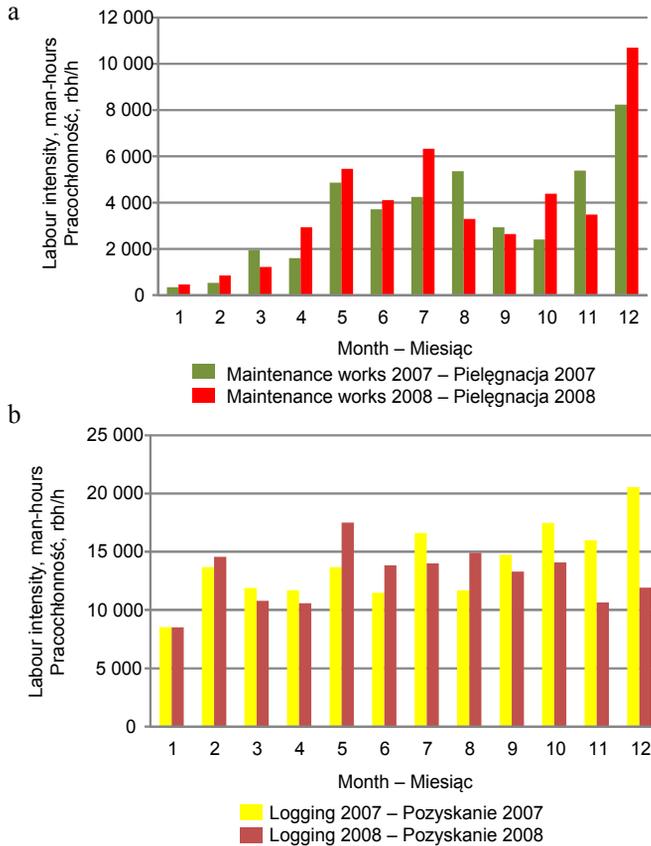


Fig. 2. Monthly demand for labour in forestry management department B: a) in respect of maintenance works, b) in respect of logging works

Rys. 2. Miesięczne zapotrzebowanie na robociznę w nadleśnictwie B: a) do prac pielęgnacyjnych, b) do prac pozyskaniowych

Table 1 contains values of demand for labour in respect of maintenance works in the two selected forestry management departments in 2008. Also, columns 3 and 5 contain the results of the calculations of the number of employees needed to perform the works in the successive months.

The Catalogue of Labour Intensity of Forestry Works is the source of information presented in Table 2. It contains selected activities and the values of labour intensity attributed to them on two levels of work mechanisation.

Calculation of the demand for labour, given that 50% of tasks are performed at a higher level of mechanisation (with the use of equipment hooked to the wheel tractor). It has been assumed that increasing the degree of mechanisation would cause 10-times decrease in the demand for man-hours. The results of the calculations have been presented in Tables 3 and 4.

Table 1. Demand for labour in forestry management departments A and B in the year 2008
 Tabela 1. Zapotrzebowanie na robociznę w nadleśnictwach A i B w 2008 roku

Month Miesiąc	Forestry Management Department A Nadleśnictwo A		Forestry Management Department B Nadleśnictwo B	
	man-hours rbh/h	jobs etat	man-hours rbh/h	jobs etat
January – styczeń	1 579.88	7.9	857.57	2.3
February – luty	3 019.21	15.1	467.92	4.3
March – marzec	7 442.35	37.2	1 217.52	6.1
April – kwiecień	8 071.73	40.4	2 928.86	14.6
May – maj	28 647.29	143.2	5 464.44	27.3
June – czerwiec	12 998.43	65.0	4 102.85	20.5
July – lipiec	11 928.38	59.6	6 323.07	31.6
August – sierpień	7 196.48	36.0	3 299.97	16.5
September – wrzesień	10 171.07	50.9	2 641.78	13.2
October – październik	11 324.37	56.6	4 387.60	21.9
November – listopad	8 781.41	43.9	3 484.15	17.4
December – grudzień	10 310.56	51.6	10 709.21	53.5

As shown in Figure 1, in the forestry management department A, the nature of changes in the demand for labour with respect to both analysed work categories in the two years under analysis (2007 and 2008) was similar. Very few maintenance works are performed in the winter months (January, February, March), and their greatest accumulation definitively occurs in the month of May. The seasonality of logging works is of different nature. In both years under examination the demand for labour can be recognized as more stabilised during the year in respect of the previously discussed category of logging works. It ranged from approximately 5000 man-hours in the month of December 2007 to approximately 2000 man-hours in the month of May in the same year. As regards maintenance works in the forest management department under consideration, the lowest value of demand was recorded in January 2007 (approximately 250 man-hours), whereas in the month of the greatest accumulation of works, i.e. in May, over 45000 man-hours. In the other summer and autumn months the demand prevailed at the level of approximately 1000 man-hours. This is connected with the presently existing permanent demand for lumber and with the technical capabilities facilitating logging in more difficult weather conditions.

Greater fluctuations in the demand for labour with regard to maintenance works can be observed in the other of the forest management departments under analysis, i.e. in department B. Figures 2 a and 2 b show similar values as in respect of forestry management department A. In forestry management department B a great changeability of demand for labour regarding maintenance works has been clearly noted. An interesting phenomenon observed is a very big demand in the month of December in both analysed years, 2007 and 2008. As regards logging works the demand for labour was relatively steady over the whole year and ranged from 10 000 to about 15 000 man-hours.

Table 2. Exemplary values of labour intensity of forestry works

Tabela 2. Przykładowe wartości pracochłonności prac leśnych

Manual work Prace ręczne		Work performed by equipment suspended on wheel tractors Prace wykonywane urządzeniami zawieszanymi na ciągnikach kołowych	
Weeding in rows or belts during the rise period Pielenie w rzędach lub pasach w okresie wschodów [13]	3.30-4.20 man-hours/are rbh/ar	Intercrop soil scarifying by multi-row hoe Spulchnianie gleby na między- rzędziach opielaczem wielorzę- dowym [237]	0.08-0.15 man-hours/are rbh/ar
Cutting out weeds from crops and removal of coatings in derivative crops Wykaszenie chwastów w upra- wach oraz usuwanie nalotów w uprawach pochodnych [153]	36.0-57.0 man-hours/hectare rbh/ha	Intercrop nursing Pielęgnowanie międzyrzędzi [271]	2.00-4.50 man-hours/hectare rbh/ha
Nursery of 2 and 3-year old seedlings Szkółkowanie sadzonek 2-3-latek [5]	5.70-6.30 man-hours/1000 pcs. rbh/1000 szt.	Mechanical nursery of seedlings with a single-row planter Mechaniczne szkółkowanie siewek sadzarką jednorzędową [238]	0.66-0.85 man-hours/1000 current meters of planted row rbh/1000 m
Planting one-year-old seedlings in holes made by tree planting bars, in belts and dishes Sadzenie jednolatek pod kostur na pasach i talerzach [132]	8.5-12.1 man-hours/1000 pcs. rbh/1000 szt.	Planting in furrows on stumped surface after full ploughing Sadzenie w bruzdach na powierzchni zapniaczonej po pełnej orce [265]	1.40-1.90 man-hours/1000 pcs. rbh/1000 szt.

Source: Catalogue of time standards for forestry works performed as part of forest management.
Źródło: Katalog norm czasu dla prac leśnych wykonywanych w zagospodarowaniu lasu.

Table 3. Demand for workers – manual work

Tabela 3. Zapotrzebowanie na robotników – prace ręczne

Works performed manually – Prace wykonywane ręcznie	
Total labour intensity, man-hours Pracochłonność całkowita, rbh	8 000
Number of man-hours per employee a month, man-hours Liczba roboczogodzin dla pracownika w miesiącu, rbh	200
Number of employees Liczba pracowników	40

The above-presented analyses of two selected categories of works illustrate well the issue of seasonality of work. They show, on the one hand, that the problem of work seasonality concerns various categories to a different degree and, on the other hand, that changeability in the demand for labour can achieve very high values (for example

Table 4. Demand for workers – partially mechanised work

Tabela 4. Zapotrzebowanie na robotników – prace częściowo zmechanizowane

Labour intensity of works performed manually, man-hours Pracochłonność prac wykonywanych ręcznie, rbh	4 000
Number of man-hours per employee a month, man-hours Liczba roboczogodzin dla pracownika w miesiącu, rbh	200
Number of employees Liczba pracowników	20
Labour intensity of works performed by the equipment hooked on the wheel tractor, man-hours Pracochłonność prac wykonywanych urządzeniami zawieszanymi na ciągniku, rbh	400
Number of man-hours per employee a month, man-hours Liczba roboczogodzin dla pracownika w miesiącu, rbh	200
Number of employees Liczba pracowników	2
Total number of employees Całkowita liczba pracowników	22

in respect of logging works). The purpose of this study is to make a detailed analysis of the phenomenon of work seasonality. Table 1 contains the collected values of the demand for labour in respect of maintenance works in the forestry management departments A and B in 2008. In analyzing the foregoing table, we notice considerable differences in respect of both departments in the demand for labour between the subsequent months. By way of an example, in the forest management department A, the demand in January amounted to about 1580 man-hours and in February it still rose to about 3020 man-hours, which means that the demand for labour almost doubled. A huge increase in May can be observed. In that month the aggregate demand for labour in respect of maintenance works exceeded 28 500 man-hours, whereas in April it amounted to 8000 man-hours “only”. This gives us a three-times increase. And in June, however, a fall in the demand was observed as compared to May – by more than a half, to nearly 13 000 man-hours. Smaller differences can be observed with regard to the forestry management department “B”. And, yet, two-times increase or fall is not infrequent here, either. Table 1 also presents a monthly demand for “jobs”. It has been assumed that one employee can work 200 hours in a month. In both forestry management departments under analysis the nature of changes in the demand for employees is similar and ranges from several (8.3) in the month of January to several tens in the summer months. Only the data relating to the month of May for forestry management department “A” denote an exceptionally big demand. So, it turns out that in various months of the year there is a need to suddenly increase employment by even more than ten persons. Unfortunately, the seasonality and cycles of works most often force the employer to resign from their services after the period of one month’s or several months’ employment.

In Table 2 the values of labour intensity of selected forestry works performed at different levels of mechanisation are stated. It has been assumed that the works lead to a very similar cultivation or breeding results. The labour intensity values presented in the table have been taken from the Catalogue of labour intensity of forestry works performed as part of forestry management, the Catalogue ordinal number being given in square brackets. The values presented in table show that, for example, in the scope of

works connected with weed control in forest cultivations there is a possibility to do these tasks manually (using simple tools) and mechanically (by the equipment hooked to the tractor). As regards the first possibility, according to the authors of the Catalogue, the operation of weeding the area of one are requires, depending on the degree of difficulty, 3.30 to 4.20 man-hours. Performance of such operation at a higher level of mechanisation requires from 0.08 to 0.15 man-hours per are. The comparison of the two values shows that manual weeding requires about forty times greater expenditure of labour.

In the other example, the performance of the operation of cutting weeds by the power generation unit and the tractor allows to decrease the demand for labour approximately fifteen times [Nurek 2011].

The data relating to the nursery operation require a more comprehensive analyses. Where the operation is performed manually, the demand for labour has been stated in reference to 1000 pieces of nursery plants. Labour intensity of mechanical nursery has been stated in man-hours per 1000 current meters of a nursery belt. Therefore, there is a certain difficulty in converting the units so as to enable comparison of the demand for labour. If we assume that ten nursery plants fall to every current meter [Nurek 2011], then one can recognize that labour intensity per 1000 plants would be approximately 0.07 to 0.08 man-hours. It follows, then, that the labour intensity of the nursery operation performed by equipment hooked to the tractor is about 80 times lesser as compared to the labour intensity of such operation performed manually [Szkółkarstwo... 1992].

Similar differences in labour intensity can be expected to exist in relation to many tasks. For instance, digging holes for fencing and drilling such holes, cutting weeds with a scythe and with combustion mower or just harvesting by an agricultural tractor and harvesting with a specialist forestry harvest tractor. The presented examples demonstrate that the possibilities to reduce the demand for labour, such possibilities arising from raising the level of mechanisation of forestry works, can be sought for in various categories of such works. For the operations that can be performed at various levels of mechanization can be found both among the categories of works pertaining to nursery, forest breeding, forest protection and among those pertaining to forest utilization.

As already mentioned, the owners of the forestry service companies do not chose, however, to perform works using mechanized equipment. The main reason for this is their unwillingness to invest in the situation where they are not certain whether they would get any next mandates. Such behaviour results in an increased demand for seasonal workers.

Taking into consideration the foregoing calculations and analyses one may consider the following situation.

In April the demand for labour amounts to about 8000 man-hours. This means that 40 employees are needed to perform tasks during one month (Table 3). Let us assume that we can do half of the tasks using various kinds of mechanised equipment and, thereby, reduce the demand for labour 10 times. So, the total labour intensity in the month of April would amount only to 4400 man-hours (Table 4). We would need, then, 20 employees for manual work (4000 "non-mechanised" man-hours) and 2 to perform other works at a higher technical level. Eventually, this would mean the reduction in the demand for employees by 18 persons. An attempt at increasing the share of the works at a higher technical level naturally denotes a further fall of the demand for labour. The effect achieved seems to be very beneficial from the point of view of seasonality of the demand for employees. For, one can imagine a forestry service company employing

ten or so or several tens of persons on the permanent basis and using them, as the need may be, to perform various mechanised works. A disadvantage of such solution is, however, the necessity of investing in equipment and in the people with higher qualifications.

In addition to the solution proposed, one may consider the possibility of putting off the time limit for the completion of some works, taking into consideration, naturally, the breeding requirements. This possibility stems from the fact that the completion of works with the use of mechanised equipment leads to the shortening of time for their completion, hence more works in various forest areas can be performed in the required agro-technical time limit. One should also consider the possibility of searching for mandates in other forestry management departments where particular tasks are performed with a time shift due to different natural and forestry or climatic conditions.

RESUMÉ

The seasonality of work in the area of forestry brings about many problems concerning the policy of employment in the companies performing economic tasks for forestry management departments. The owners of those undertakings avoid hiring employees on a permanent basis, thereby reducing the costs of operation and they hire seasonal workers instead. However, this solution impedes the companies' development. It is not conducive to investing in machines and employees' training. Therefore, actions should be taken to show the owners of forestry service companies the solutions that might improve the situation. The actions described in this article aim at creating a possibility to eliminate adverse effects of the seasonality of forestry work. They would facilitate the performance of tasks in a shorter time and by fewer employees. This ensues, in turn, a greater flexibility and mobility of forestry firms. It appears from the examples discussed in the article that mechanisation of even a part of the works can bring about a considerable reduction of the demand for labour. Thus, it would allow the firms to employ a smaller number of, but better qualified, workers holding a license to operate various mechanised equipment. The development of forestry service companies should aim, in the long run, at creating firms that are well equipped technically, that have a stable and well-trained crew. For such firms would be a guarantor of performance of tasks at a proper quality level, in appropriate periods of time and, what is equally important, in compliance with all safety requirements.

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BADANIA WPŁYWU SEZONOWOŚCI PRAC LEŚNYCH NA ZAPOTRZEBOWANIE NA PRACOWNIKÓW ZAKŁADÓW USŁUG LEŚNYCH (ZUL)

Streszczenie. Jedną z cech charakteryzujących prace leśne jest ich sezonowość. Większość prac leśnych to czynności proste, niewymagające szczególnego przygotowania wykonujących je robotników. Obecny stan techniki leśnej pozwala jednak na wykonanie wielu operacji z użyciem maszyn i urządzeń technicznych. W Polsce najczęściej korzysta się z pracy ręcznej. Jest ona jeszcze stosunkowo tania i dostępna. Większość zakładów świadczących usługi na rzecz nadleśnictw korzysta właśnie z tej najprostszej formy wykonania zadań, przy czym do ich realizacji wynajmuje tak zwanych pracowników sezonowych. Dzięki temu rozwiązaniu eliminuje się koszty utrzymywania robotników w czasie sezonowego zmniejszenia na usługi. Głównym celem podjętych badań jest zaproponowanie rozwiązań technologiczno-organizacyjnych zmniejszających wpływ naturalnej sezonowości prac leśnych na poziom i strukturę zatrudnienia w zakładach usług leśnych. Ze wstępnych analiz wynika, że zwiększenie stopnia mechanizacji prac może skutkować zmniejszeniem zapotrzebowania na pracowników realizujących zadania w nadleśnictwie nawet o kilkadziesiąt osób w miesiącu.

Słowa kluczowe: sezonowość prac, pracochłonność w leśnictwie, zakłady usług leśnych, mechanizacja procesów technologicznych w leśnictwie

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