

ORIGINAL PAPER

The effect of public tenders on technological change creation at forestry enterprises in Poland

Dariusz Rutkowski⁽¹⁾✉, Andrzej Węgiel⁽²⁾, Włodzimierz Stempski⁽³⁾, Roman Gornowicz⁽³⁾

⁽¹⁾ Department of Forestry and Forest Ecology, Faculty of Agriculture and Forestry, University of Warmia and Mazury in Olsztyn, Pl. Łódzki 2, 10-727 Olsztyn, Poland

⁽²⁾ Department of Forest Management, Poznań University of Life Sciences, Wojska Polskiego 71c, 60-625 Poznań, Poland

⁽³⁾ Department of Forest Economics and Technology, Poznań University of Life Sciences, Wojska Polskiego 71c, 60-625 Poznań, Poland

ABSTRACT

Technical infrastructure is of great importance to timber harvesting contractors for the execution of this challenging process. Firstly, it determines the efficiency and quality of work, and secondly, it has a huge impact on the safety of workers. The effectiveness of forest environmental protection also depends on the technologies being applied. For over a decade, the State Forest Holding (SFH) has outsourced forest services in Poland to forestry companies. When outlining requirements and adopting certain criteria for the evaluation of potential contractors, the contracting party may have an influence on the technical equipment used by these contractors. The aim of this study was to determine the impact that SFH public tender requirements used between 2013 and 2018 had on the technical equipment of companies providing forestry services. We also endeavoured to determine whether the tender policy of the SFH administration in Poland significantly facilitated the technological development of forestry enterprises. Towards these aims, available documentation relating to the technical requirements of forestry tenders during the 2013-2018 period, was investigated. Data were collected from 2,482 tenders conducted in 414 forest districts (96% of all forest districts) across Poland. This included all the technical equipment that any company wishing to participate in the tender must have had at its disposal. The focus was on the availability of a harvester, a forwarder, a forest trailer with a crane, and a tractor adapted to skidding. In addition, the proportion and percentage level of the non-price evaluation criterion, *i.e.*, possession of a harvester or a forwarder, was analysed. Based on the results, it was noted that the potential technological development stimulation that could be provided by public tenders, are not fully exploited. Nevertheless, the proportion of tenders requiring the availability of a harvester increased in the 2013-2018 period. At the same time, however, the percentage of forest enterprises requiring the use of a forwarder decreased. Moreover, the most common technical requirement for companies to participate in tenders, was the requirement of having only a tractor adapted for skidding. Additionally, in the non-price criteria for the selection of offers, the number of forest districts using the criterion 'ownership of a harvester or forwarder' decreased to only 19 in 2018, while in 2015 it was 135. We have found that the methods used in tenders do not promote tech-

✉e-mail: dariusz.rutkowski@uwm.edu.pl

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nological progress in forestry companies, which may hold negative consequences for the public contracting authority and forest management in the future.

KEY WORDS

forestry companies, public procurements, harvester, forwarder, tractor with trailer, tractor adapted for skidding

Introduction

At the threshold of the 1990s economic transformation in Poland, the technological level of forest management was significantly lower than in western and northern Europe. According to Data (2000), the machinery and technology used was akin to that of Scandinavian countries in the 1970s. Thus, Polish forestry was more than 20 years behind. The high risk of this technology gap widening in subsequent years was also pointed out (Kocel, 1993).

In Polish forestry, the 1990s was the time of the State Forests National Forest Holding reorganization. As a result of this, almost all employed chainsaw operators lost their jobs. Their tasks were taken over by forestry service companies, who have carried out most of the forestry work in Poland to date. This scenario of outsourcing forestry also exists in many other European countries (Rummukainen *et al.*, 2012; Häggström *et al.*, 2013; Kovalčík *et al.*, 2016). Initially, the equipment used by these companies was mainly second-hand and purchased from the State Forests administration (Więsik, 2019). This was also an economic necessity for forest districts to get rid of heavily depreciated and worn-out machinery (Barszczewski, 1996). On the other hand, for newly established forestry companies, it was an opportunity to purchase technical equipment with a relatively low financial commitment. New owners very often used the machines until they were technically worn out (Kocel, 1992). From the start, the forest services sector has been the subject of numerous surveys – the first of which was done in 1993, where the 377 newly established companies were surveyed. The results of this study showed that the technical equipment used to carry out forestry work are mainly farming equipment and specialized tractors (Kocel, 1995, 2013). According to Data (2000), who has been studying the forest services sector in the Regional Directorate of State Forests in Szczecin, the equipment used for forestry enterprises was still at a low level in 1999. Apart of 93 skidders, no company had any highly specialized forest machinery. Four years later, Poland joined the European Union and this access to the European labour market had a significant impact on technological progress in forestry in the country. On the one hand, the emigration of workers and the resulting shortage on the domestic market caused an increase in labour costs. On the other hand, it was now easier to import second-hand machinery. Unfortunately, imported equipment was often old and heavily exploited (Grodecki, 2007). On the national forests territory in 2004, there were 16 harvesters in operation and 9 of these were owned by forestry companies. There were also 56 forwarders operating and 37 of which were owned by forestry companies (Jodłowski and Kocel, 2006). Two years later in 2006, there were already 93 forwarders and mini-forwarders, plus 21 harvesters in operation. By 2008, the number of forwarders and mini-forwarders had increased to 263, and there were 152 harvesters. Such a rapid growth in the number of specialised machineries was evidence of the far-reaching changes afoot in the forestry services market (Grodecki, 2008d).

Another crucial event in the technological development of forestry companies in Poland, was the introduction of the outsourcing of forest services in accordance with the Public Procurement Law (Ustawa, 2004). Since 2008, public open tenders have been used to deliver forest management services. In the first years of using tenders, the assignment of contracts for forestry services was

determined solely by price. Strong competition in the forestry services market meant that tenderers had to perform at the lowest possible cost to be given a contract. The negative side-effects of this system were that the quality of services deteriorated, and the level of safety and the level of humanisation of work decreased (Grodecki, 2008b). With annual tenders based mainly on price criteria, no alternative work outside the forests, and uncertainty about the operational range of harvesters and forwarders, an investment in technical equipment appeared to be a significant risk (Grodecki, 2014). However, the purchase of pre-owned machinery lowered this risk, and therefore the share of heavily used machinery in forestry increased. As research from that period shows, only about 15% of the machines in operation were less than 3 years old (Żabierek, 2013). Nevertheless, at that time this was comparable to other European data (Malinen *et al.*, 2016).

Since 2012, the situation where price criterion was used for the selection of tenders has gradually changed. Non-price technical criteria have appeared more often in tenders, favouring companies equipped with modern harvesting machines. Further equipment upgrading of forestry enterprises was also taking place. According to Grodecki (2014), the approximate number of harvesters working in Poland in 2014 was around 400, while the number of forwarders was about 700 units. In 2016, Mederski *et al.* (2016) stated that forestry companies had 460 harvesters in 2014, while 530 were recorded by the end of 2015. Therefore, the share of timber harvested with harvesters and forwarders has been systematically increasing.

Moskalik's assumption (Bodziak, 2017) that approximately half of the timber in Poland can be harvested in a fully mechanised way, means that there is potential for the involvement of 1500 harvesters. So, there is no doubt that the rationale for the further technical development of forestry enterprises exists. One of the mechanisms that could encourage this expansion, is public tenders for forestry services issued by forestry authorities. However, until now, there has been little research on the impact of procurement policies on the technical aspects of the forest services sector.

The aim of the study was to determine the impact of public tender requirements issued by the administration of the State Forests between 2013 and 2018 on the technical equipment of companies providing forestry services. The study also endeavoured to determine whether the tender policy of the SFH administration in Poland significantly facilitated technological development of forestry enterprises.

Materials and methods

A study of the impact of tender policies on the technical equipment of forest enterprises was carried out based on tender documentation from forest districts across Poland. Individual forest districts were grouped into 17 Regional Directorates of State Forests (RDSF), which became the basis for regional comparisons.

Data collection was possible thanks to full publicity of the procurement procedure. The data was obtained from documentation that forms a part of every contract notice, the so-called Terms of Reference (literally: Specification of Important Terms of Purchase). Data analysis included the technical requirements issued to the potential contractors, and the non-price criteria that were used to select the offer.

From the Terms of Reference for tenders for forestry services, the following data were obtained:

- Technical equipment requirements that the contractor had to fulfil to be able to take part in the tender procedure: the availability of a harvester, a forwarder, a forest trailer with crane, and/or a skidding tractor.

- The proportions and percentage level of the non-price evaluation criterion: possession of the harvester or the forwarder.

Information was collected only for the section of the orders (so-called packages) referring to harvesting, skidding and forest management. The sections that went beyond elementary forest management tasks concerning nursery, hunting, fire protection, grassland science and others, were not included. The orders related to the 2017 hurricane disaster were also not taken into consideration. The data was collected for a six-year period (2013-2018) from across the country.

Altogether, the Terms of Reference from 2,482 tenders were collected from 414 forest districts, which constitutes 96% of all forest districts in Poland. The obtained data was saved in a database where each tender was given its own number. In the case of procurements lasting more than one year, information on the criteria, conditions and results was repeated for all years the tender was issued.

Results

CONDITIONS FOR PARTICIPATION. The number of forest districts applying four technical conditions required in tender procedures (harvester, forwarder, forest trailer with crane, and a tractor adapted to skidding) is presented in Figure 1.

The number of forest districts that used harvester availability as a condition for tender participation, systematically grew between 2013 and 2018. In 2013, this condition was used by 84 forest districts (20%) and in 2018 it was already used in 169 forest districts (40%). The requirement of a harvester was most often used in RDSF Radom, where every forest district applied it at least once. In contrast, this criterion was almost never used in RDSF Kraków (Table 1, Fig. 2). Apart from RDSF Radom, there were regions of Poland where the condition of having a harvester at one's disposal was applied more often than anywhere else. These were: RDSF Szczecin, RDSF Zielona Góra, RDSF Poznań, RDSF Katowice, RDSF Białystok, and RDSF Olsztyn (Fig. 2).

The number of forest districts using forwarder availability as a requirement for participation in the tender process during the first three years (2013-2015) was equal to the number of forest districts using the requirement to own a harvester.

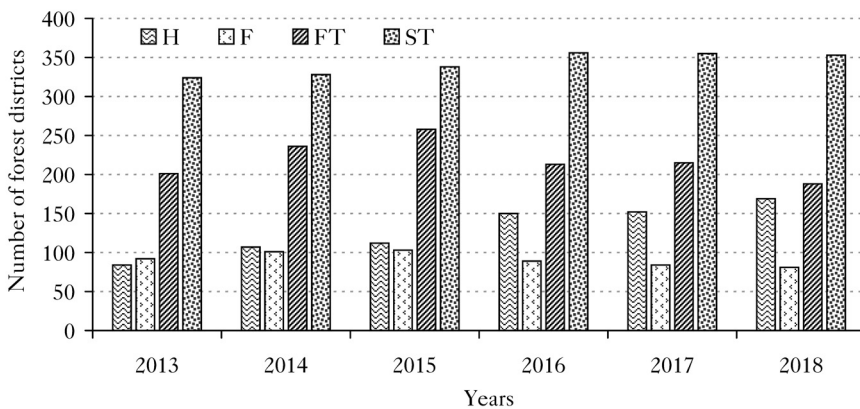


Fig. 1.

The number of forest districts that used the selected technical conditions for tender participation between 2013 and 2018

H – harvesters, F – forwarders, FT – forest trailers, ST – skidding tractors

In the following three years (2016-2018), the number of forest districts using this requirement decreased and was already significantly lower than the number of forest districts requiring a harvester (Fig. 1). The requirement of forwarder availability was most often applied by the forest districts of RDSF Gdańsk and RDSF Katowice, and most seldom by the forest districts of RDSF Piła, RDSF Toruń, RDSF Wrocław and RDSF Lublin (Table 1, Fig. 3).

Table 1.

The share [%] of forest districts in each Regional Directorate of State Forests (RDSF) applying selected technical terms of participation in tender proceedings in 2013-2018

No.*	RDSF	Number of audited forest districts	Technical condition for possession and use [%]			
			harvester	forwarder	skidding trailer with crane	tractor adapted to skidding
1	Białystok	30	53	27	80	90
2	Gdańsk	14	79	100	50	100
3	Katowice	35	59	84	68	100
4	Kraków	15	7	20	33	100
5	Krosno	25	35	27	92	100
6	Lublin	24	29	21	83	100
7	Łódź	19	37	21	58	95
8	Olsztyn	30	53	57	83	100
9	Piła	20	40	5	90	100
10	Poznań	25	84	24	88	92
11	Radom	22	100	17	96	100
12	Szczecin	32	85	56	74	100
13	Szczecinek	29	45	24	97	97
14	Toruń	27	19	11	78	89
15	Warszawa	14	36	14	93	71
16	Wrocław	33	55	33	88	70
17	Zielona Góra	20	85	30	65	90
	Mean		53	34	77	94

*The numbers in column 1 correspond to those shown in Figures 2, 3, 5

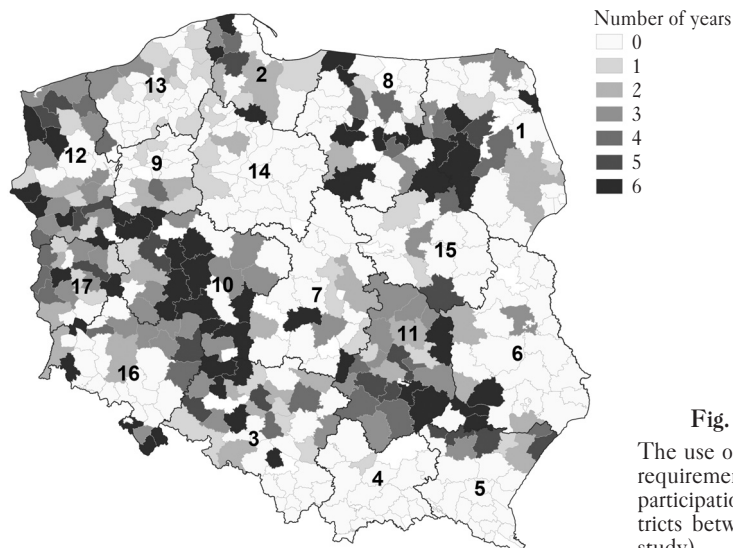


Fig. 2.

The use of the harvester availability requirement as a condition for tender participation by individual forest districts between 2013 and 2018 (own study)

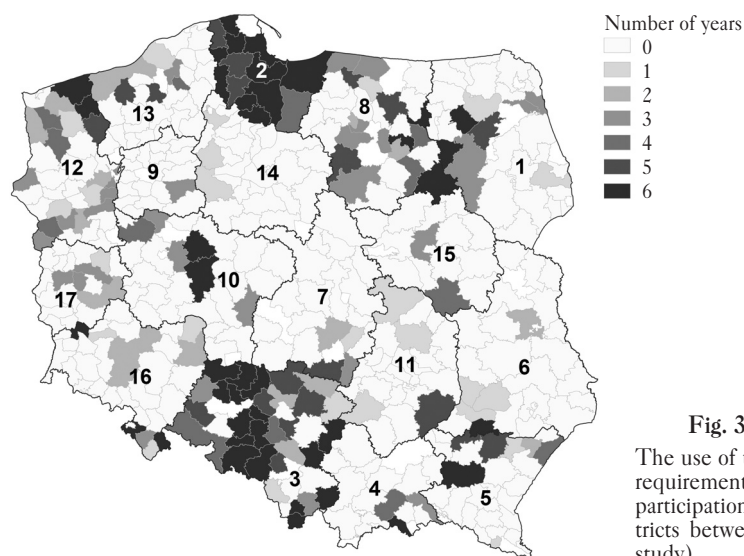


Fig. 3.

The use of the forwarder availability requirement as a condition for tender participation by individual forest districts between 2013 and 2018 (own study)

The technical requirement to have a skidding trailer with a crane was much more common in tender proceedings than the requirement to have a harvester or forwarder (Fig. 1). It was used most often in 2015, and in 2018 it was the least. More than 90% of forest districts applied this condition to the tender procedure in four RDSFs: Krosno, Radom, Szczecinek and Warszawa (Table 1).

Overall, the requirement to have a tractor adapted to skidding was the most frequently applied technical requirement in tender procedures (Fig. 1). All forest districts in 9 RDSFs applied this requirement at least once (Table 1).

TENDER EVALUATION CRITERIA. The offers submitted in public tenders were evaluated according to the criteria specified by the contracting authority. The main criterion was the price at which the forestry services were to be carried out. In addition to the price, criteria concerning the company's ownership of either a harvester, a forwarder, or both, also appeared in the reviewed tenders. Companies that had these machines at their disposal were therefore given preference in the tenders.

The possession of a harvester or a forwarder was adopted as the technical (non-price) tender evaluation criteria. In 2013 and 2014, 99 forest districts applied this technical criterion. In 2015 the criterion was used the most often, in 135 districts. Then the number steadily decreased until only 19 forest districts used this in 2018 (Fig. 4). In 2017, forest districts in only six RDSFs applied this technical criterion, and in 2018 it was used in no more than seven RDSFs (Table 2).

Technical criteria for tender evaluation were used most frequently in RDSF Radom (Fig. 5), and had the highest average impact on the assessment of tender offers in the RDSF Warsaw districts (Table 2). In contrast, none of the forest districts applied technical criteria for tender evaluation in RDSF Piła (Table 2, Fig. 5).

Discussion

Technological development of Polish forestry enterprises is accelerating (Grodecki, 2014; Mederski *et al.*, 2016). Nevertheless, there is still a need to increase the number of specialised machineries working in forestry, such as harvesters and forwarders (Bodziak, 2017). Technical, technological,

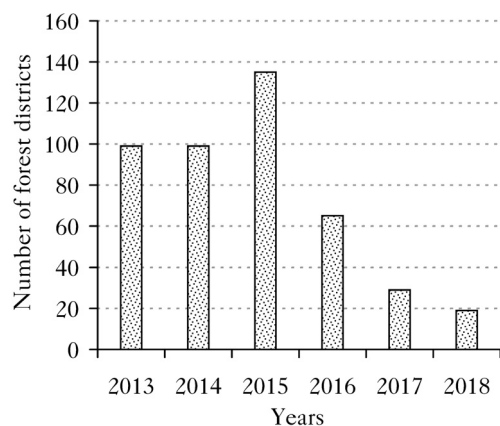


Fig. 4.

The number of forest districts that used the technical criteria for evaluation (possession of a harvester or forwarder) in their tender procedures between 2013 and 2018

Table 2.

The share [%] of forest districts in particular Regional Directorates of State Forests (RDSF) that used technical criteria for tender evaluation (possession of a harvester or forwarder) in tender proceedings in 2013-2018

No.	RDSF	Number of audited forest districts	Year					
			2013	2014	2015	2016	2017	2018
1	Białystok	30	1.4	1.1	2.4	2.1	0.8	0.1
2	Gdańsk	14	1.8	3.1	4.6	1.8	2.1	3.6
3	Katowice	35	2.7	1.7	1.6	0.8	1.2	1.0
4	Kraków	15	0.7	0.7	2.3	2.0	3.0	2.3
5	Krosno	25	1.5	1.7	1.4	1.3	0.0	0.0
6	Lublin	24	2.0	1.7	2.4	0.0	0.0	0.0
7	Łódź	19	2.9	3.7	3.7	1.0	0.5	0.5
8	Olsztyn	30	1.8	2.8	1.0	0.3	0.0	0.7
9	Piła	20	0.0	0.0	0.0	0.0	0.0	0.0
10	Poznań	25	0.5	0.9	1.5	0.0	0.4	0.9
11	Radom	22	1.7	1.3	9.3	7.0	0.0	0.0
12	Szczecin	32	3.6	3.0	1.8	0.0	0.0	0.0
13	Szczecinek	29	4.6	4.6	5.1	1.0	0.3	0.0
14	Toruń	27	1.0	0.4	0.4	0.6	0.8	0.0
15	Warszawa	14	7.3	8.2	5.0	2.5	2.5	0.8
16	Wrocław	33	1.7	1.4	3.0	1.7	1.4	1.8
17	Zielona Góra	20	3.5	3.5	3.0	0.2	1.5	2.1
		Mean	2.3	3.7	2.9	1.3	0.9	0.8

and organisational solutions based largely on motor-manual work, are still in the majority. However, such technologies in logging and skidding manifests in low labour productivity, which has significant economic effects (Grodecki, 2008b). Moreover, modern forest machinery provides better comfort and greater safety for workers (Messingerová *et al.*, 2005; Dahlke *et al.*, 2009; Gerasimov and Sokolov, 2009, 2014; Leszczyński and Stańczykiewicz, 2015; Landekić *et al.*, 2019; Grzywiński *et al.*, 2020). The State Forest Holding administration should be particularly interested in upgrading the technological equipment of forestry enterprises. Any sudden outflow of workers from the forestry sector could lead to an economic crisis and the implementation of planned economic activities would be significantly hampered (Grodecki, 2008c).

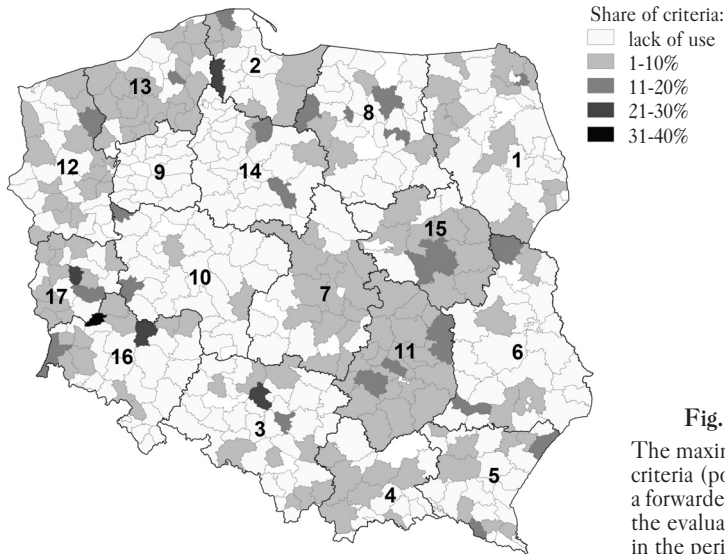


Fig. 5.

The maximum share of the technical criteria (possession of a harvester or a forwarder) used per forest district in the evaluation of tender proceedings in the period 2013-2018 (own study)

Public procurements can be an excellent tool to stimulate technological development in forestry (Grodecki, 2014). During the analysed period (2013-2018), many forest districts used both technical requirements and technical equipment as tender participation conditions and preferred evaluation criteria for tenderers. However, were they significant enough to create technological development in forest enterprises?

Different technical requirements were commonly used by forest districts in public tenders. These were mainly based on the requirement to have certain equipment, often in the field of timber harvesting and skidding. Meeting such requirements was a prerequisite for participation in the tender. The application of such technical conditions was intended to minimise the participation of technically weak companies in tenders. It could also encourage them to purchase specific machines. The only technical condition for participation in tender proceedings, the use of which increased steadily between 2013 and 2018, was the availability of a harvester by the tenderers. Nevertheless, in no year was this condition applied more frequently than the condition to have a skidding trailer with a crane, or the condition to have a tractor adapted to skidding. The increase in frequency of the harvester condition was balanced by the decrease in frequency of the forwarder condition (Fig. 1). Thus, it is difficult to conclude whether the technical requirements for tenderers became more or less important in the analysed period.

For creating the technical equipment growth of enterprises, non-price criteria for the evaluation of offers were more important than the requirements set out in tender procedures. This is because the conditions of participation required only the 'availability' of specific equipment, while the evaluation criteria rewarded their 'possession'. With appropriate lease agreements, possession could be established relatively easily for the purposes of a specific tender. In practice, this did not even have to go into effect.

This technical criteria for evaluating offers (possession of a harvester or forwarder) were used most often by forest districts in tender proceedings in 2015. In the following years, the number of forest districts using it was steadily decreasing. In 2018, only 19 districts in the whole country used them. The average weight of technical assessment criteria has not exceeded the 10% level in any RDSF. The highest was in RDSF Radom with 9.3% in 2015 and in RDSF Warszawa where it was 8.2% in 2014. In 2018, neither of the RDSFs exceeded the level of 1%.

One reason for a decline in the use of technical evaluation criteria, was their replacement by other non-price criteria. Between 2016 and 2018 this was particularly exaggerated when the rules for using certain non-price criteria in the State Forests administration were defined more precisely (Decyzja, 2016). In 2016, use of the criterion ‘employing staff on a contract of employment’ was recommended (Jajor, 2016). In 2017, the criterion ‘social aspects’ and ‘independent delivery of key contract elements’ was promoted. Finally, in 2018, it was recommended to use the ‘independent tender performance’ criteria (Bodył, 2018).

All these recommendations caused a significant decrease in the use of technical criteria during the last three years of the analysed period. The lowering of requirements in this field can be explained by the need to open the forestry services market to less well-equipped companies. This was likely caused by the desire to increase competition in tenders, due to the increasingly frequent ‘lack of offers’ phenomenon for certain packages (Bodył, 2018). However, this certainly did not support technological progress and was rather an adaptation of requirements to the market situation. The very high regional differences observed in technical requirements for tenderers indicate that they did not serve to stimulate technological development of forest enterprises. They were rather a reflection of the existing circumstances, characterised by large differences in location of harvesters and forwarders in particular RDSFs (Grodecki, 2014).

Tenders could have been a good tool for creating technological progress in forestry companies. However, to make these mechanisms work, forest districts should allow higher prices from tenderers when announcing the tenders. As practice shows, when an offer was considered too high in terms of price, tenders were cancelled. Generally, companies knew the price that could be accepted and tried to include this in their calculations (Więsik, 2019). This was usually at the cost of any investment in technical equipment. Another factor that could have had a negative impact as far as the willingness to invest in modern equipment is concerned, was changes made to the requirements of forest inspectorates in subsequent tenders. Companies deciding to purchase modern machinery, hoping that it would increase their chances in subsequent tenders, would be disappointed by the lowering of requirements by the contracting authority.

During the analysed period (2013-2018), there was a systematic increase in the number of harvesters and forwarders working in forestry (Mederski *et al.*, 2016; Bodył, 2019). During this time, the increases in machine harvesting was about 7% per year. In 2018, about 36-37% of timber was already harvested by machines (mainly by harvesters) (Bodył, 2019). However, the results presented in this paper indicate that the increase in the level of machine harvesting was not the result of the tender procedures applied by forest inspectorates. Rather, technological development resulted from economic conditions, mainly growing labour costs in Poland and a decrease in the number of people who would be willing to work in logging.

Conclusions

- ✦ The technical tender award criterion concerning the availability of a harvester was applied in increasing numbers of forest districts between 2013 and 2018. In 2018, 169 units applied this criterion, while those concerning the availability of a forwarder decreased since 2015 (maximum 103 units).
- ✦ The technical conditions regarding the possession of a forest trailer was a very common technical requirement for tenders between 2013 and 2018. The highest number of forest districts (62%) used it in 2015, while in 2018 it was used by the lowest number of all the districts examined (45%).
- ✦ The most frequently applied technical requirement for participation in tender proceedings was the requirement of having a tractor suitable for skidding. In the period of 2013-2018, the

highest number of forest districts applied this requirement in 2016 (86% of all forest districts). In the following two years, the number of forest districts applying this requirement was close to the maximum. The lowest share was found in 2013 (78% of forest districts).

- ✦ Technical award criteria that were non-price criteria for the evaluation of tenderers, were used with increasing rarity in tender procedures between 2013 and 2018. In the years after 2015, both the number of forest districts using these criteria and their average impact on the tenders' evaluation, have decreased.
- ✦ The study results indicate that the solutions applied in forest service tenders by the State Forests Holding administration were not sufficient to effectively stimulate technological change in forest enterprises.

Authors' contributions

D.R. – the research concept, data analyses, manuscript preparation; A.W. – the research concept, manuscript corrections; W.S. – manuscript corrections, review and editing, R.G. – manuscript corrections, review and editing.

Conflict of interests

The authors declare no conflicts of interest.

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STRESZCZENIE

Kreowanie zmian technologicznych w przedsiębiorstwach leśnych z wykorzystaniem przetargów publicznych w Polsce

Od ponad 10 lat Lasy Państwowe zlecają prace z zakresu pozyskiwania drewna z wykorzystaniem nieograniczonych przetargów publicznych. Zleceniodawca, tworząc wymagania dla potencjalnych wykonawców i przyjmując pewne kryteria oceny składanych ofert, może mieć wpływ na ich wyposażenie techniczne. Celem pracy była ocena wpływu wymagań stosowanych w przetargach publicznych przez administrację Lasów Państwowych w latach 2013-2018 na wyposażenie techniczne firm realizujących usługi leśne. Podjęto także próbę odpowiedzi na pytanie, czy polityka przetargowa Lasów Państwowych w znaczącym stopniu kreuje rozwój technologiczny przedsiębiorstw leśnych. Badania prowadzono na podstawie dokumentacji przetargowej (specyfikacje istotnych warunków zamówienia) nadleśnictw z terenu całej Polski. Z 96% nadleśnictw w Polsce zebrano informacje o wyposażeniu technicznym, jakim musi dysponować każde przedsiębiorstwo chcące wystartować w przetargu. Skoncentrowano się przy tym na dysponowaniu harwesterem,

forwarderem, przyczepą leśną z żurawiem i ciągnikiem przystosowanym do zrywki. Przeanalizowano też udział i poziom procentowy pozacenowego kryterium oceny ofert – dysponowanie harvesterem lub forwarderem. Wyniki przeprowadzonych badań wykazały, że możliwości stymulowania rozwoju technologicznego, jakie dają zamówienia publiczne, nie są w pełni wykorzystywane. Co prawda udział nadleśnictw stosujących warunek dysponowania harvesterem wzrastał w latach 2013-2018, ale jednocześnie obniżył się odsetek nadleśnictw stosujących warunek dysponowania forwarderem. Wymóg dysponowania przyczepą zrywkową z żurawiem był znacznie częściej stosowanym technicznym warunkiem udziału w postępowaniu przetargowym niż wymóg dysponowania harvesterem czy forwarderem. Natomiast dominującym technicznym wymogiem udziału przedsiębiorstw w przetargach było dysponowanie jedynie ciągnikiem przystosowanym do zrywki (ryc. 1, 2, 3, 5; tab. 1). Z kolei w kryteriach pozacenowych wyboru ofert liczba nadleśnictw stosujących kryterium „posiadanie harwestera lub forwardera” zmniejszyła się ze 135 w 2015 r. do jedynie 19 w 2018 r. Największy spadek zanotowano w latach 2015-2016, kiedy liczba nadleśnictw stosujących to kryterium zmalała ze 135 w 2015 r. do 65 w 2016 r. (ryc. 4; tab. 2). Przedstawione w pracy wyniki świadczą o tym, że zarówno wymagania przetargowe w zakresie wyposażenia technicznego, jak i techniczne kryteria pozacenowe w niewielkim stopniu podnoszą poziom wyposażenia technicznego przedsiębiorstw leśnych. Zastosowane w przetargach rozwiązania nie kreują postępu technologicznego w przedsiębiorstwach leśnych, co może mieć negatywne skutki dla publicznego zleceniodawcy i gospodarki leśnej w przyszłości.