

Better Knowledge and Up-to-date Equipment Also Among the Private Forest Owners?

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Abstract:

Contemporary technologies, knowledge, and suitable equipment for forest operations are both important and necessary. In this regard the private forest owners should not be left out. They conduct various works in their forests by applying their own machines and equipment and often insufficient knowledge. It must be pointed out that their technology, equipment, knowledge, and safety are on considerably lower level than it is the case with professional forest workers. This fact should be especially regarded in the countries with extremely prevalent share of private ownership of forests. This article deals with the typical situation of prevailing ownership structure in Slovenia on the selected case. This situation is definitely not satisfactory.

What are the solutions? Definitely the answers point to the education and cooperation of forest owners: the lectures in the field of harvesting and other forest works as well as integration of forest owners clearly lead to better information, knowledge, and equipment for forest operations. In this article the example of personal protective equipment shows the benefits of such cooperation and integration. The additional example shows that the better qualification causes easier, more efficient, and especially safer work.

Keywords: equipment, private forest owners, knowledge, education, integration of owners

1 Introduction

Slovenia is one of the most wooded countries in Europe. According to the latest data, the forest covers 58.5 % of the country's area (Slovenia Forest Service, Forest Report 2010). The forest land structure is mainly private and divided among many forest owners. The equipment and qualification of people working in forest varies. The status of professional workers conducting forest work operations in the scope of forest companies is regarded as adequate. The bulk of the timber cut by chainsaws is skidded to the forest road with the adapted and specialized forest tractors. The mostly used technology is increasingly completed with more up-to-date approaches, i.e. mechanized cutting, whereas universal cable cranes are applied in more difficult conditions.

The situation of forest stands shows that the majority of work lies in private forests where forest work causes the most problems due to poor technical equipment of the owners and their inadequate qualification. Thus, the whole technology, equipment and knowledge are considered to be on the considerably lower level compared to the professional forest workers. Consequently, the forest work technique is also unsuitable, there are too many accidents, and plenty of owners show no interest of forest work whatsoever. The article uses several cases studies to show the situation, typical of the prevailing private ownership structure in Slovenia. At the same time we are aware of the possible ways and methods to improve the existing situation.

2 Situation in the private forests – can we improve something?

This chapter shows the main characteristics which have a major influence on the forest work – the prevailing private ownership, mechanical equipment and qualification, and work accidents. Therefore, the described situation can be improved – the article shows one of the possible ways of improvement.

2.1 Ownership and forest stands

The ownership conditions of Slovenian forests dictate the focal point of our work (Fig. 1). Private forests cover 75 % of the whole wooded area, with the rest mainly falling under the state ownership.

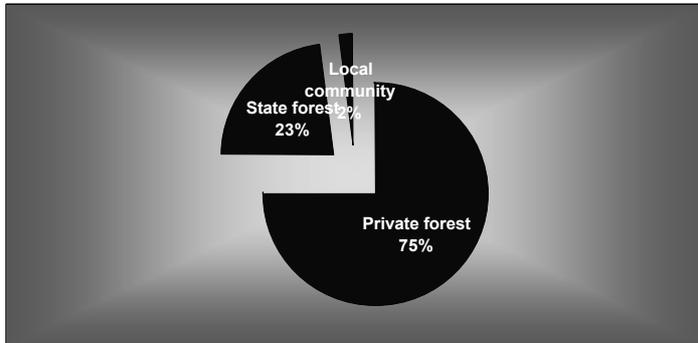


Figure 1: Forest ownership

The forest ownership has been changing in the last several years mainly due to denationalization processes. In numbers, the private forest share has increased for approximately 10 % since 1996 (Slovenia Forest Service, Forest Report 2010). Apart from the prevailing private forest ownership, also the amount of work conducted by the forest owners in their forests is important. Some relevant data for Slovenian forests is shown in the Table 1:

Table 1: Forest stands in 2010

Surface of forests (ha)	1.185.169
Growing stock (m ³ /ha)	279.27
Annual increment (m ³ /ha)	6.85
Annual cut (m ³)	5.321.927
Cut realization (m ³)	3.374.137

The area of forests has not changed considerably in the previous year, which is not the case for the growing stock and annual increment per hectare that recorded the increase. The data determined in plans and their realization imply that the logging operations in state forests are conducted almost according to the plan, whereas the results in the private forests show considerable lower level of realization. There are many reasons: insufficient economy of timber cutting, lack of interest for forest work, and also often objective problems due to poor equipment and qualification preventing the forest work. The higher realization of plans is definitively the area that would need improving in the future. In this respect, the interest for work of forest owners plays the key role – their better equipment for forest operations and more knowledge could be the possible solutions to achieve this goal.

2.2 Forest work equipment status

Machines, knowledge and proper equipment are factors that have crucial influence on forest work. This fact is especially important in the prevailing private ownership where many of forest owners conduct operations in their forests with their own mechanization, equipment and more often than not with insufficient knowledge. Things are improving, but still the present situation cannot be regarded as satisfactory.

What are the solutions? One of them is definitely the education and forest owner integration: forest work education courses and integration of forest workers definitely bring better information, knowledge and equipment for forest work operations. Apart from the education, these connections can also provide more organized, easier and less expensive purchase of forest work equipment.

Several analyses in the field of mechanization (Konečnik 1997, Horvat 1995, Kovšca 1996, Marenče 1997) used by forest owners show better equipment of those with larger land. With the exception of chainsaws, the equipment mainly consists of machines used for agricultural works, partly equipped also for forest operations. In average, they are old, whereas their utilization is poor due to insufficient amount of work (Tab. 2).

Table 2: Machinery and its age

Land area (ha)	CS/land	Age	Tractors/land	Age	Winches/land	Age
0 to 4.99	1.3-1.8	9.1	0.7-1.1	14.7	0.2-0.5	6.6
5 to 9.99	1.4-2.1	9.3	0.7-1.3	14.3	0.4-0.7	8.4
10 and more	1.5-2.2	9.1	0.9-1.3	13.6	0.6-0.8	8.6

According to the census in 1991 (Cunder 2001) and also later period it is established that Slovenia is completely comparable to other countries in terms of the number of tractors per farm. If the level of equipment is expressed with the number of tractors per ha of cultivated land, as more objective indicator, the extremely above-average level of machinery equipment is evident.

With 4 ha of agricultural land per tractor or 0.25 tractor/ha Slovenia is positioned high above the EU average.

In some previous studies (Poje et al. 2006), the authors established that there prevail farms with two tractors (40.7 %), followed by farms with one tractor (29.2 %) and farms with three tractors 23.7 %. Mostly these are standard or universal farm tractors.

All this data shows a great number of machines which are in average old and inadequately equipped. More than 75 % of tractors are only used on one farm, thus showing very poor mobility of the machinery. The surveyed farms have only 2 % of tractors intended exclusively for providing services to others, whereas some 20 % offer such services only partly or occasionally (Cunder 2001).

2.3 Accidents

The majority of forest work accidents are a consequence of the current situation in the field of equipment and qualification of all people working in their own forests – these most frequently occur due to their underestimation of dangers, inadequate personal protective equipment, ignorance of work techniques, out-of-date, poorly maintained and equipped working machines and devices, and also poor psychophysical fitness. Recently, there is the increase in number of forest owners working in the forest who are not properly qualified for this type of work and also use inappropriate equipment and machinery.

Safety regulations determine that each tractor has to be equipped with safety cabin or frame. Apart from old machines, the inappropriate protective equipment is regarded as the factor that prevents the safe work. According to the data, there are still around 10 % of tractors without safety cabin or frame in Slovenia (Poje et al. 2006). Similarly alarming is the fact that the majority of these tractors operate in hilly and mountainous areas where the possibility of accidents due to tractor roll-overs is even greater.

According to the findings of Slovenia Forest Service, the majority of accidents occur during logging operations. The causes for accidents pertain definitively to the insufficient or incorrect work technique, since the survey results show that the injuries are mostly caused by blows of the whole tree or its parts. This is why it is necessary to emphasise the tree logging which regarded as demanding and definitively the most dangerous operation of timber harvesting.

This kind of work requires knowledge that can be acquired in courses and education trainings. Integrated and organized qualified owners, mentioned in the article, can also play an important role in reducing the number of the described accidents.

3 Integration of forest owners – a way to better knowledge

The shown data and analysis of the current situation lead to the conclusion that there is no need for additional machines – their number can be even decreased; the existing machines need to be put into better use. In our opinion, the existing situation can be at least partly improved by applying some new forms of integration and modification of work organization (machinery hire syndicates, forest owner societies). By improving the mobility, the machinery could be better utilized, people would be guaranteed additional earnings, and the machines would be better equipped and thus the work safety increased. This can be regarded also as a way to more intensive work in private forests and consequently a higher level of potential exploitation of forest production.

The characteristics of forests and land structure cannot be changed overnight. However, by integrating and connecting forest owners the conditions can be improved and established for better and safer forest work. Through various integration forms, the number of which has been recently increasing, the forest owners can get acquainted with proper technique and dangers of forest work with their participation in various courses. Also the purchase of proper and less expensive forest work equipment can be organized in the scope of such integrations. The enumerated activities can considerably improve the existing state.

4 Work methods and results

The article shows two examples of good practice that could contribute to the improvement of the situation in private forests.

The first example analyses the situation in the field of the equipment of forest owners with personal protective equipment. The data from questionnaires was used. The survey focused on such equipment – i.e. the level and the application of this equipment.

The second case focuses on the forest work efficiency – the worker, who had finished all necessary trainings, was compared with the worker with insufficient knowledge and practice for such work.

4.1 Personal protective equipment

Numerous data from previous analyses (Konečnik 1997, Horvat 1995, Kovšca 1996) indicate the insufficient and improper equipment also in the field of personal protective equipment for forest work – Table 3.

Table 3: Equipment of forest owner with personal protective equipment

Data source	Helmet		Protection of sight and hearing		Safety footwear		Gloves		Safety trousers	
	owns (%)	uses (%)	owns (%)	uses (%)	owns (%)	uses (%)	owns (%)	uses (%)	owns (%)	uses (%)
Konečnik 1997	37	9	17	5	62	47	94	70	9	3
Horvat 1995	21	10	17	5	65	54	74	49	no data	no data
Kovšca 1996	38	11	22	5	no data	no data	84	60	no data	no data

The application of proper footwear is still satisfactory, whereas in regard to the application of helmet, safety trousers, and protection of sight and hearing devices the situation is not good. The level of equipment is insufficient, but the data showing the actual equipment usage are even more alarming. There is a difference of having the proper equipment and actually using it. Here, the deviation from the desired situation is even greater.

Similar analysis in the field of personal protective equipment was recently conducted in one of the associations of forest owners (Verderber 2010). Besides the organized forest work safety courses, people get to know the proper equipment in the scope of these associations – in this case the personal protective equipment for forest work. Apart from information about the necessity and importance of such equipment, the integrated owners were offered the possibility of the organized and financially attractive equipment purchase. In the actual operational area of the association, one part of members got acquainted with the importance of protective equipment during the course and thus also purchased several pieces of this equipment. Not only the data analysis shows significantly better level of equipment, but also the actual usage of the purchased protective equipment (Tab. 4).

Table 4: Personal protective equipment in the association of forest owners

Association of forest owners	Helmet		Protection of sight and hearing		Proper footwear		Gloves		Safety trousers	
	owns (%)	uses (%)	owns (%)	uses (%)	owns (%)	uses (%)	owns (%)	uses (%)	owns (%)	uses (%)
	85	80	69	57	68	64	85	83	65	62

The data represent seemingly small detail which is in this case the result of organization and integration of people and their better knowledge about the work safety. However, this can be the case of good practice leading to better equipment and safer work of forest owners. This is the way to activate certain forest owners and achieve positive actions of others.

4.2 Qualification for forest work

Also another case is mentioned of how the integration of forest workers can lead to better work. It is the case of brush cutter used occasionally in tending operations. The integrated and organized forest owners can acquire this knowledge in courses and practical training. The efficiencies of two workers using the brush cutter for forest area clearing operation were compared (Bizjak 2011). The work was conducted in different working conditions with both workers using the same working means and also all necessary protective equipment. One of the workers with proper qualifications has already finished the training of working with the brush cutter and had a few years of experience, whereas the second was quite the opposite. On the basis of this simple case the fact tries to be established that solely proper equipment is insufficient for the safe work but the individual also has to be properly qualified.

The objects were selected in different working conditions (Object 1, 2, and 3). They varied according to tree species, undergrowth thickness and density, terrain inclination, rockiness, and presence of grassy plants and creepers. Each object was divided into two planes with workers conducting operation on the equally large surface. Thus, the equal working conditions were provided for both workers.

Several different analyses were conducted – in this article only the differences pertaining to the work efficiency and fuel consumption are presented. Accordingly, the comparison of “trained worker”, who finished the training and had several years of experience was conducted with the “untrained”, who was his opposite – this was the essential difference, since the working conditions were equal for both.

First, the work efficiency was compared – it was denominated with time spent for the work on the plane (Fig. 2). The untrained worker expectedly needed more time on all three planes. The difference or the spent time ratio was the biggest on the Object 2 – here, the dimensions of individual plants to be removed with brush cutter were essentially higher than at other two objects. The untrained worker had more problems due to his lack of knowledge of proper working technique and also spent more time for the same work. It has to be also mentioned that due to improper working technique in such cases also the accident occurrence is higher.

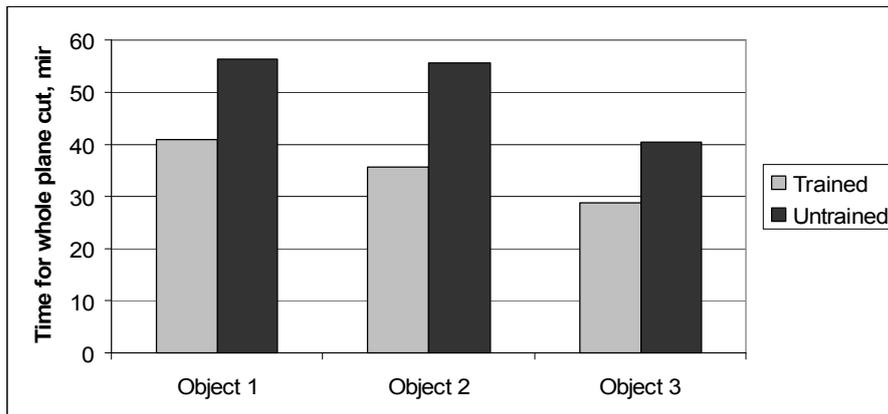


Figure 2: Comparison of spent time for whole plane cut

Table 5 shows the actual effects of one hour work together with the efficiency ratios between two workers within one object.

Table 5: Effect ratio of trained and untrained worker

	Untrained worker, Effect/hour (m ² /h)	Trained worker, Effect/hour (m ² /h)	Untrained : trained worker
Object 1	160	220	1 : 1.38
Object 2	162	254	1 : 1.57
Object 3	222	321	1 : 1.44

The fuel consumption values show the expected results (Fig. 3). The untrained worker burnt more fuel on all objects. The ratios are shown in Table 6 – this time the biggest difference is recorded on the Object 2 and 3.

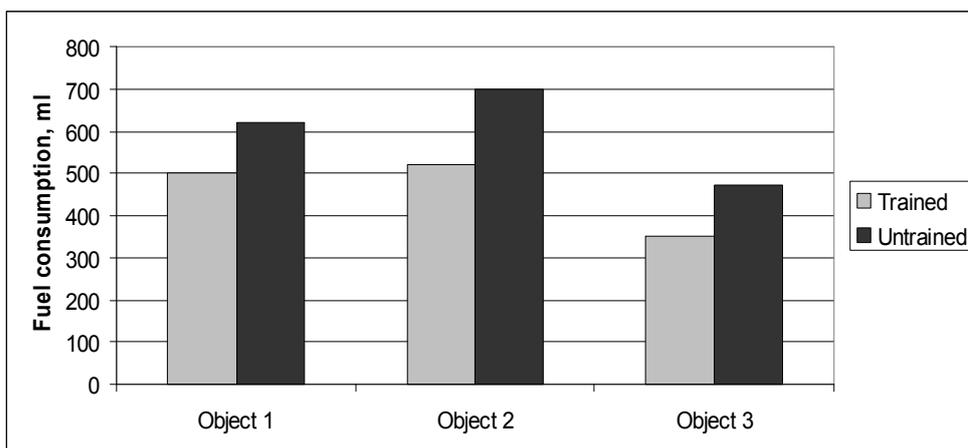


Figure 3: Comparison of fuel consumption for the whole plane cut

Table 6: The fuel consumption ratio of untrained and trained worker

	Untrained worker (ml/m²)	Trained worker (ml/m²)	Untrained : Trained worker
Object 1	4.1	3.3	1.24 : 1
Object 2	4.7	3.5	1.34 : 1
Object 3	3.1	2.3	1.35 : 1

On the basis of this simple case, it is shown that the untrained worker is always slower, more expensive, and his work is also more dangerous due to his insufficient knowledge of the proper technique. The differences are only increasing with the difficulty of working conditions.

This is the reason why the importance of education is emphasized together with better qualification for hard and dangerous forest work. One of this types of hard work is also the tending operations with the application of brush cutter. This is a working means which is only occasionally used in forest work – the forest owner experience of working with brush cutter reflects this fact. Organized and integrated forest owners can be informed of the proper way of handling this device through the system of education – the owners who possess such knowledge are more efficient, more economical, and especially safer when conducting their work.

5 Discussion and conclusion

High level of wooded areas in Slovenia, prevailing private forest ownership with high number of active owners – these are the facts characteristic of forest work. The level of their equipment and qualification for hard and dangerous work is of the crucial importance. The situation in this field is not good. The whole technology, equipment and knowledge are on significantly lower level if compared to professional workers and forest companies performing day-to-day forest operations.

The work realization in private forests is also substantially lower than target plans. The reasons are many, the ways to improvement mainly long. Recent years are witnessing the increase in various forms of organizations and integrations of forest owners – this can be one of the solutions leading to more intensive forest work. Information, education, additional equipment can cause better conditions and at least partly increase the interest for forest work.

The land structure in Slovenian forests is a fact, whereas the changes in the field of ownership are often very long. The changes in the ownership structure will not occur soon. However, foresters can be more active in working with owners who show more willingness and interest for forest work. These are the owners who integrate in various forms of cooperation due to several individual interests. Together with the fieldwork experts they can become the foundations of better forest work. Informed, qualified and equipped owners can be those individuals who would work more and better in their forest. It is these active owners that can become good promoters of expert views of forest management.

The motivation of all participants in forest work is important and the forest owners play the crucial role. If the goal is established, it is easier to achieve it. We are more successful, if we do not work as individuals but rather as a connected group. Here, the example of good practices mentioned in this article can be one of the suitable methods and paths.

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