Analysis of Accidents During Cable Yarding Operations in Austria 1998–2008

Petros A. Tsioras, Christian Rottensteiner, Karl Stampfer

Abstract – Nacrtak

This paper deals with accidents in the period 1998 – 2008 reported during harvesting operations in ÖBf AG, Austria's largest forest enterprise, with a focus on cable yarding. In total 1888 accidents were recorded with 8.7% of these associated with cable yarding activities. The overall accident rate amounted to 36 incidents per million cubic meter extracted by cable yarder. There was a clear spike in accidents between 2 and 3 pm. Most accidents occurred on Wednesdays and Mondays (26 and 25%, respectively). The four months of March, June September and November accounted for 45% of all accidents. The majority of accidents (63.2%) were caused by broken spar and anchor trees, bouncing cables and falling objects. Frequently injured body parts were the extremities such as hand and feet (64%) and the head and neck area (15.2%). Contusions (37.8%) are the most common kind of injury followed by bone fractures (12.8%), sprain or strains (11.6%) and punctures or lacerations (10.4%). An average cable yarding accident required 17.9 days for recovery, compared to the 25.6 days for manual extraction and 29.7 days for extraction by means of a tractor or skidder. Accident severity varied among body parts: eye injuries resulted in three lost work days, while injured extremities required 20 days for recovery. During wood extraction, some stems with branches may be unhooked and fall down. In this case, the accidents caused are the most severe needing 27 days for recovery.

Keywords: cable yarding, forest operations, safety, accident statistics, incident rate, Austria

1. Introduction – *Uvod*

Sustainable forest management sets new levels of standards on forest operations. In this context, forest operations should incorporate technically feasible, economically viable, environmentally sound and institutionally feasible solutions (Heinimann 2000). Due to technological advancements a wide variety of forest machinery is currently available. However, the optimization of wood harvesting systems implies in depth knowledge of all their elements and factors that could possibly affect their efficiency.

The steepness of the terrain is a limiting factor with regard to the use of machinery in timber extraction. Cable yarding represents an environmentally friendly option of wood extraction, especially in steep terrain compared to other existing technologies (Holzwieser 1998, Visser and Stampfer 1998). The fact that most forestlands of Austria are located in the mountainous regions of this country, where approximately 62% of the forest area has slope greater than 30%, and 24.7% of the area is located on slopes greater than 60% (BFW 2011), has led to extensive use of cable yarding systems. Use of mobile cable-yarders is mainly carried out in areas exceeding 40% in slope (Gschwantner 2009). The importance of cable yarding systems for Austrian forestry is underlined by the fact that every fifth cubic meter of timber is extracted by cable yarding systems (BMLFUW 2009).

A crucial dimension of the social aspects of forest work is its impact on the safety and health of the workforce (Heinimann 2000). Forestry professions belong to the most dangerous jobs in all fields of production (Peters 1991, Poschen 1993, Mitchell et al. 2001, Bentley et al. 2005, Potočnik et al. 2009, Lindroos and Burström 2010). Timber harvesting, with or without machinery, is difficult, especially on steep slopes and is connected with high risk of accidents. The increased accident frequency in forest operations has triggered many studies with regard to accident analysis in forestry. Most of them focused on chainsaw accidents (Mc Farlane 1977, Doyle and Conroy 1989,

Wang et al. 2003, Bentley et al. 2005, Montorselli et al. 2010) and fatal accidents in forest operations (Jarl 1980, Peters 1991, Rodriguez-Acosta and Loomis 1997, Mitchell et al. 2001, Thelin 2002). A general evaluation of the severity of accidents in forest operations in Slovenia was done by Potočnik, et al. (2009), while Suchomel and Balanová (2009) analyzed the impact of weather conditions on injury during harvesting operations. However, no study so far has examined the characteristics of cable yarding accidents.

The objective of this study was to increase our knowledge about accidents during cable yarding operations through the analysis of the ÖBf accident archive in the period 1998 – 2008. The analysis of these data is discussed and proposals for the promotion of safety and health during work are made.

2. Material and Methods – *Materijal i metode*

The evaluation is based on data of the Austrian State Forest Enterprise ÖBf AG. ÖBf AG is responsible for the management of 14.8% of the total forest area of Austria (Bundesamt für Wald 2011) and, among other activities, harvests an annual timber volume of more than two million m^3 (Österreichische Bundesforste 2011). According to the current legislation in Austria, all accidents resulting in at least three days of lost work have to be reported (ASVG 2011). However, the company has been systematically keeping record of all accidents of its employees since 1981, including all minor accidents which resulted in less than three lost work days.

During the data capture period, tower yarders were mainly used in combination with processors. The most common mode of extraction was the whole--tree-method. The trees were felled and their top was removed by chainsaw. The trees, after being extracted uphill, were processed and bucked on the forest road and later transported to the sawmill. All forest workers had been offered protective equipment (helmet with ear and eye protection, cut-proof trousers, boots and gloves) as well as training courses by the company.

In the context of this study, the ÖBf archives for the period 1998 – 2008 were examined for cable yarding accidents. All accidents that occurred: a) due to a fall from trees or cable towers during the setting-up, dismantling, repair and maintenance of cable yarders or b) during wood extraction by means of cable yarding technology, were identified as cable yarding accidents and included for further analyses.

The final version of the dataset included details on five fields: personal data of the injured worker (year of birth etc.), temporal data (month, day and time of accident), cause of accident, injured part of the body and type of injury. Six causes of accident were identified: falling down from a tree or a cable tower, work with a cable yarder (during the setting up, dismantling, repair or maintenance process), falling objects (e.g. support spar), falling loaded tree(s) or loading carriage, during loading or unloading the yarder carriage and stab wound caused by cable.

Injured body parts were categorized into seven groups: head and neck, chest and back, abdomen and pelvis, arms and hands, legs, feet and multiple injured body parts. In the case of multiple injuries no more detailed information was available. With regard to the type of injury, four major groups were identified: by mechanical force (e.g. lacerations, sprains, broken bones, eye injuries, etc), by natural forces (e.g. lightning, sunburns), by chemical action or poisoning and others (e.g. insect bites).

Production data of the company enabled the estimation of commonly used incidence rates such as the number of accidents per million production units, in our case cubic meters, as well as per million work hours for every year. The average annual number of work hours per full time worker was estimated to be 1808, excluding vacation days and national holidays. It should be noted that production data for cable yarding were available only for the period 2001 – 2008. The recorded lost work hours per accident were used for the classification of accident severity. To obtain the number of lost work days an eight-hour workday was assumed.

Statistical analysis has been conducted with the help of the statistical package SPSS 17. Statistical differences have been checked with the help of chi--square tests, with Yates correction for continuity when necessary (Bremmer et al. 2000). The test for significance level was set to 5%.

3. Results and discussion – *Rezultati i rasprava*

3.1 All types of accidents – *Svi tipovi nesreća*

During the period 1998 – 2008 a total of 1888 accidents occurred within all fields of production of the enterprise (Table 1). The large majority of accidents (1769 – 93.7%) affected forest workers of ÖBf while 119 (6.3%) administrative employees. Also, 64 commuting accidents have been recorded, 56 of which occurred on the way to or back from work and eight accidents occurred during work activities.

The overall incident rate for the study period for all types of accidents was 92.8 accidents per million work hours with its lowest value (70.8) in 2005 and

Table 1 Accidents and accident rate during the study period
Tablica 1. *Nesreće i stopa nesreća u istraživanom razdoblju*

Year *Godina*	Accidents *Nesreće*		Type of injured employees *Vrsta ozlijeđenih zaposlenika*		Commuting accidents *Nesreće pri putovanju*		Accident rate per million work hours *Stopa nesreća na milijun radnih sati*
	Non fatal *Bez smrtne posljedice*	Fatal *Smrtne*	Forest workers *Šumarski radnici*	Admin. personnel *Admin. osoblje*	On the way to work *Na putu za posao*	During work *Za vrijeme posla*	
1998	242	2	232	12	8	0	107.3
1999	243	3	231	15	3	3	112.3
2000	168	0	161	7	4	0	91.8
2001	169	0	155	14	9	0	89.0
2002	163	0	152	11	6	2	96.2
2003	206	0	200	6	2	1	119.5
2004	121	2	120	3	4	0	79.6
2005	102	0	100	2	5	0	70.8
2006	138	1	128	11	7	1	87.9
2007	164	3	146	21	4	1	91.3
2008	161	0	144	17	4	0	75.2
Total *Ukupno*	1877	11	1769	119	56	8	$\bar{x}$ = 92.8

its highest (119.5) in 2003. Accordingly, the overall incident rate per million production units was estimated to be 77.6 accidents per million cubic meters, ranging from 49 (2005) to 118 (1999) (Table 1).

A total of 11 fatal accidents have been recorded during the study period, resulting in a rate of 0.49 fatal accidents per million cubic meters or 0.6 fatal accidents per million work hours.

3.2 Cable yarding accidents – *Nesreće pri izvlačenju drva žičarom*

3.2.1 Demographic distribution – *Demografska raspodjela*

A total of 164 accidents occurred during cable yarding operations which amounts to 8.7% of all accidents (Table 2). The years with the highest number

Table 2 Trend of overall accidents and accidents during cable yarding operations
Tablica 2. *Kretanje ukupnih nesreća i nesreća pri iznošenju drva žičarom*

Year *Godina*	Employees *Zaposlenici*	Accidents during cable yarding, n *Nesreće pri iznošenju žičarom,* n	Percentage of accidents during cable yarding, % *Udio nesreća pri iznošenju žičarom, %*	Percentage of overall injured employees, % *Udio ukupno ozlijeđenih radnika, %*
1998	1593	23	9.4	15.3
1999	1398	22	8.9	17.6
2000	1324	10	6.0	12.7
2001	1259	9	5.3	13.4
2002	1202	9	5.5	13.6
2003	1188	25	12.1	17.3
2004	1103	10	8.1	11.2
2005	1100	7	6.9	9.3
2006	1108	21	15.1	12.5
2007	1146	15	9.0	14.6
2008	1174	13	8.1	13.7
Average *Prosjek*	1236	14.9	8.7	13.9
Total *Ukupno*	13.595	164	-	-

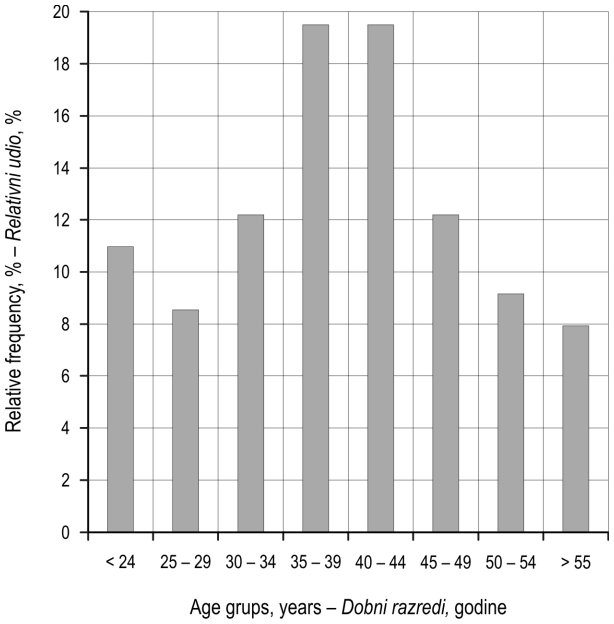

Fig. 1 Distribution of accidents in age classes
Slika 1. *Raspodjela nesreća po dobnim razredima*

of accidents during cable yarding were 2003 (25 accidents) and 1998 (23 accidents). The highest proportion of cable yarding accidents can be found in 2006 with 15.1% (21 accidents). The minimum number of cable yarding accidents was recorded in 2005, when only seven people (6.9%) were injured, while the lowest proportion of cable yarding accidents was found for the year 2001 with 5.3% (nine accidents).

The increased accident frequency in 2003 might be attributed to the large areas of windthrown forest areas in this year (Österreichische Bundesforste 2004). Under pressure to recover large quantities of windthrown wood, more workers and forest machines were recruited by ÖBf. This fact, which has changed the composition of the cable yarding working teams (Eiwegger 2009) along with the increased difficulty of processing and extracting wind thrown trees (Odenthal-Kahabka 2005, Sonnleitner and Seebacher 2003) are possibly related to the increased accident frequency for this year.

Skidding accidents represent 14.1% of the total number of accidents for the study period, with cable yarding responsible for 8.7% of them. This percentage is lower compared to other studies that analysed skidding accidents in Slovenia (24%) (Potočnik et al. 2009), New Zealand (22%) (Gaskin and Parker 1993) or Sweden (20%) (Engsås 1995) but higher than 4.6% reported for cable yarding accidents in Switzerland (Wettman 2005). Such differences can be attributed to a number of factors, such as different ownership, equipment and technology status (Potočnik et al. 2009).

All injured employees were male and the average age at the time of the injury was 38.8 years (SD±10.04). The youngest of them was 18 and the oldest 59 years old. More than half of them (51.2% – 84 forest workers) were between 30 and 45 years old (Fig. 1). After the age of 44 the number of accidents is declining. This finding is similar to Bentley et al. (2005) who

Table 3 Cable yarding accidents per extracted million cubic meters for the period 2001 - 2008
Tablica 3. *Nesreće pri izvlačenju drva žičarom na milijun kubnih metara za razdoblje od 2001. do 2008.*

Year *Godina*	Extracted volume *Privučeni obujam*	Number of accidents - *Broj nesreća*		Accidents per million m^3 - *Nesreće na milijun m^3*	
		Accidents leading to three or more lost days *Nesreće s tri ili više dana bolovanja*	All accidents *Sve nesreće*	Accidents leading to three or more lost days *Nesreće s tri ili više dana bolovanja*	All accidents *Sve nesreće*
2001	25 1239	8	9	31.8	35.8
2002	23 6921	8	9	33.8	38.0
2003	24 6959	20	25	81.0	101.2
2004	29 0342	5	10	17.2	34.4
2005	29 3799	5	7	17.0	23.8
2006	35 5099	17	21	47.9	59.1
2007	36 2573	14	15	38.6	41.4
2008	32 3768	7	13	21.6	40.2
Average *Prosjek*	29 5088	10.5	13.6	35.6	46.2
Total *Ukupno*	236 0700	84	109	-	-

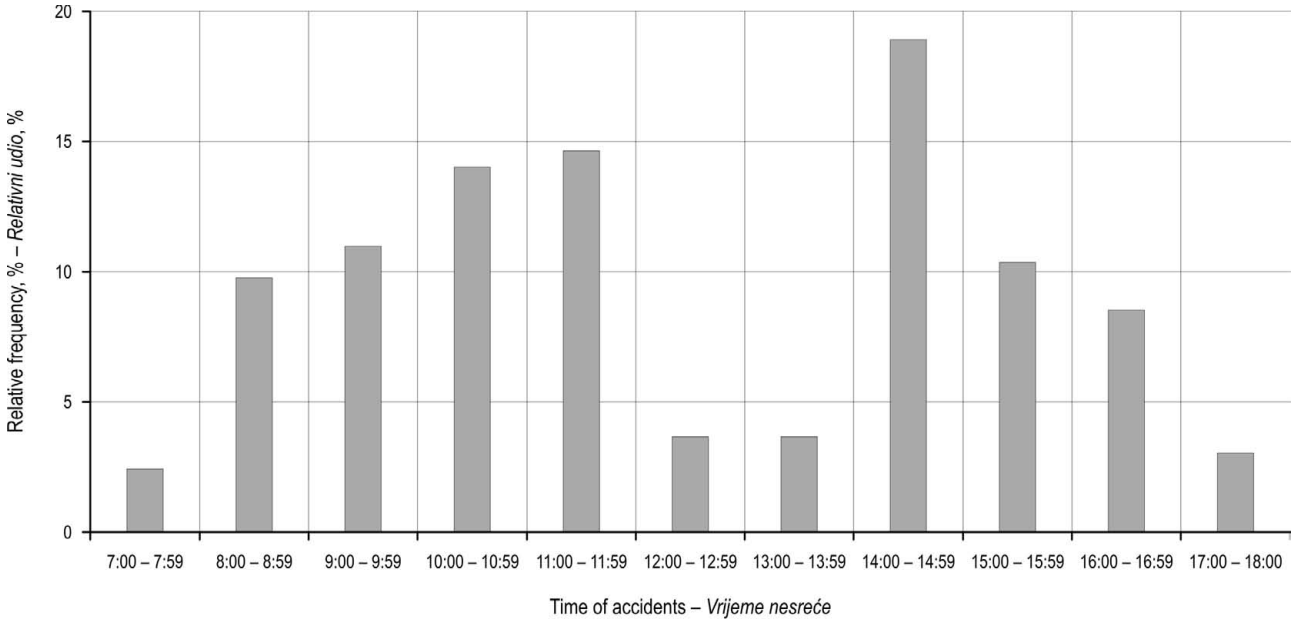

Fig. 2 Breakdown per accident time
Slika 2. *Raspodjela po vremenu nesreće*

also found the age group of 35 – 44 years to be more prone to accidents, even compared to workers in their first months in employment. However, in our study and for the years 2005 – 2008, the comparison between the age distribution of forest workers and cable yarding accident frequency per age group showed no significant differences ($\chi^2 = 9.333$, $df = 7$, $p = 0.23$), suggesting that the accident frequency reflects the workforce age distribution.

The trend of decline of injuries as workers' seniority increased is evident in other studies (Wang et al. 2003). This fact could be attributed to the increased expertise of the older forest workers. This result is also consistent with other studies (Driscoll et al. 1999) that analysed fatalities in forest work. However, the fact that accidents do happen at increased frequency for experienced workers might imply the need for training throughout the worker's career, not only at the beginning of employment (Wang et al. 2003).

Incident rates for cable yarding were estimated only for the period 2001 – 2008 (Table 3). During this period, an average of 295,000 m^3/year were extracted by means of cable yarding technology, resulting in an incident rate of 46.2 accidents per million cubic meters or 35.6 accidents per million cubic meter if minor accidents are excluded.

3.2.2 Temporal analysis – *Vremenska analiza*

The accidents are not uniformly distributed across different hours ($\chi^2 = 38.195$, $df = 10$, $p < 0.0000$) and the majority them occurred between 10:00 – 12:00 and 14:00 – 15:00 (Fig. 2). The risk of injury seems to be increasing during the morning hours until lunch break. The peak between 10 am and 12 pm has been reported in other studies (Bentley et al. 2005, Wettmann 2005, Fischer 1991, Stadlmann 1991) and could probably be related to the circadian rhythms of the human body. However, in our study, most accidents (18.9%) occurred after lunch in the time interval 14:00 – 15:00. The second peak between 2 and 3 pm could be attributed to the »lunch effect« (Camino-López et al. 2011), according to which food consumption might be related to increased accident frequency in the hours following the lunch. After this time point, accident risk seems to be decreasing till the end of the shift.

The distribution of accidents is uneven across the weekdays ($\chi^2 = 46.805$, $df = 5$, $p < 0.0000$). The highest incident rate was reported on Wednesday (26.8% or 44 accidents) and the next highest on Monday (25% or 41 accidents) compared to other studies that place Monday and Tuesday as the most dangerous days of the week (Wettmann 2005, Jacke 1989, Fischer 1991). The peak on Monday could be attributed to the change to job tasks after the weekend rest (Jacke 1989), and the high number of accidents on Wednesday to fatigue. After Wednesday, accident frequency is declining, reaching its lowest value on Friday with 9.8% or 16 accidents. The second half of the week shows a decrease in incidents which might be attributed to higher motivation due to the upcoming weekend.

The highest number of accidents (19) was reported for October, followed by March, June and November with 18 accidents each (Fig. 3). No statis-

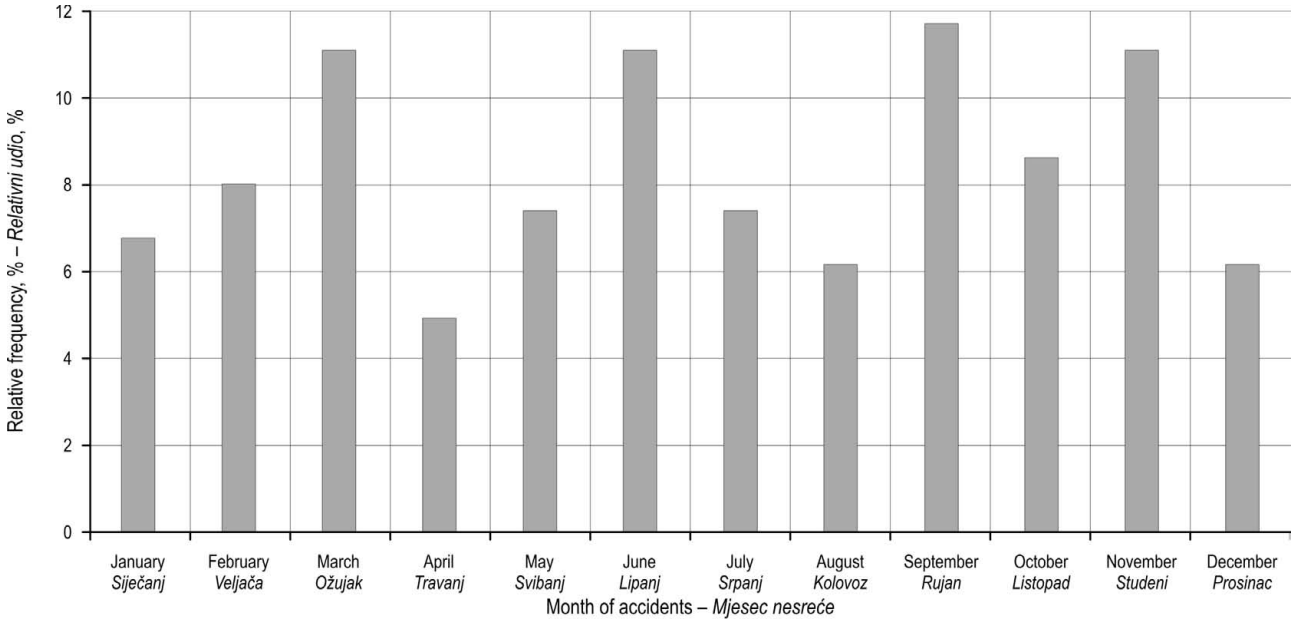

Fig. 3 Distribution of accidents per month
Slika 3. *Raspodjela nesreća po mjesecima*

tical differences have been found ($\chi^2 = 11.555$, $df = 11$, $p = 0.398$). Finally, April was the month with the lowest incident frequency of eight.

3.2.3 Cause of accident – *Uzrok nesreće*

The prevailing activities at the time of the accident were the hooking and unhooking of loads using a choker cable (43%) and the setting-up, dismantling, maintenance or repair (33%), respectively. In the majority of incidents, the forest workers were struck by or striked against an object (76%). The rest injury initiating events included vehicle rollovers (18%), and slips, trips and falls (6%).

According to the analyzed dataset, broken support and anchor trees, bouncing cables and falling objects or tree stems caused almost two third of all accidents during cable yarding operations. This category of accidents is very common in forest operations (Driscoll et al. 1999, Wang et al. 2003, Bentley et al. 2005). According to Peters (1991), such accidents are often due to violations of safe work practices and poor working technique and need proper investigation.

Unfortunately, limited conclusions can be drawn with regard to the working activity during an accident and the cause of accident due to the lack of more detailed data. Our inability to investigate the underlying reasons stems from the accident recording system used by the company, which successfully fulfills the requirements set by AUVA, however inhibits further analysis of accidents. This drawback could be addressed by the recording of supplemental information on the accident report sheet (Eiwegger 2009).

3.2.4 Type of injuries – *Oblik ozljeda*

The most frequent types of injuries were contusions (37.8%), a finding similar to other studies (Potočnik et al. 2009, KWF 2011) (Table 4). Bone fractures (12.8%), sprains and strains (11.6%) and punctures or lacerations (10.4%) were the rest most common types of injuries. It should be noted that 19 accidents resulted in multiple types of injuries, but unfortunately, no more information on them is available.

Extremities (legs and arms) were the most affected body parts (64% or 105 accidents). This result is close to 66% reported for Slovenia (Potočnik et al. 2009) and 64% for Germany (KWF 2011) but higher than 51% for the Jilin Province in China (Wang et al. 2003) or 50% for Louisiana (Lefort et al. 2003). Head and neck injuries (15.2%), chest and back injuries (9.8%) and injured abdomen or pelvis (3.0%) followed. Extremities were the most frequently affected body parts with regard to accidents. As a more elaborate analysis reveals (Fig. 4), finger and thumbs represent the extremity parts most frequently affected, which is quite expected due to the nature of cable work. Eyes follow (7.3%), indicating not continuous use of protective equipment but this percentage is lower compared to 16.5% reported by Potočnik et al. (2009). Head-neck injuries accounted for 15.2% of all accidents, lower than 28% reported by Wang et al. (2003). Finally, accidents that affected multiple body regions accounted for 7.9% of all incidents.

Table 4 Frequency related to the kind of injuries
Tablica 4. *Učestalost nesreća prema vrsti ozljeda*

Kind of injury – *Vrsta ozljede*	Accidents, n – *Ozljede,* n	Percentage, % – *Udio,* %
Contusion – *Nagnječenje*	62	37.8
Bone fracture – *Prijelom kosti*	21	12.8
Sprain, strain trauma or luxation – *Uganuće, istegnuće ili iščašenje*	19	11.6
Puncture or laceration – *Otvorene ili razderane rane*	17	10.4
Foreign body (e.g. in the eye) – *Strano tijelo (npr. u oku)*	9	5.5
Ligament rupture and meniscus injury – *Kidanje ligamenata i ozljede meniska*	5	3.0
Myorrhexis – *Mioreksa, raskidanje mišića*	4	2.4
Herniated disc and spine defect – *Oštećenje diska i ozljede kralješnice*	2	1.2
Sinew injury – *Ozljede mišića, tetiva*	1	0.6
Separation of extremities – *Odvajanje ekstremiteta*	1	0.6
Concussion – *Potres*	1	0.6
Comminuted fracture – *Usitnjeni lomovi*	1	0.6
Vascular injury – *Ozljede žila*	1	0.6
Miscellaneous – *Razno*	19	11.6
Missing information – *Bez podataka*	1	0.6
Total – *Ukupno*	164	100

Fig. 4 Injured body regions
Slika 4. *Ozlijeđeni dijelovi tijela*

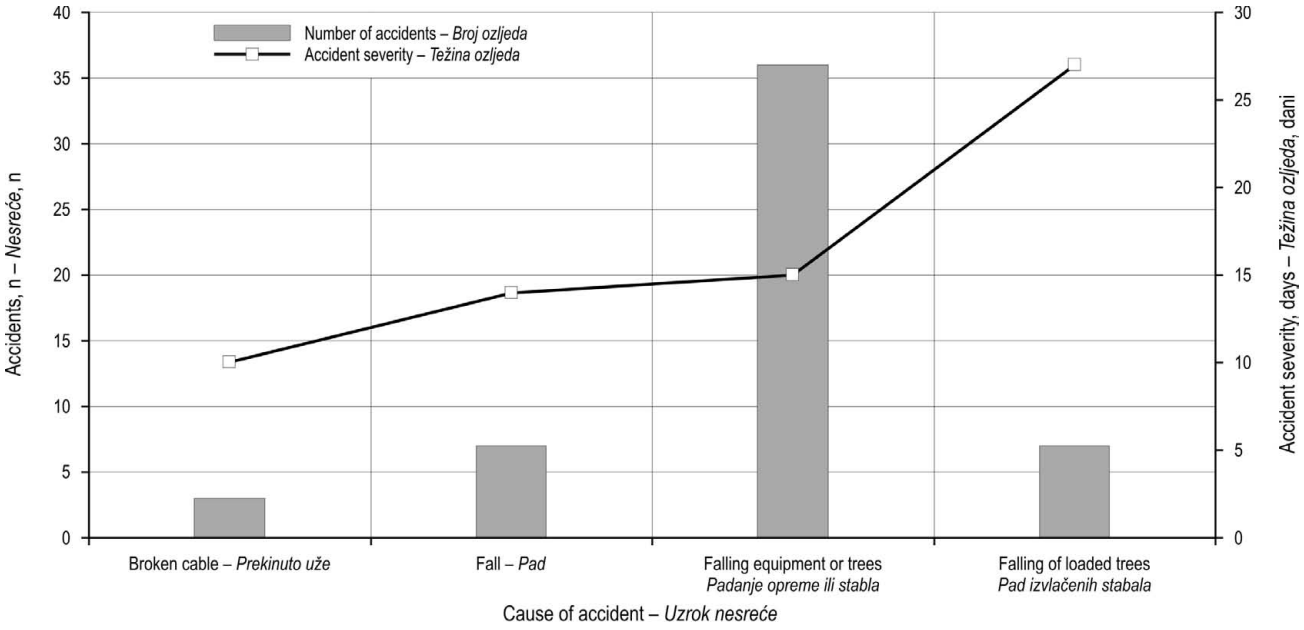

Fig. 5 Frequency and lost work days per cause of accident
Slika 5. *Učestalost nesreća i izgubljeni dani prema uzroku nesreće*

3.2.5 Accident severity – *Težina nesreće*

An average number of 17.9 (or 21.4 lost work days excluding all minor injuries) days were lost per cable yarding accident compared to 25.6 for manual extraction and 29.7 lost days for extraction by means of tractor or skidder, respectively. This is the first indication that cable yarding, despite higher accident frequency and difficulties caused by steeper terrain, results in less severe accidents. These accident severity values are lower than 32.5 lost work days reported for skidding accidents by (Potočnik et al. 2009) but surpass the 11 lost work days reported by Bentley et al. (2005). Finally, during the study period only one fatal accident has been recorded. Therefore,

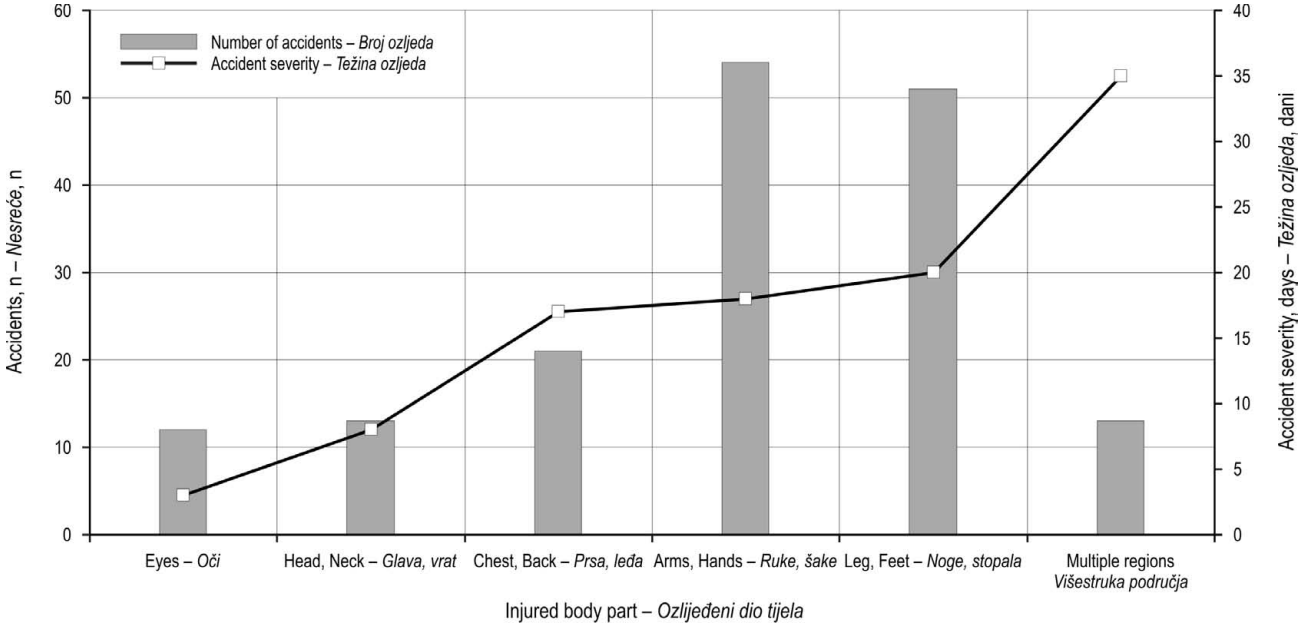

Fig. 6 Frequency and accident severity per injured body part
Slika 6. *Učestalost i težina nesreća prema ozlijeđenim dijelovima tijela*

the incident rate of fatal accidents is very low (0.42 accidents per million cubic meters).

Injuries caused as a result of unhooking loaded stems during extraction demanded the most days (26.6) for recovery (Fig. 5). Breakdown of support and anchor trees, bouncing cables and falling objects are the most frequent reasons that lead to an accident, and resulted in an average of 14.7 lost work days. The least severe incidents were caused by broken cable cords (9.6 lost work days).

Multiple injuries were the most severe resulting in 35 lost work days (Fig. 6). Injuries in the leg and chest-back areas follow with 20.7 and 18.7 lost work days, respectively. On the contrary, eye injuries resulted in an average of only three lost days, while head and neck injuries resulted in an average of eight lost work days.

4. Conclusions and summary – *Zaključak i sažetak*

High accident frequency in forest operations is a well known fact and has initiated many studies all over the world. Most of these studies have focused on work with chainsaw or report the general accident levels in one country for a specific period of time. Exceptions include works of Väyrynen (1982), who analyzed accidents during the maintenance of heavy forest machinery, as well as of Lindroos et al. (2008), Lindroos and Burström (2010), who focused on the accidents of special groups of forest workers. The originality of the current study is its focus on accidents during cable yarding operations. In this context, the current study is focused on cable yarding accidents for a period of eleven years in a large forest enterprise. The choice of ÖBf is justified by the amount of existing data, which enabled the calculation of incident rates, as well as better understanding of the working environment.

The comparison of the presented results with the results of other studies is limited mainly due to the lack of reported incidence rates, such as the number of accidents per million production units or million work hours. According to the analysis of data, cable yarding seems to be an extraction technology with increased frequency but reduced accident severity compared to other skidding methods used by ÖBf. However, in order to reach safer conclusions, more similar studies must be conducted with focus on cable yarding as well as other special aspects of forestry work or equipment.

In a large number of published studies, the extent and importance of minor accidents is unknown as these accidents are not recorded. This is often due to the standards set by the National Insurance or Labor Inspectorates (Potočnik et al. 2009 ASVG 2011). In order to address this problem, the current study includes all cable yarding accidents including the minor ones and provides incident rates for both cases. This approach enables better understanding of the prevailing situation. Still, there might be a possibility that a limited number of cable yarding accidents have not been included in the present study, as a result of missing explanatory information (e.g. some commuting accidents during work might have taken place with cable yarding machinery on their way to wood extraction sites).

The social dimension of accidents should not be underestimated, and it is expressed in low professional prestige and even an important reason for forest workers to change their profession (Lewark and Härle 1991, Tsioras 2011). This fact underlines the need for more specialized studies on accident analysis during forest operations. The reduction of both accident frequency and severity will only be possible through concerted actions: training of forest workers and use of protection equipment can maximize their effects on prevention strategies, if they are properly assisted by well organized accident recording systems. In times of declining numbers of forest workers (Jacob et al. 1994, Axelsson 1998, Gröger and Lewark 2002, BUS/BUWAL 2003, Salminen et al. 1999, Tsioras 2010), forest worker safety should remain a top priority of national forest policies worldwide.

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Sažetak

Analiza nesreća pri iznošenju drva žičarom u Austriji u razdoblju od 1998. do 2008.

U radu se prikazuju nesreće na radu nastale pri privlačenju drva u austrijskom najvećem šumskom poduzeću ÖBf AG u razdoblju od 1998. do 2008. godine. Posebno se pritom analiziraju nesreće nastale pri iznošenju drva žičarom. U promatranom je razdoblju zabilježeno ukupno 1888 nesreća, od čega je 8,7 % povezano s aktivnostima na iznošenju drva žičarom. Svi zaposlenici ozlijeđeni u analiziranim nesrećama bili su muškarci u prosjeku od 38,8 godina u vrijeme ozljede (SD ± 10,04). Najmlađi među njima imao je 18, a najstariji 59 godina. Više od polovice njih (51,2 % – 84 šumarska radnika) imalo je između 30 i 45 godina.

Godina s najvećim brojem nesreća pri iznošenju drva žičarom bila je 2003. godina, što se može povezati s nevremenom i opsežnim šumskim područjima s velikim vjetroizvalama u toj godini. Zbog potrebe iznošenja velikih količina drva iz takvih područja u šumskom poduzeću ÖBf AG te je godine na pridobivanju drva angažirano mnogo više radnika i šumskih strojeva. S obzirom na vrijeme pojavljivanja nesreća utvrđen je jasan vrh u broju nesreća koje se događaju između 2 i 3 sata popodne. Najviše se nesreća dogodilo srijedom i ponedjeljkom (26 % odnosno 25 %). U četiri mjeseca, tj. u ožujku, lipnju, rujnu i studenom, dogodilo se 45 % ukupnoga broja nesreća. Najveći je dio nesreća (63,2 %) uzrokovan polomljenim sidrenim i potpornim stablima žičare, zatim odskakivanjem čeličnoga užeta žičare i padom različitih objekata.

Učestalo ozlijeđeni dijelovi tijela bili su ekstremiteti, odnosno dijelovi ruku i nogu kao što su šake i stopala (64 %) te područje glave i vrata (15,2 %). Različite kontuzije i nagnječenja bili su najčešći oblik ozljeda, a za njima slijede prijelomi kostiju (12,8 %), uganuća i istegnuća (11,6 %) te različiti oblici otvorenih rana, posjekotina i razderotina (10,4 %). Težina nesreća iskazana brojem izgubljenih radnih dana zbog nesreće razlikovala se prema dijelovima tijela koji su ozlijeđeni: ozljede oka imale su za posljedicu tri izgubljena radna dana, dok su ozljede ekstremiteta tražile 20 dana bolovanja za oporavak. Najteže nesreće koje su zahtijevale 27 dana oporavka zabilježene su u slučajevima pridobivanja drva u kojima bi se iznošeno deblo pri privlačenju žičarom otkvačilo i palo.

Stopa nesreća pri izvlačenju drva žičarom u radu je utvrđena za razdoblje od 2001. do 2008. godine. U tom je razdoblju prosječno žičarom privučeno 295 000 m^3/godina. Stopa nesreća utvrđena na osnovi toga obujma iznosi

46,2 nesreće na milijun kubnih metara drva ili 35,6 nesreća na milijun kubnih metara, ako se isključe manje i lakše nesreće. Prosječan broj izgubljenih radnih dana zbog nesreća na iznošenju drva žičarom iznosi 17,9 dana (ili 21,4 dana ako se isključe sve manje ozljede). U usporedbi s tim broj izgubljenih radnih dana zbog ozljeda pri ručnom privlačenju drva ili privlačenju drva traktorima i skiderima iznosi 25,6 odnosno 29,7 dana. Takav je odnos prvi znak da se pri iznošenju drva žičarom, usprkos većoj učestalosti nesreća i težini postupaka zbog strmoga terena, ipak događaju manje ozbiljne nesreće u odnosu na one pri ručnom privlačenju i privlačenju traktorima i skiderima.

Mogućnost je usporedbe prikazanih rezultata s rezultatima drugih istraživanja ograničena uglavnom zbog nedostatka izvještaja o stopama nesreća, npr. o broju nesreća na milijun proizvodnih jedinica ili milijun radnih sati. Na osnovi analize prikupljenih podataka može se zaključiti da iznošenje drva žičarom rezultira povećanom učestalošću, ali i smanjenom težinom nesreća u usporedbi s ostalim metodama privlačenja drva koje se primjenjuju u ÖBf AG. Međutim, radi potvrde takvih zaključaka i postizanja sigurnijih rezultata potrebno je provesti više sličnih istraživanja s težištem na iznošenje drva žičarom i na druge posebnosti šumskoga rada i šumarske opreme.

U velikom broju provedenih istraživanja i objavljenih radova opseg i važnost manjih nesreće ostaje nepoznat s obzirom na to da se takve nesreće ne evidentiraju. To je često posljedica različitih standarda koje postavljaju državna socijalna i zdravstvena osiguranja i inspekcije rada. S namjerom da se pažnja posveti i tomu problemu, u ovom su radu obuhvaćene sve nesreće na iznošenju drva žičarom, do onih najmanjih, te se daju njihove stope za oba slučaja. Smatra se da takav pristup omogućuje bolje razumijevanje postojeće situacije.

Socijalna dimenzija koju imaju nesreće na radu ne smije biti podcijenjena, što je izraženo u niskom profesionalnom ugledu, pa i u važnom razlogu za promjenu zanimanja šumskih radnika. Ta činjenica naglašava potrebu za specijaliziranim istraživanjima nesreća pri šumskim radovima. Smanjenje učestalosti i težine nesreća pritom je moguće samo konkretnim akcijama: osposobljavanje i izobrazba šumskih radnika te korištenje zaštitne opreme, što može povećati njihov utjecaj na razne preventivne strategije, ako su one potpomognute dobro organiziranim sustavima evidencije nesreća. U doba smanjivanja broja šumskih radnika sigurnost i zaštita zdravlja šumskih radnika trebala bi ostati prioritet nacionalnih šumarskih politika.

Ključne riječi: iznošenje drva žičarom, šumski radovi, sigurnost, statistika nesreća na radu, stopa nesreća, Austrija

Authors' address – *Adresa autorâ*:

Petros A. Tsioras, PhD.
e-mail: ptsioras@for.auth.gr
Lab. of Forest Utilization
Aristotle University (POB 227)
GR-541 24 Thessaloniki
GREECE

Christian Rottensteiner, MSc.
e-mail: christian.rottensteiner@bocu.ac.at
Assoc. Prof. Karl Stampfer, PhD.
e-mail: karl.stampfer@bocu.ac.at
University of Natural Resources and Applied Life Sciences Vienna
Department of Forest and Soil Sciences
Institute of Forest Engineering
Peter Jordan Straße 82
1190 Wien
AUSTRIA

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