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Educational aspects of the profession of 'forest machinery operator' in view of survey results

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Abstract. In the early 1990s, an employment reduction in the State Forests caused the lowest-income employees to be transferred to external service providers. At the same time, due to the lack of students applying in this field, numerous vocational schools were shut down. At present, professions in the forestry sector are characterized by work under harsh conditions combined with low pay and are thus rarely chosen by young people. As a result, this service sector's average age is increasing very visibly. The aim of this paper was to gather information about the motivation of the students who did decide to begin training in this field and their professional aspirations. Our work is based on data obtained from forestry schools and a 9-question survey. Questions in the survey concerned the motivation to become an operator of forest machines, family traditions related to this profession, professional interests and plans for the future. The data analysis revealed that forestry education at the level of vocational schools is practically inexistent. For the past six years, the only unit that trained new forestry workers continuously was the Forestry School in Rogoziniec. The school's graduates primarily pick up the profession of harvester operator and forwarder operator. Even more alarming is the fact that most of this school's students are aware of the present employment conditions in Poland and are considering going abroad to find jobs. Therefore, in order to retain the newly trained workforce, it is necessary to improve the attractiveness of the forestry professions and to introduce systemic solutions for the development of qualifications and competences, which should be of interest to both forestry entrepreneurs and the State Forests.

Keywords: vocational school, forest machine operator, education, professional aspirations

1. Introduction

Until the end of the 1980s, when there was no private sector in forestry, forest inspectorates performed all of their work with their own employees. These workers were usually graduates from forestry schools, that is, technical and three -year basic vocational schools preparing students to become employed in forestry (Gornowicz et al. 2008). The State Forests National Forest Holding (PGL LP) supported these institutions, financially as well. The situation changed at the beginning of the 1990s, when several thousand private business entities were established as a result of the restructuring of PGL LP. At that time, vocational schools gradually began to suspend their activities. According to Gornowicz et al. (2008), this happened because PGL LP ceased to be interested in participating in the costs of educating workers who were the employees of external companies that perform work for PGL LP. This is the PGL LP's position to this day (Gizak 2017).

According to Jelonek and Szklarczyk (2012), training to become a 'forest machine operator', along with other occupations, such as musical instrument fitter, equipment operator for the glass industry or well driller, is one of the least popular fields of vocational education (< 30 persons on a national scale). This is hardly surprising; according to the American CareerCast service, which performs an annual analysis of jobs in terms of earnings, work environment, level of perceived stress and career prospects, the profession of logger (and thus, forestry worker) has remained at the infamous forefront in the ranking of the five worst occupations for at least five years.[1] Grodecki (2014)

[1] www.careercast.com/jobs-rated/10-worst-jobs-2012 -2013, -2014, -2015, -2016

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rightly points out that due to the difficult working conditions, high risk and low wages, the occupation of forestry worker is not prestigious and is rarely chosen by young people. With the departure of experienced workers due to retirement or disability, valuable skills, knowledge and experience are disappearing, once passed on from generation to generation. Current changes, both economic and demographic, pose difficult challenges to the forestry sector – especially in the sphere of ensuring the inflow of qualified staff (Fijas et al., 2015). Polish entrepreneurs are finding it increasingly difficult to secure the employment of competent persons, especially those who work in the field of forest management. As a result, these jobs are often performed by random people, for whom forestry work is the only available job opportunity. According to Grodecki (2014), the lack of a proper education at the level of a qualified forestry worker and forest machine operator may become a serious factor limiting the functioning and development of the state forestry industry in Poland in the near future.

Although issues relating to forestry services and occupations have been addressed by Płotkowski (1998, 2002), Nowacka and Moskalik (2005, 2012, 2013), Kocel (2002, 2005), Sowa et al. (2006), Nowacka et al. (2011), Nurek (2011), issues concerning education processes and preferences as well as the expectations of future employees have been discussed rather rarely. Therefore, we decided to perform research to: (i) identify the schools offering qualifications in the occupation of 'forest machine operator' and determine the current number of students and graduates, (ii) identify the place of residence of students who attain the occupation of 'forest machinery operator', (iii) identify the factors motivating persons to undertake education in the occupation of 'forest machine operator', (iv) assess the impact of family traditions on the choice of becoming a 'forest machine operator', (v) identify the interests of students who are studying the occupation of 'forest machine operator' in supplementary education, and (vi) identify the professional aspirations of students who are studying the occupation of 'forest machine operator'.

2. Study methods

Based on the positioning of websites, 10 schools offering training in the occupation of 'forest machine operator' were selected. The authorities of each school were then asked to answer three questions:

- As of which school year has the school been offering vocational training in the occupation of 'forest machine operator' (occupation number 834105)?
- Is the school currently providing education in the occupation of 'forest machine operator'? (if yes – in how many of its units, for how many students)?
- How many pupils have attained the occupation of 'forest machine operator' from the school thus far?

In addition, according to the rules and principles of developing questionnaires presented by Dudziak (2010) and Sztumski (2010), a survey was prepared consisting of 9 questions, 5 of which were close-ended (including 2 dichotomous and 3 scaled questions), and 4 semi-open questions. The questions were arranged in four consecutive thematic blocks, concerning in turn: factors motivating a person to begin education in the occupation of 'forest machine operator', family traditions relating to the forestry sector, interest in continuing education after graduating from vocational school, and professional aspirations. When assessing family traditions, students were asked to provide information as to whether any of their immediate family is the owner of a forestry company or its employee (not an owner). The relatives of the closest family were determined to be the third degree of kinship, both in a straight line (parents, grandparents) and lateral line (siblings, siblings of parents).

The demographic questions asked about class year (I/II/III), sex (M/F) and place of residence (voivodeship, county, urban/rural area). The survey was conducted on May 11, 2017 at the Forestry School Complex in Rogoziniec, the leading institution during the time of the study, among 30 students of the Basic Vocational School present that day (year I – 9 persons, year II – 9 persons, year III – 12 persons). The questionnaire was auditory – the questionnaires were distributed and collected directly by the interviewer, and all of the respondents were from one class year.

3. Results

Among the 10 schools informing on their website that they offer training in the occupation of 'forest machine operator', only two institutions are currently teaching this specialization: the School Complex in Oleszyce (Podkarpackie Voivodeship, Lubaczowski County) – 0.5 of a class (8 students) and the Forestry School Complex in Rogoziniec (Lubuskie Voivodeship, Świebodzin County) – 3 classes (47 students). It is worth noting that for the last six years, the only institution that regularly trained future forestry workers was the Forestry School Complex in Rogoziniec (Table 1).

The vast majority (25 persons) of students at the Basic Vocational School of the Forestry School Complex in Rogoziniec are from rural areas located in nearby counties. Half of the respondents live in the Lubuskie Voivodeship in the following counties: Świebodziński (5 persons), Nowosolski (4 persons), Zielona Góra (3 persons), Żagańskie (2 persons) and Sulęcin (1 person). Twelve respondents from the Wielkopolskie Voivodeship are attending classes, mostly from the following counties: Nowy Tomyśl (4 persons), Grodno (3 persons), Międzyychodzki (2 persons) and Gostyński, Wolsztyn and Oborniki (1 person). Two persons from Świd-

Table 1. Training in the profession of "forest machinery operator" in selected vocational schools

Name of the school	Education in the profession	Number of students*	Number of graduates
Forest School Complex in Benice	From 2015/2016; Currently no recruitment	-	-
Forest School Complex in Biłgoraj	Currently no recruitment	-	359
Forest School Complex in Goraj	Recruitment conducted for several years – ineffective	-	-
Complex of Schools of Nature and Service and School Hostel in Jelenia Góra	Until 2005/2006; At present, there is no vocational school	-	no data
Forest School Complex in Lesko	From 1983/1984; Currently no recruitment	-	238
Upper-secondary School in Męcka Wola	From 2015/2016; At present the school does not exist	-	-
School Complex in Oleszyce	From 2013/2014 – until now	8	12
School Complex in Opatówko	Recruitment was cancelled	-	-
Forest School Complex in Rogoziniec	From 2011/2012 – until now	47	50
Forest School Complex in Ruciane-Nida	Recruitment from 2012/2013 – ineffective	-	-

*as for 31.05.2017

nica County (Lubelskie Voivodeship) and one from Gryfino County (Zachodniopomorskie Voivodeship) also decided to train in the occupation of 'forest machine operator'.

24 students declared that their greatest motivation for attending the Basic Vocational School was the prospects offered by the occupation of 'forest machine operator' (high demand for qualified employees, variety of work in the field of forest management and harvesting, possibility of working on technologically advanced forest machines, etc.). Another equally important motivating factor was personal interest (16 students), which was most often associated with logging technologies. This was reflected in the possibility of completing a course on loading cranes (13 students), chain saw operations (8 students) and the opinion of attractive practical classes (7 students). Other motivators were less significant – the willingness to gain independence, a good opinion about the school, family tradition, small distance from place of residence, the ease of traveling to school, high level of education and participation in an 'open house' were indicated by less than 5 people. For one respondent, it was important to obtain a category T driver's license, that is, for an agricultural tractor or slow-moving vehicle (Figure 1).

Only three respondents (10%) were found to have an owner of a forestry company in their immediate family, and eight (27%) had relatives working in a forestry enterprise. None of these persons indicated family tradition as one of the reasons for studying in this field.

The completion of Basic Vocational School is only a stage in the education path of 21 students (70%) – twelve of them (40%) want to continue their studies in a two-year evening upper secondary school and take the *Matura* exam; seven (23%) plan to take Qualifying Professional Courses (R.13. and R.14.), which will give them the title of a forester technician; and two (7%) want to continue their education, one to become qualified as a mechanic and the other at the Czech Forest Academy in Trutnov. The remaining nine students (30%) believe that attaining the occupation of 'forest machine operator' after completing the Basic Vocational School suffices. All the respondents, however, expressed their willingness to participate in additional courses and training to supplement their professional competences. Among the listed offers, the most popular among the youth were courses on the operation of specialized forest machines – forwarders and harvesters (93% and 87% of responses, respectively), roundwood quality assessment (73%) and a course on arboriculture – 70%. The students showed less interest in training in the assortment method of harvesting wood (53%) and in proper tending treatments – early and late forest thinning (50%), and early and late stand tending (40%) (Figure 2). The set of responses did not include the course on operating chain saws 'logger–lumberjack' and the maintenance of loading cranes (ending with qualifications of a loader crane operator, category IIŻ, forestry type), be-

cause these are required competences to be attained by the students during vocational training as part of their practical classes.

The students were subsequently asked about the position in which they would like to work in the future (they were to indicate one response). Over half of the respondents aspire to get the job of a harvester operator (33%) and forwarder operator (27%). Only individual respondents indicated other types of work positions – logger, skidder, foreman and tree nursery worker. 13% of respondents planned to set up their own business, including two students planning to establish their own forestry services company right after leaving school (Figure 3).

Because the work of a forestry worker, and especially the operator of specialized forest machines, very often involves the need to travel long distances, respondents were asked whether they were considering delegated work in the future (eventually being home only on weekends). Of all the respondents, 60% indicated a readiness to take a job outside of their current place of residence and the associated need to be highly mobile, while 40% do not plan to undertake delegated work, and therefore, will look for a job in the vicinity of their family home. The situation is similar when asking about the possibility of becoming employed abroad, where wages are relatively higher than in Poland – as many as 2/3 of the respondents (20 students) do not exclude such a possibility.

The last question strictly on professional aspirations was connected with the intention of establishing one's own forestry company. Five students (17%) decidedly and thirteen (43%) most probably will not undertake such a challenge. Eight students (27%) admitted that they are considering such a possibility, while four (13%) are determined to set up their own forest business, including two who stated that they will do so immediately after graduation (Figure 3).

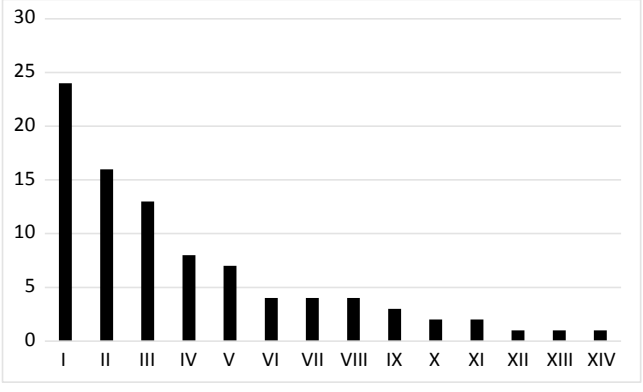

Figure 1. Motives for studying in ZSZ at ZSL in Rogoziniec

I – career perspectives; II – satisfying curiosity; III – vehicle loading crane- training and qualifications; IV – chainsaw- training and qualifications; V – attractive practical science; VI – willingness to be independent; VII – good opinion about the school, VIII – family tradition; IX – recommendation by friends or family; X – close distance to the place of residence; XI – good communication connection; XII – high standards of teaching; XIII – participation in classes advertising the school; XIV – others (driver's license for tractor)

4. Discussion

The changes occurring in the forest industry make education in forestry ever more important (Sample et al. 2015). On the one hand, Grodecki (2014) is of the opinion that the lack of schools providing education in the profession of forest

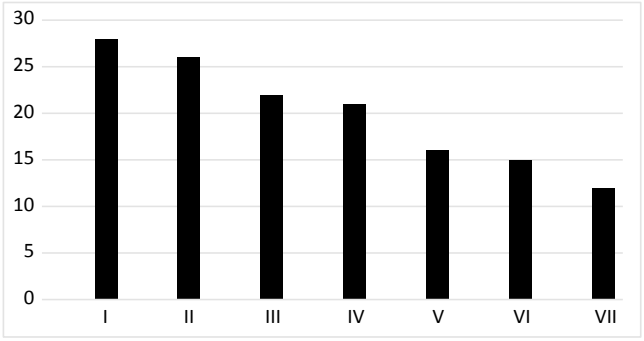

Figure 2. Interest in additional vocational training

I – forwarder operators – training and qualifications; II – harwester operators – training and qualifications; III – tree quality assessment – training and qualifications; IV – arboristics – training and qualifications; V – wood sorting – training and qualifications; VI – forest thinning – training and qualifications, VII – stand tending – training and qualifications

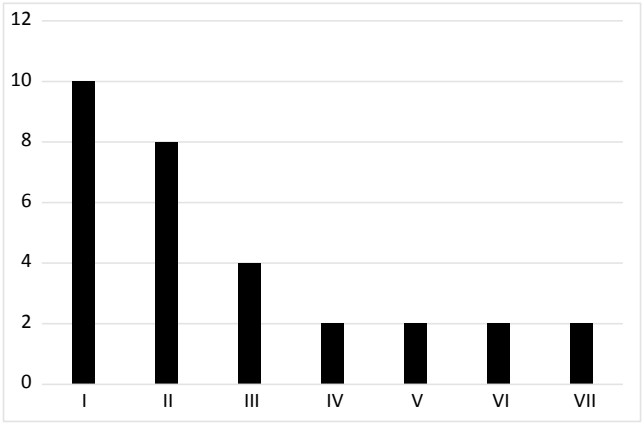

Figure 3. Preferred work placements of students after the end of education

I – harvester operator; II – forwarder operator; III – lumberjack; IV – wood extraction operator; V – foreman; VI – forest nursery worker; VII – company owner

machine operator in Poland, where about 40 million m³ of wood is harvested and where forest management has a long tradition and good prospects, is incomprehensible and troublesome. On the other hand, the existing vocational upper secondary schools in Poland educating potential employees for the needs of the forestry service (including up to the position of forester) are able to meet the labour demand for mid-level technical personnel with a wide margin (Gornowicz et al., 2008). Although today, the completion of a vocational upper secondary school in forestry no longer guarantees employment at PGL LP; these schools are still much more popular than the basic vocational schools in forestry. According to the data published by the statistical yearbook in 2016, up to 2416 students attended the eleven forestry schools under the jurisdiction of the Minister of the Environment in the 2015/2016 school year (GUS 2016). Representatives of the surveyed schools where vocational upper secondary schools in forestry also operate, do not conceal the fact that they never had a problem in recruiting students to the secondary school for the occupation of forestry worker. It seems that vocational school is still functioning as a school of 'second choice' in the awareness of society. Also, the elimination of vocational education was additionally impacted by the education system reform of 2011, which introduced, among others, four-year vocational upper secondary schools with the possibility of taking the upper secondary school completion exams (*Matura*) and the three-year basic vocational schools with a complicated further education path (Ustawa 2011). In addition, the choice of upper secondary school by the future adepts of forestry is most often dictated by the prospect of stable employment in PGL LP and a high salary, which is not guaranteed by work in a forestry company. Despite this, according to Grzywacz (2012), it is not clear what the future of these types of schools should be, and to a large extent, it depends on the country's plans to change the education system, as well as the requirements of employers. Currently, PGL LP is aiming to hire staff who have completed higher education, which is why Kocel (2014) believes that in response to the increase in the share of high technology and the need to provide the highest quality of services, some of the vocational upper secondary schools in forestry should be transformed into schools for forestry workers, just as in the case, for example, of German forestry. In the light of the results obtained, it is difficult to agree with this position. For example, both Basic Vocational Schools in Biłgoraj and Lesko have experience in training future forest machine operators, but due to the lack of students' interest in this field, these schools have stopped recruitment. The schools in Goraj and Ruciane-Nida faced a similar problem, having been unsuccessful for several years in recruiting lower secondary school students to this field. Given this situation, it seems that transforming the vocational upper secondary schools in forestry would not be an effective solution.

One should agree with Van Damme and Brown (1992) and with Sample et al. (1999), who state that forestry education must adapt to the changing needs of the labour market. The direction of the changes in Polish forestry vocational education is most accurately indicated by the respondents, the majority of whom aspire to attain the occupation of a harvester or forwarder operator. Logging timber with machine technology significantly affects the level of safety and the efficiency of the performed work; hence, vocational schools should take this into consideration in their program. In recent years, in many European countries, as well as in some countries of America, Africa and Asia, there has been a dynamic growth in obtaining wood through outsourcing (Louw 2004; Westermayer 2006; Shawn, Greene 2008; Kawasaki, Kohroki 2009; Kastenholz et al. 2011; Häggström et al. 2013). Additionally, according to Grodecki (2014), the operation of technically advanced forest machines is highly acknowledged and ennobling in rural communities. The gradual decrease in the number of forestry workers will, however, force an increasing share of timber to be harvested by machines (Fijas et al. 2015); therefore, the demand for operators will increase. According to the research conducted by Karjalainen et al. (2001), the mechanization of forestry work, especially in terms of logging, has become a widely used solution in many industrialized European countries, for example, in Sweden (about 98%), Ireland (about 95%) and Finland (about 91%). Marciniak's (2011) simulation study indicates that this trend is also occurring in Poland. By 2020, approximately 500 harvesters and approximately 1,000 forwarders will be working in Poland. According to the author, who assumed a ratio of 1:1 (one machine − one operator) in the study, by 2020, approximately 1500 trained operators should be able to find jobs in operating logging machines. Recent scientific reports, however, show that the dynamics of change in the number of harvesters themselves are much faster – in 2015, there were 530 machines of this type (Mederski et al. 2016); so, a higher demand for operators should be expected. Meanwhile, vocational schools providing education in the occupation of 'forest machine operator' are not meeting these needs and are not training students to work with multi-functional forest machines. The profession can only be learned through professional courses offered systematically, several times a year, by two entities – Forest Consulting Center Sp. z o.o. company from Poznań (originating from the Education Center of Forest Entrepreneurs) and the Training Center for Forest Machine Operators at the Gidle Forest Inspectorate. Unfortunately, the cost of the course is around 10,000 PLN, which largely limits the ability of vocational school students to take it.

In the authors' opinion, the recent legislative changes in Poland may have a positive impact on the development of vocational education in forestry. The Education Law,[2] enacted on December 14, 2016, introduces education in a 3-year stage I sectoral school, after which it is possible to continue education at a 2-year stage II sectoral school. This, in turn, will guarantee obtaining a diploma confirming vocational qualifications in the profession taught at the level of a vocational upper secondary school (after passing the exams confirming the qualifications in the given profession) and obtaining a secondary school completion certificate (after passing the *Matura* examination). Currently, as part of the project 'Partnership for vocational education, Stage 3: Vocational education meeting the needs of the labour market', work is in progress to modify the Core Curricula of Vocational Education (CCVE), for which, as a result of competitions, several small teams have been established. Their task is, among others, to change the CCVE, taking into account the recommendations of representatives of social partners and the opinions of the ministries competent for the occupations. The existing provisions in the CCVE of 2012 for the occupation of 'forest machine operator' (occupation number 834105) requires immediate updating. The very name of the profession, given today's conditions, is somewhat misleading − 'the vocational school graduate is prepared to obtain timber with a gas-powered chain saw and skid wood using tractors with attachments and suspended devices', rather than 'operate a harvester or forwarder'. One could agree with the common opinion that forestry practice – especially that connected with modern technologies – is very expensive, but this is the best time to overcome such financial barriers. Schools can use EU funds under the Regional Operational Programmes, and a special Fund for the Development of Vocational Education is planned by the Ministry, perhaps already in 2018, to finance, among others, the retrofitting of schools with modern technical and didactic aids, the costs of practical vocational training at an employer, organizing internships for vocational education teachers so that they may update knowledge and skills, or for additional sectoral qualifications for vocational school students.[3] Ultimately, it would be advisable for the vocational schools to cooperate not only with employers, but also with accredited training centres with well-developed teaching methods as well as qualified teaching and instructional staff. At the moment, few schools decide to undertake this form of cooperation, mainly because of a lack of trust in external, non-state entities. However, it should be noted that none of the stakeholders of this issue, neither the State Forests, entrepreneurs nor the forestry schools, are able to develop effective solutions alone. This requires the cooperation of all parties (Kocel 2014).

5. Conclusions

There are 10 schools in Poland offering the opportunity to become a 'forest machine operator'. To date, only four schools have provided classes in this field, and currently, only two of them are doing so.

The persons deciding to attend a basic vocational school with a forestry profile were basically men (100% of respondents) coming mainly from rural areas (83%), who lived in close proximity to the school.

The basic factors motivating students to train in the field of 'forest machine operator' were the perspectives offered by the occupation of forestry worker (including the high demand for qualified employees, the diversity of forest management and wood harvesting activities) and one's own interests mainly in the technology of wood harvesting (respectively 80% and 53% of respondents).

Family traditions relating to forestry work did not have a significant impact on the choice of the 'forest machines operator' by students at the Basic Vocational School in Rogoziniec.

The vast majority of students (70%) training for the occupation of 'forest machine operator' treat the knowledge and skills attained in their education as a stage for further education. All the respondents expressed a willingness to participate in courses and workshops in order to attain additional professional competences. The most popular among the youth were the courses for operators of specialized forest machines – forwarders (93%) and harvesters (87%).

Students show little interest in starting their own forestry business (PKD 02.40.Z). After attaining professional qualifications in the occupation of 'forest machine operator', they would particularly like to work as operators of multi-functional machines – harvesters (33%) and forwarders (27%). Unfortunately, there is a very high risk that future graduates of vocational school will seek employment abroad (67% of respondents).

Taking into account the multitude of activities conducted in forestry, requiring an even higher degree of interdisciplinary knowledge and competences, the fields of forestry education should be made more attractive by modifying the core curriculum, which should keep pace with the technological progress being observed in forestry over the past several years. Vocational schools with a forestry profile should seek financial support for practical vocational training from EU programmes and the ministries.

[2]Act of 14 December 2016 on the School Education Law, Journal of Laws, item 59.

[3]https://men.gov.pl/ministerstwo/informacje/zmiany-w-ksztalceniu-zawodowym-dla-rynku-pracy.html

The reconstitution of forestry vocational education in Poland requires the cooperation of schools primarily with forestry companies and associations of forestry entrepreneurs, as well as certified training centres, the academic community of higher education institutions in forestry and State Forests. Only jointly developed solutions will enable the image of a forestry worker to be changed, which in effect will result in providing the forestry services sector with young people well prepared for their profession.

Conflict of interest

The authors declare no potential conflicts of interest.

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Author's contribution

A.R. – collection of source material, work on the study results, performing analyses, writing the text; K.A. – substantive supervision, study concept, literature review, study methods, text corrections.