

## AGRICULTURAL MACHINES MAINTENANCE AND REPAIR SERVICES IN WESTERN POMERANIA

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### Abstract

The research, determining the potential of network of maintenance workshops for agricultural machinery. A survey was conducted in 30 maintenance workshops in Western Pomerania in 2009. The study period covered the years 2007–2008, when 8,476 repairs were made. The analysed workshops have experienced staff with appropriate qualifications. 63.4% are employees with formal experience between 11 and 20 years. Employees with experience below 10 years amount 34% of staff. The demand for repair services is generated by the implementation of field work. During this period, the potential of staff and maintenance positions is fully used, while during off-season there is a significant surplus of service supply over demand. Annually, this surplus is 530% in the area of maintenance services for agricultural machinery. The effective use of the potential of the repair shops employees in the surveyed period was 30.5%.

### Introduction

In agriculture, most treatments should be performed in specific agrotechnical periods. Failure to meet the basic terms of treatments, results in significantly negative effects on plant production, leading to lower yields obtained and their quality (BANASIAK 1999, KARCZMARCZYK 2005). Modern vehicles and agricultural machinery, are produced on the basis of modern design solutions and technology (JUŚCIŃSKI, PIEKARSK 2009a). As a result of natural differences in baseline characteristics of machines and their parts and external factors affecting the machine operation – it comes to frequent wear and damage that

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must be consistently and methodically remove, and prevent their occurrence. According to the author's research (TOMCZYK 2005a,b, 2006), in the structure of the standstill of tractors and agricultural machinery from technical reasons:

- about 20% – errors in construction and manufacturing technology,
- about 25% – inadequate maintenance and storage of equipment,
- about 15% – the insufficient quality of executed repairs.

The usage of modern means of mechanization in Polish agriculture requires specialised technical background. The maintenance workshops network, currently being built with considerable support of equipment manufacturers, is highly diverse considering the quality of service. The time (needed on removing technical or technological faults occurred during their use) is the measure of reliability of machines operation systems (SKROBACKI, EKIELSKI 2006). The seasonality of works in agriculture negatively affects the use of service facilities and generates the need to study the course of developments in this market segment (JUŚCIŃSKI, PIEKARSKI 2008a,b). Taking into consideration the fact of simultaneous occurrence of many causes leading to the heterogeneity of demand, the maintenance services require many intensive logistic works (JUŚCIŃSKI, PIEKARSKI 2009b). The aim of the research was to determine the potential of network of maintenance workshops for agricultural machinery operating in Western Pomerania.

## Material and Methods

The research, determining the potential of network of maintenance workshops for agricultural machinery, was conducted in months I–VI 2009 in Western Pomerania. The study period covered the years 2007–2008, when 8,476 repairs were made. In agrotechnical season (from June to November) 5,190 repairs were made, while the other repairs (3,286) were held out of this season (from December to May). The source materials were obtained by using the method of questionnaire with a closed structure. The study included 30 agricultural maintenance workshops for agricultural machinery (13 workshops, 11 workshops non-specialist, 6 authorized service). The main selection criterion of workshops was the ability to perform complex repairs (mechanical and electronic) for agricultural machinery and tractors manufactured until 2005. The sample size was chosen by using the method of purposive sampling. The sample was made more detailed according to method of selection of typical individuals. The evaluation of collected data was made using the statistical analysis of *R*-Spearman statistical correlation.

## Results

The structure of crops in Western Pomerania is dominated by cereal crops occupying 73.0% sown area. Industrial plants amount 16.4%, fodder crops – 4.6% and potatoes – 3.6%. Such a structure of crops has an impact on farm equipment with the means of mechanization. According to the National Agricultural Census 2001 agricultural tractors were in 30.2% farms. More than 10% farms with an area of over 1 ha of agricultural land had combine harvesters, 7.5% – balers, 5.5% – potato harvesters, 1.4% – beet harvesters. The protection of agricultural measures requires broad action to guarantee the functional and time efficiency of logistic customer service (PIEKARSKI 1997).

The promptness of realization of specific agrotechnical practices plays a crucial role on a farm. These fixed dates largely depend on weather conditions. Each day of delay may expose farmers on different kind of loss, which in consequence reduce his income. Facing a machine failure, a part of farms with outdated construction equipment decide to repair it themselves. While farmers with modern machinery must have it repaired by a specialized workshop. More than a half – 57.8% of researched workshops, in order to use their full repair potential, takes a machine for repair in less than 3 days from the date of notification (Fig. 1). In 32.6 % analysed workshops the time of expectation on repair ranged from 4 to 7 days. In other service plants it takes more than 7 days.

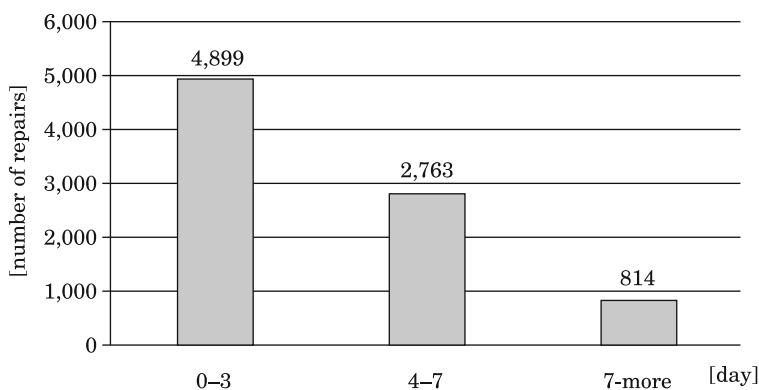


Fig. 1. The waiting time for repair

The waiting time for repair depended largely on the seasonality of field work and the number of positions serving in the workshop.

The repair time is an extremely important element in total repair (Fig. 2). Over half of repairs- 53% is made in 2 days from the moment of arrival of

a machine to workshop. Workshops make 20% of ordered repairs in a day, while the remaining 27% of repairs is made in 3 to 7 days time. The repair time of agricultural machines depends on the degree of damage. In situation when the failure of specific machine is repetitive and typical, workshops are earlier supplied with spare parts and the repair time is relatively short. When the failure is rare, workshops are not able to eliminate it earlier than in 3 days.

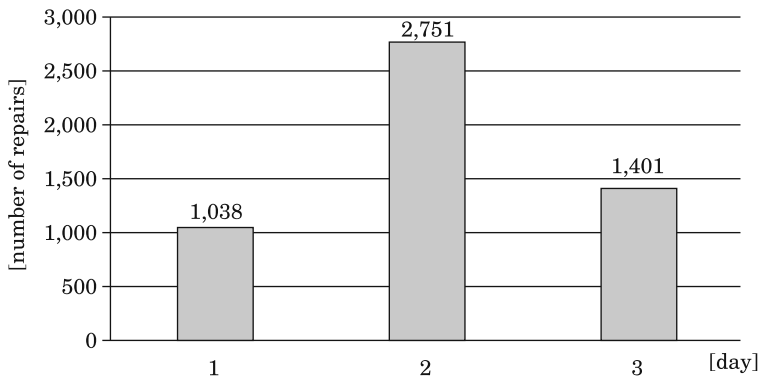


Fig. 2. The mean repair time in the season field works (months of June – November)

Repairs last longer when farm works are not being done. In 47% of cases, they may take up to 3 days. 41% of repairs is made in time from 4 to 7 days, and the remaining 12% of failures is eliminated in more than 7 days. The longer repair time during field work off-season results from the fact that the machines that are used seasonally are taken for major repairs. During field work season there are also the repairs of machines which at this time are rarely used. The extension of repair time also results from the fact that workshops are supplied with less spare parts.

The analysed workshops have experienced staff with appropriate qualifications. 63.4% are employees with formal experience between 11 and 20 years. Employees with experience below 10 years amount 34% of staff.

The demand for repair services is generated by the realization of agricultural measures at harvesting of cereals, oilseeds and root crops (KARCZMARCZYK 2005, BANASIAK 1999). During this period, the potential of staff and maintenance positions is fully used, while during off-season there is a significant surplus of service supply over demand. Annually, this surplus is 530% in the area of maintenance services for agricultural machinery. The number of hours of effective work in relation to potential of employees in the surveyed workshops was 30.5% (Fig. 4).

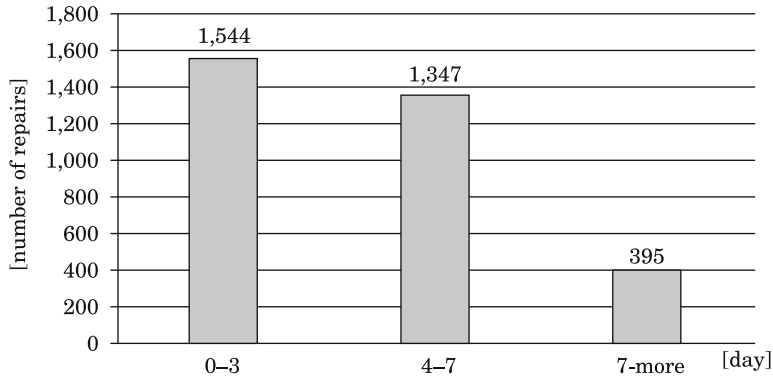


Fig. 3. The mean repair time the off-season field works (months December – May)

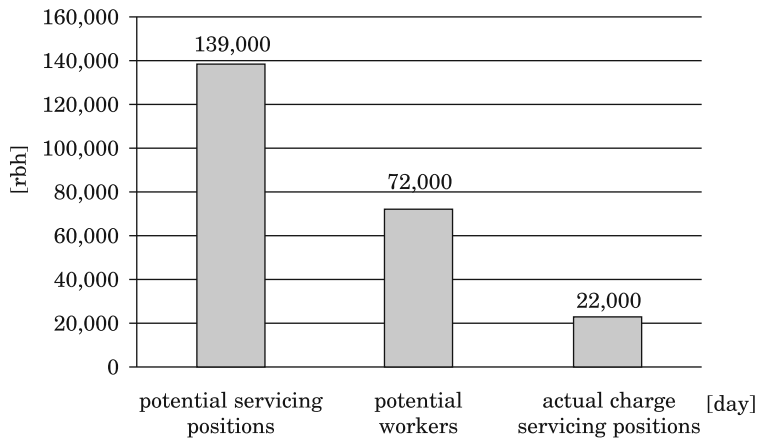


Fig. 4. Use of repair stations per year

## Conclusion

The purchasers of agricultural equipment have increasing demands about the quality of repairs. The breakdowns of agricultural machines often interrupt the technological process. The time of machine repair during intensive works in farm is a crucial element in the quality of their realization.

Qualitative changes in the construction of agricultural machinery caused the necessity to adjust the size of technical background to their service.

There is a significant surplus (530%) of supply over demand in the area of maintenance services for agricultural machinery (especially in the area of service).

The effective use of the potential of employees in the surveyed maintenance workshops stands at 30.5%.

The level of execution of the routine technical maintenance and repairs is one of the most important factors having the essential influence on the process of machines, tractors and agricultural transport means wear. The factors which have a decisive influence on the technical maintenance and repairs are design solutions of individual items of machines, the workshops equipment of technical facilities with modern tools and devices, as well as the technical level and the qualifications of repair staff (TOMCZYK 2010).

Translated by AUTHORS

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