TECHNICAL SCIENCES
Abbrev.: Techn. Sc., No 11, Y 2008

DOI 10.2478/v10022-008-0028-6

AN ANALYSIS OF THE TERRITORIAL RANGE OF FARM TRACTORS SERVICING REALISED AS AN ELEMENT OF DISTRIBUTION LOGISTICS

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K e y w o r d s: logistics, logistics systems, servicing distribution.

A b s t r a c t

The research on farm tractors inspections and repairs considering the territorial scope of the carried out orders is presented. The structure of the orders for service for four radiuses of distance that were investigated in the years 2003-2005 is demonstrated. The function of logistics concerning service teams interventions in commercial Services Company is explained. The solutions that provide the expected level of service and, at the same time, cost minimisation are presented. The article demonstrates the analysis of servicing structure and schedule of the number of farm tractor inspections and repairs for individual radiuses, of distance in the aspect of the calendar of agrotechnical operations.

ANALIZA ZASIĘGU TERYTORIALNEGO OBSŁUGI SERWISOWEJ CIĄGNIKÓW ROLNICZYCH REALIZOWANEJ JAKO ELEMENT LOGISTYKI DYSTRYBUCJI

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S ł o w a k l u c z o w e: logistyka, systemy logistyczne, dystrybucja usług serwisowych.

A b s t r a k t

Zaprezentowano badania usług przeglądów i napraw ciągników rolniczych w aspekcie zasięgu terytorialnego wykonanych zleceń. Przedstawiono strukturę zleceń serwisowych dla czterech promieni odległości, które badano w latach 2003-2005. Wyjaśniono funkcje logistyki w przedsiębiorstwie handlowo-usługowym w zakresie organizacji wyjazdów zespołów serwisowych. Przedstawiono rozwiązania, które zapewniają oczekiwany poziom obsługi klienta i jednocześnie minimalizację kosztów. Zaprezentowano analizę struktury obsługi serwisowej oraz rozkład liczby usług przeglądów i napraw ciągników rolniczych dla poszczególnych promieni odległości w aspekcie kalendarza zabiegów agrotechnicznych.

Introduction

Distribution management of farm tractors is based on business entities. The necessity to provide guarantee and postguarantee service results in the fact those very often-commercial services companies constitute the logistic network of the sales. *The Service Department,* which is responsible for carrying out the extensive orders as a part of inspections and repairs of technical means, plays and important role in maintaining the state of technical and exploitation of farm tractors. Farm tractors are the main source of driving and towing power (PIEKARSKI 1997, SKROBACKI et al. 2006). Meeting the requirements of customer service forces the authorised dealers to incur capital expenditure for the created company infrastructure (COYLE et al. 1996, CHRISTOPHER et al. 2005, CIESIELSKI 2006).

Research problem

Selective sales network created by leading producers extorts the division of home market into commercial zones. It creates a barrier to enter the market for the other companies in the same line of business. The areas serviced by individual dealers should be dependent, first of all, on the absorption capacity for new farm vehicles. What is more, it is necessary to build up appropriately high population of tractors of a given make. Providing functional efficiency will be the basis for effective activity of both, *the Service Department* and spare parts wholesalers (RUTKOWSKI 2005, PFOHL 2001). The object of the research was the authorised service of the distributor of farm vehicles that carries out guarantee and postguarantee inspections and repairs. The analysis concerning territorial layout of the carried our repair services for four radiuses of distances: $r = 0$ km, 0 km $< r <$ 50 km, 50 km $< r <$ 100 km and $r >$ 100 km was conducted.

The structure of the orders carried out by service teams

The reduction of the level of logistic costs in services provided by a service station may be stimulated by controlling the structure of service teams' trips. It is possible to maintain the optimal level of customer service and, at the same time, to reduce the route of travel, as shown in the diagram (Fig. 1).

The basic model of service consists of trips of a team of mechanics individually to each of the received reports. Employing such a system in the period of intensive field works may lead to a quick exhaustion of the potential

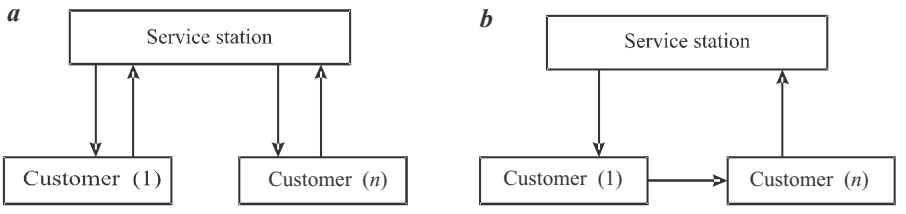

Fig. 1. The structure of service teams' trips in order to carry out repairs: a) individual trips, b) joint trips

Source: Own study.

of service teams that a company hires. This often leads to an accumulation of the works undertaken and a prolongation of the time that is needed for the realisation of the service. The lack of help from the authorised dealer negatively influences the co-operation between the purchaser and the seller after the transaction (KEMPNY 2001).

Moreover, the cyclical prolongation of the time needed for repair or for the arrival of the service team lowers the customer's loyalty and perpetuates a negative image of the brand on the market. The system aiming at increasing the coefficient of the use of working time attempts to join the service of several customers within one trip.

The realisation of this model is put into practice when:

– the scope of the service orders allows for short visits at the successive principals,

– a visit's aim is to diagnose and verify the scope of the repair,

– a visit serves the purpose of submitting some spare parts and operation materials,

– the destinations are within the same area.

In the case of joint trips it is possible to use the graph theory in service logistics. A commercial traveller is then employed and his task is to find the shortest route, which begins and ends at the service station, under the assumption that each principal is visited only once.

The problem of joining and matching the routes is connected with planning the level of the costs related to the service station activity, as well as with general distribution expenses. The trips should be planned according both to the time that is required for the realisation of the orders, and to the time needed in order to get to particular points on the route. The functioning of the system is distorted when the theoretical timing principles become negatively verified in relation to the real conditions. The issue constitutes an organisational challenge to *the Service Department*, especially during the period of intensive field works recommended in the calendar of agricultural operations.

An analysis of inspections and repairs of farm tractors in the service department carried out in the years 2003-2005

During a three-year period the services rendered by the Service Department of a company which is an authorised dealer of tractors such as JOHN DEERE and ZETOR were investigated. The object of the research was a trade-service company that conducts business activity in the sector of agricultural services. The JOHN DEERE concern was a market-leading brand with regard to the quantity of the vehicles sold by the dealer in the years 2003-2005. During this period creating a high population of these vehicles on the local market has begun through selective distribution. Due to the above, servicing was carried out in relation to a large number of tractors in working order with a short period of exploitation.

The territorial scope (radius) of the orders carried out in 2003

In the investigated period *the Service Department* rendered 534 services concerning inspections and repairs of farm machines. The territorial distribution of the services has been presented in the circular graph (Fig. 2).

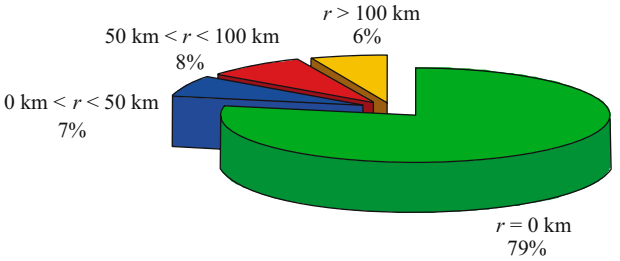

Fig. 2. The territorial structure of the services rendered within inspections and repairs of farm machines in 2003

Source: Own study.

Stationary workshop repairs (r = 0 km) in the researched period constituted 79% of the realised orders. Such a division stems from the fact that the full package of guarantee inspections (services for the tractors in working order) represented the value of 61%. Moreover, in the case of the DEERE and COMPANY concern the orders included the vehicles with a short exploitation period. The services for the remaining distance ranges oscillated around a few percent.

The quantitative distribution of the orders for particular distances are shown in the histogram (Fig. 3). During the period in question an evident

dominance of workshop repairs (r = 0 km) was observed throughout the whole year, while the temporary maxima took place in the following months: April, June, August, October and December.

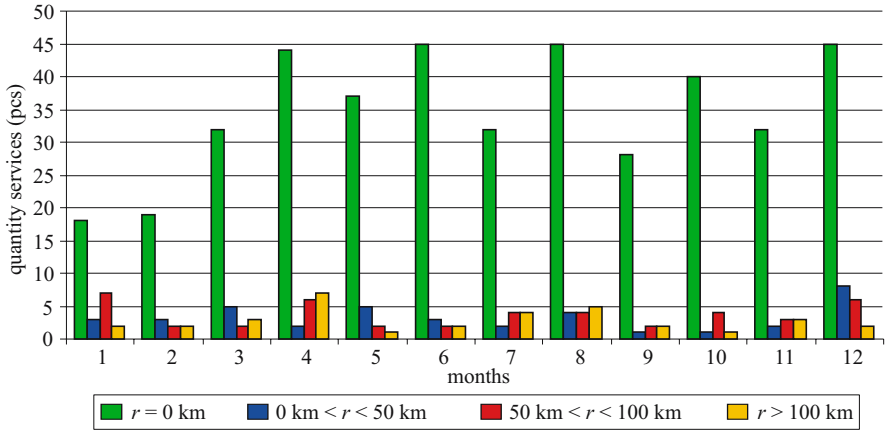

Fig. 3. The distribution of the quantity of inspections and repairs of farm tractors in 2003 for particular distances of their realisation

Source: Own study.

The territorial scope (radius) of the orders carried out in 2004

In the investigated period *the Service Department* carried out 786 services that constituted inspections and repairs of farm tractors. The territorial structure of the orders is presented in the circular graph (Fig. 4).

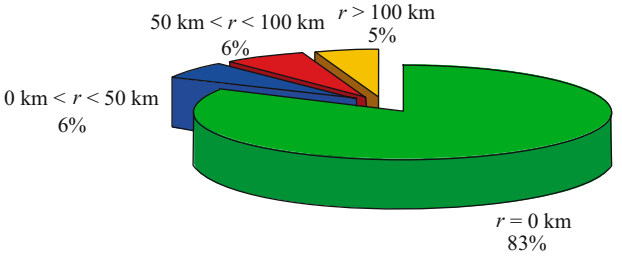

Fig. 4. The territorial structure of services that constitute inspections and repairs of farm tractors in the year 2004

Source: Own study.

Stationary workshop repairs in 2004 amounted to 83% of the orders carried out. The structure of services concerning the remaining ranges of distance from the company's headquarters was on a balanced level of a few percent. Such a structure resulted from, above all, the number of inspections carried

out with regard to the tractors in working order. In the researched period they constituted 63% of the overall number of orders. The accession of Poland to the EU, which took place on 1st May 2004, together with the increase of the VAT rate on farm machines and equipment from 0 to 22%, caused a very high level of demand in this sector.

The distribution of the orders for particular distances is presented in the histogram (Fig. 5). The workshop repairs (r = 0 km) reached the highest level in April and May. The period from June to October was characterised by balanced and high demand for services. Traditionally, at the beginning of the year and in November there is low demand for servicing.

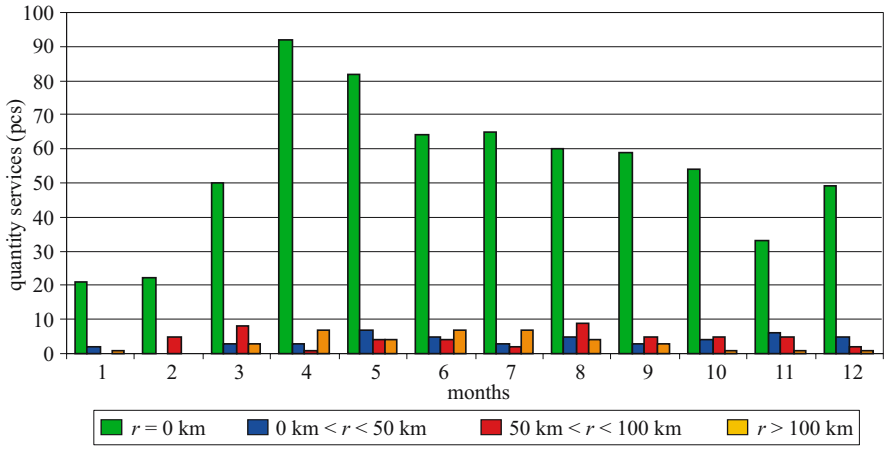

Fig. 5. The distribution of quantity of inspections and repairs of farm tractors in 2004 for the individual distances of their completion

Source: Own study.

Territorial scope (radius) of the orders carried out in 2005

Over the investigated year *the Service Department* carried out in total 719 services by inspections and repairs of farm tractors. The territorial structure of the servicing orders in the aspect, of the distance from the headquarters of the company is presented in the circular graph (Fig. 6).

Stationary workshop repairs in the investigated year 2005 constituted 60% of the carried out orders. The level of their completion resulted from the fact that all the inspections in the analysed period constituted 43% of all the orders. The structure of the servicing operations carried out in the place of residence of the employers demonstrated that the number of orders coming from the distances of 50 km < r < 100 km is twice as high as the number of orders from

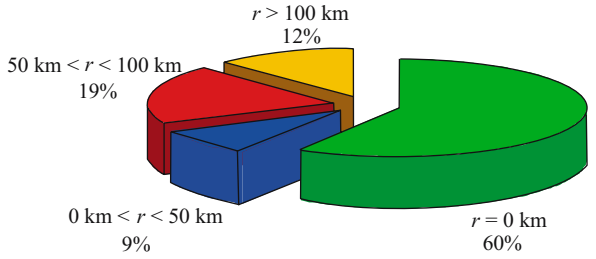

Fig. 6. The territorial structure of inspections and repairs of farm tractors carried out in 2005
Source: Own study.

shorter distances. The level of 12% of the services in the distance of over 100 km proves wide territorial scope of the examined company on the domestic market of servicing.

The distribution of orders for inspections and repairs of farm tractors in 2005 for individual distances of their completion is presented in the histogram (Fig. 7).

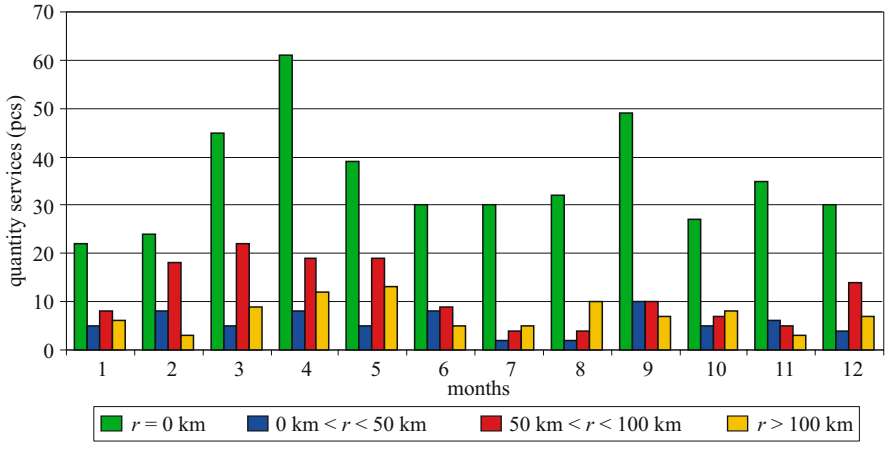

Fig. 7. The distribution of inspections and repairs of farm tractors in 2005 for individual distances of their completion
Source: Own study.

Workshop services (r = 0 km) constituted the dominating group of orders which were realised by *the Service Department*. However, their level was lower by over 20% in comparison with the years 2003 and 2004. The works carried out in the service station reached the local maxima in: March, April, May and September, so in the periods when the demand for agrotechnical operations is higher. The second area in respect of the quantity, was the group of orders

coming from the distances of 50 km < r < 100 km. The services rendered by service teams at the place of residence of the employers dominated especially the first and second quarters of the year. Such a phenomenon took place in all the three scopes of distances. It confirmed the relation between the demand for inspections and repairs of farm tractors and the process of preparation and realisation of the field labours in separate periods of the year 2005. The number of orders was highest in April and September, i.e. in the time of higher demand for agrotechnical operations (KARCZMARCZYK 2005, BANASIAK 1999).

Summary

Servicing of farm tractors and machines constitutes an important element of distribution logistics. From high technological and structural level of modern farm vehicles stems the necessity to provide professional servicing. The inspections and repairs should be carried out irrespective of territorial distribution and the length of the radius of the trip of service team, in the time that takes into account the specific needs of the market. The reaction speed, delivery time of a given service and successful performances are most often mentioned clients' requirements.

The analysis of the results of the research allows to formulate a thesis that there is a relation between the quantity of orders for individual radiuses and the change of satisfaction of the market with products of a given brand in subsequent years. Moreover, a statistic increase in the age of the tractors is crucial in the scope of services offered. There was a decrease in stationary services (r = 0 km) connected, first of all, with technical inspections, and there was a steep increase in realised orders which required trips of repair teams. Such a tendency concerned all three radiuses: 0 km < r < 50 km, 50 km < r < 100 km and r > 100 km in the analysed period.

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Accepted for print 25.08.2008 r.