

THE ANALYSIS OF THE NEW FARM TRACTORS MARKET IN POLAND IN 2010-2020 IN THE CONTEXT OF INCOME GENERATED BY FARMERS' HOUSEHOLDS

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ABSTRACT

The objective of the paper is to analyse changes in the new farm tractor market in Poland and the annual income of farmers' households generated in the same period. The studies covered the period from 2010 to 2020. The new farm tractors market was analysed with reference to the number of sold tractors, which was measured by the number of registrations. The paper considers quarterly seasonality of sale along with demand for selected producers and engine-power categories of new farm tractors sold in Poland. By "new tractors" the authors mean those registered for the first time in Poland and manufactured in the same or the preceding year. In 2010-2020, there were over 148,000 new farm tractors registered in Poland. The highest number of tractors sold was recorded in 2012, the lowest in 2016. Tractors from Western Europe, USA, and Japan predominate on the Polish market. Among new vehicles, the highest number registered in the investigated period constituted New Holland (23,780) tractors, followed by John Deere (19,453), Zetor (16,398), Deutz-Fahr (10,508), and Kubota (7,674). The total share of these producers in 2010-2020 amounted to approx. 58%. With regard to the engine-power categories in the analysed period, tractors with power of 37-73 kW and 74-132 kW (33.85%) constituted the largest proportion (49.07%). An increased interest in tractors with power below 36 kW was also observed from 2016 to 2020. Such vehicles accounted for 10% of all registrations. The general trend related to the volume of average annual income is not consistent with the trend of purchasing new farm tractors, while the highest number of registrations was recorded during the period in which inflation rates reached their highest values.

Introduction

The main assets of a farm, apart from land, are farm tractors. The volume of demand for mechanisation means, including tractors, indicates the purchasing power of farms, and their modernization capacity to modernise. The basic method of assessing the rationality of purchasing farm machinery and tractors as part of investment projects implemented under RDP 2014-2020 (Rural Development Programme) consists of comparing the intensity of use of these mechanisation means against the adopted criterion value. The annual rate of the farm equipment use is a measure of this criterion, e.g. $\text{hrs}\cdot\text{year}^{-1}$, $\text{ha}\cdot\text{year}^{-1}$, etc., considering the assumed period of its operation (Muzalewski, 2015). Numerous factors have an impact on farmers who decide about the purchase. Farmers consider both the price of a machine and its technical parameters, as well as a brand (Grisso *et al.*, 2014; Walley *et al.*, 2007). A regional diversity of the tractor market is similar to the diversity of overall volume of tractors in the Polish agriculture (Zalewski, 2017). Since farms in western and northern voivodeships are larger, they need tractors with higher power, and, consequently, more expensive. Furthermore, the farms in these regions generate higher revenues, and also have more opportunities to obtain EU funds. These factors allow farmers in the said areas to buy tractors with better technical parameters, mainly with higher power. It is also worth mentioning that farmers from southern and eastern Poland, where farms are smaller, have very limited investment outlays. As a result, they are more likely to buy used tractors and equipment with less power (Lorencowicz, 2020).

The number of tractors sold in a given period reflects the state of the market with regard to farm machinery, while the condition of the agricultural engineering market characterises the changes taking place in agriculture and in the State's economy (Pawlak, 2015). Also, the situation on the market for farm products, which sometimes changes significantly, has a decisive impact on the demand for new tractors (Skudlarski, 2016, 2017). It was necessary to conduct research of the demand for farm tractors, due to the unstable market conditions that affect the profitability of farms.

Agricultural income is a vital element of agricultural policy in all countries, in particular, where the economy is based on the market system. This is an important goal of agricultural policy, notwithstanding the scope of state influence on the rural economy or the amount of funds from the state budget allocated for agriculture (Grzelak, 2017). The income generated by agricultural holdings has certain specific features which differentiate it from the income of other population groups earning their salaries under employment contracts or generating income from non-agricultural business activities. The specific nature of this results from the fact that a farmer running a family agricultural holding has a double role to play, namely being the owner of capital goods and an employee. As a consequence, there is a close connection between an agricultural holding and a household. Moreover, a farming income serves production and redistributive functions (Pawłowska-Tyszko *et al.*, 2014).

Inflation has a direct impact on the level of investment in agriculture. According to Kusz *et al.*, (2015), the inflation rate is positively correlated with the growth rate of capital expenditures within the agricultural sector. This may be a consequence of the fact that an increase in prices compensates for the capital-intensive nature of agricultural production. In turn, along with the reduction of the rediscount rate on bills of exchange, capital acquisition costs also fall, which has a positive influence on the level of completed investments. Furthermore, reduced inflation levels allow the reduction of capital acquisition costs. One of the objectives

of the Common Agricultural Policy is ensuring a fair income to farmers. This is to be reached by advancing technological progress, increasing work efficiency in agriculture, ensuring proper development of agricultural production, and making optimum use of production factors, including the workforce. The inclusion of the Polish agriculture in the EU Common Agricultural Policy area through financial support schemes, notably, the requirements as regards the conditions, quality and size of production, have become major factors determining farm income levels (Majewski *et al.*, 2013). Taking into account the disparities in the distribution of income generated by farmers' households, studies should involve both disposable income and expenditures (Wołoszyn *et al.*, 2014). At the same time, it is worth remembering that farmers' households are characterised by the lack of regular inflows from agricultural operations, which results in substantial volatility in current income, compelling them to a greater accumulation of assets and reduced spending (Jones, 2010), including putting aside the purchase of tractors and other agricultural machines.

The objective of this paper is to analyse the volatility of the market of new farm tractors registered in Poland in 2010-2020, and the income generated by farmers in the same period.

Material and Methods

The analysis of the market with regard to new farm tractors was carried out based on their sales, measured by the number of registrations. In order to standardise the term 'new tractor', the analysis assumed that the term would be understood as a tractor registered in the considered year, and manufactured in the same or in the preceding year. The paper used data obtained from the Central Registry of Vehicles and Drivers (CEPiK – *Polish Central Information System*). Data concerning the registration of tractors might not be the same as the values previously provided in other sources, due to database update.

The scope of the analysis consisted of the quarterly seasonality of sales, demand for selected manufacturers of farm tractors, and the engine-power categories of new farm tractors, registered in Poland in 2010-2020. The power ranges were based on the available literature (Zajac *et al.*, 2012; Skudlarski, 2016, 2017).

The analysis of farmers' income was carried out based on the average monthly disposable income in farmers' households, as per the data from the Statistical Yearbooks of Agriculture published in the period between 2010 and 2020 by Statistics Poland (Główny Urząd Statystyczny, GUS 2020).

Results and Discussion

In 2010-2020, there were 148,008 farm tractors registered in Poland. The highest number of new tractors during the period in question was recorded in 2012. The number registered then was 19,274. After 2012, a downward trend in their sales was observed, until 2016, when the number of registered new tractors was below half the level of 2012, and totalled 8,656. In all the subsequent years, there was an uneven growth up to the level of 14,436 in 2020. This number was 66% higher compared to 2016 and 25% lower than in the record year of 2012. The transition period between successive rounds of support in the form of Rural Development Programmes (RDP 2007-2013 and RDP 2014-2020) was, inter alia, the reason for this noticeable change in 2016. This was associated with investments being suspended by

farmers waiting for the use of funds from the next programme, and the lack of possibility to purchase a second (auxiliary) tractor in the next round (ARMA, 2021). Another factor that had a negative impact was the situation in the milk, pork, and produce markets, which resulted in the limitations on investments using own resources (Seliwiak, 2016). Moreover, the decrease in the sales of new tractors was a consequence of the market saturation effect, resulting from increased investments supported by EU funds (Kaczmarek, 2016). It is also important to note the tendency among farmers to buy tractors with lower power in southern and eastern Poland, parts of the country characterised by smaller arable areas (Lorencowicz, 2020).

While analysing the quarterly sales of new tractors, two different trends can be observed. One in 2010-2015 and 2020, the other in 2016-2019. In January-June in the first period, there was an increase in the sales of tractors that reached their maximum levels in Q2. Then, the sales decreased in the second half of the year, reaching the lowest level mainly in December, except for 2015, when the lowest sales were recorded in July and September (Figure 1).

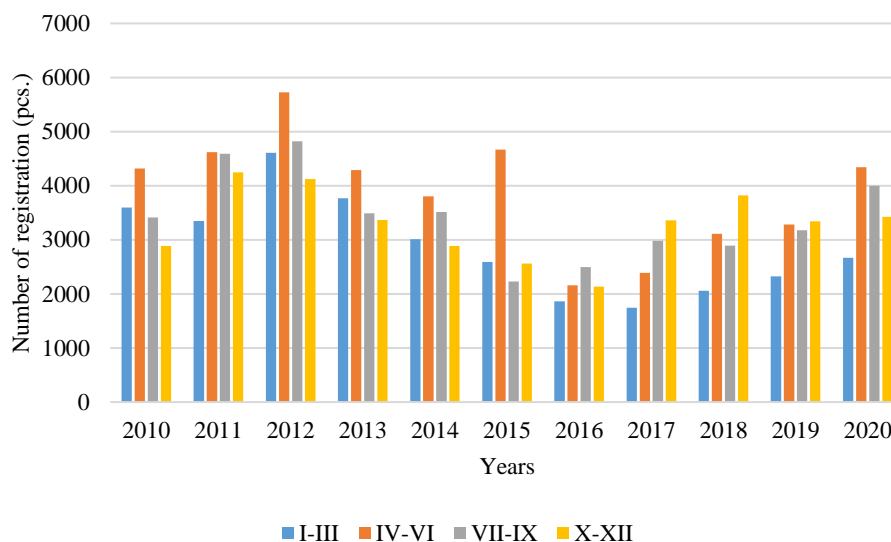


Figure 1. Number of registered new farm tractors in Poland in individual quarters of 2010-2020

Source: own elaboration based on the CEPiK data

The second trend, starting from 2016, was an upward one, mainly in the second half of the year, and in various quarters, which peaked in October-December in 2017-2019. And in 2016 such a period occurred in July-September.

In the analysed period, the highest number of registrations was recorded in Q2 2012 (5,723), while the lowest was in Q1 2017 (1,745). This was the lowest number of registrations compared to the corresponding periods of the analysed years. It is also worth emphasising that as many as seven out of eleven analysed years had the highest seasonal sale in the months

April-June. We should also mention 2020, when 14,436 tractors were registered. This result should be considered a very good one, given the difficulties caused by the COVID-19 pandemic, and the resulting huge number of restrictions, disrupting production and sales processes.

Numerous manufacturers from around the world are present on the Polish market of farm tractors. Most of them are brands from Western Europe. The best-selling machinery also includes tractors from the USA and Asia (China, India, Japan).

In 2010-2020, New Holland produced the highest number of registered tractors (23,780; 16.07%). It was followed by John Deere (19,453; 13.14%), Zetor (16,398; 11.07%), Deutz-Fahr (10,508; 7.10%), and Kubota (7,674; 5.18%). The total share of the listed manufacturers in the sales of tractors amounted to approx. 53% in this period. Tractors supplied by foreign manufacturers predominated in the sales categories in the analysed period. Registration of the Polish brands, which included Ursus, Farmer, and Pronar, was at a low level, and amounted to 3.07%, 0.50% and 0.41%, respectively. In the case of Ursus, its restructuring has influenced its sales results in recent years. Farmers declared bankruptcy by liquidation in 2016, while Pronar ceased the production of farm tractors. Ursus, as the most recognisable Polish brand, reached its maximum in the analysed last decade in 2017 (936 machines sold). As reported by Zając *et al.*, (2012), sales in 2006 were higher, and amounted to 1,319, sharing the same level of sales as New Holland at that time.

It is worth noting that Case IH was ranked fifth in terms of the most frequently registered farm tractors before 2010 and three years later. However, it was replaced by Japanese manufacturer Kubota, with 7,674 sold machines in 2013, which still keeps this rank, and maintains an upward trend with a share of 5.18%. In turn, Case (5.04%) remains on the sixth position with a slight fall, maintaining its sales at the average level of approx. 650 machines per year.

We should also mention the share of the sales of tractors from the factory in Minsk with the logo of (MTZ) - Belarus. There were 5,221 such vehicles registered in Poland in 2010-2020 (a share of 3.52%). The highest sales in terms of numbers were recorded in 2011, amounting to 5.9% of the registration of new tractors in that year, and then in 2019, with the result of 8.1%. During this time, in 2014, Belarus also recorded its lowest sales at the level of 86.

The number of registered best-selling tractors on the Polish market was characterised by similar trends in 2010-2020. The sales of these brands increased until 2012 (except for Kubota – 2014), reaching the first peak, then the minimum in 2016. Next, the second maximum level was recorded in 2017-2018, and, in the case of Kubota - in 2020. When referring to the results of general registration in 2010-2020, we can observe that most sold tractors (19,317) were recorded in 2012, and the lowest number was observed in 2016 (8,429). After reaching this minimum, the number of registrations increased slightly until 2020, when an increase by approx. 17% occurred compared to the preceding year, resulting in sales higher by 2,393 machines.

The number of registrations of new tractors of various manufacturers in 2010-2020 is presented in Table 1.

Table 1.
Number of registered new farm tractors of various manufacturers in Poland in 2010-2020

Brand	Year											Total
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Belarus	700	991	341	102	86	217	174	272	411	971	956	5221
Case IH	715	829	1072	452	592	546	488	665	770	583	751	7463
Class	242	446	843	613	461	452	360	413	274	345	376	4825
Deutz-Fahr	1059	1245	1609	899	878	1034	626	1020	641	774	723	10508
Farmer	275	190	118	62	46	41	0	0	0	0	0	732
Farmtrac	427	596	787	468	599	424	259	501	204	196	329	4790
Fendt	460	363	297	179	207	131	63	54	104	167	203	2228
John Deere	2101	2328	2707	2442	1753	1794	1041	1282	1530	1252	1223	19453
Kubota	130	308	306	604	1128	1045	626	771	869	881	1006	7674
Lamborghini	215	186	186	156	129	102	43	17	1	5	3	1043
Landini	87	177	249	251	261	140	21	60	77	10	32	1365
Massey Ferguson	417	587	768	480	375	322	143	284	213	385	601	4575
McCormick	49	135	184	285	263	81	47	13	16	15	48	1136
New Holland	2383	2639	3725	2578	2374	1984	1210	1505	1920	1713	1749	23780
Pronar	33	218	152	78	13	12	97	11	0	0	0	614
Same	371	363	408	469	68	86	45	36	3	2	2	1853
Steyr	10	58	157	125	162	202	220	249	225	183	249	1840
Ursus	347	241	464	439	293	403	894	936	323	139	68	4547
Valtra	357	373	379	334	364	372	239	337	352	315	352	3774
Zetor	2173	1843	2701	2085	1695	1556	1081	1127	741	680	716	16398
Other	612	1016	1031	1583	1377	974	752	1738	3104	3370	4992	20549
Total	14507	16774	19137	14684	13124	11918	8429	11292	11778	11986	14379	148008

Source: own study based on the CEPiK data

The sales of new farm tractors in terms of engine power were similar to the total sales. This was the most noticeable in case of the two largest shares of the power ranges 37-73 kW (50-99 hp) and 74-132 kW (100-179 hp) – Figure 2. In the predominant power range of 37-73 kW, the highest sales were recorded in 2012, at the level of 10,446, which accounted for 55% of all tractors sold that year, and 14.7% of tractors sold in the same power range in 2010-2020. In the above-mentioned range, the lowest sales were recorded in 2016, and amounted to 4,119, accounting for 49.9% of all tractors sold that year, and 5.8% in ten-year terms in this power category. It is also worth noting that in the analysed period, the sales of tractors with power up to 36 kW (49 hp) was constantly at the stable average level of 616 machines a year by 2016, while there was a drastic increase - by as much as 54% – in 2017, to the level of 1,334 machines, compared to preceding years. The trend was maintained until 2020, when sales amounted to 3,844 machines. The remaining power ranges 133-161 kW

(180-218 hp) and above 161 kW (above 218 hp) were at a much lower level of sales - 438 and 492 machines a year, respectively. However, a 48% increase was seen in 2018 compared to 2010 in the interest in tractors with power exceeding 161 kW, when the sales were the lowest in the analysed period. A similar increase occurred in 2020 in the segment of 133-161 kW, in which the increase was as high as 68% compared to the year with the lowest number of registrations (2016).

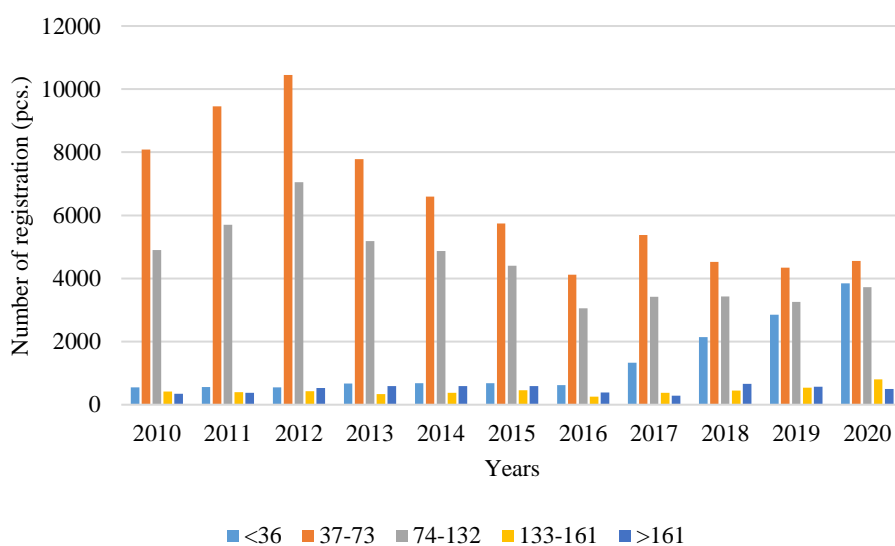


Figure 2. Number of registrations of new tractors of various power ranges in 2010-2020
Source: own elaboration based on the CEPiK data

With regard to engine-power categories in the registration structure, the greatest share (49.07%) was attributed to tractors with power ranging from 37 to 73 kW. This was followed by tractors with power of 74-132 kW (33.85%), and up to 36 kW (10.01%). The share of other engine-power ranges was insignificant. The power categories of tractors registered in the last decade are presented in Figure 3.

Among the two largest power structure segments of tractors registered in Poland in 2010-2020, the highest number registered was by New Holland (27.2% of the total number of registrations) in the first segment of 37-73 kW. It was followed by Zetor (25.14%), then John Deere (14%), Deutz-Fahr (13.48%), Kubota (10.4%) and Case (9.79%) – Figure 4. In the second segment, in which the power was in the range of 74-132 kW, the largest share was observed in the case of John Deere (30%), followed by New Holland (28.26%), Zetor (17.21%), Deutz-Fahr (12.32%), Case (6.82%) and Kubota (5.39%) - Figure 5.

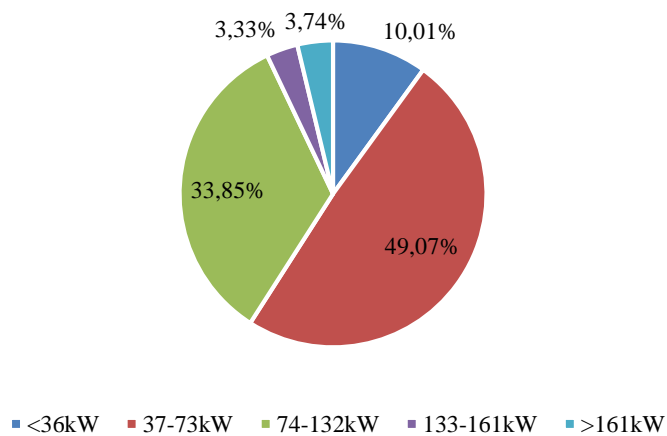


Figure 3. Engine power categories of new tractors registered in Poland in 2010-2020, (%)
Source: own elaboration based on the CEPiK data

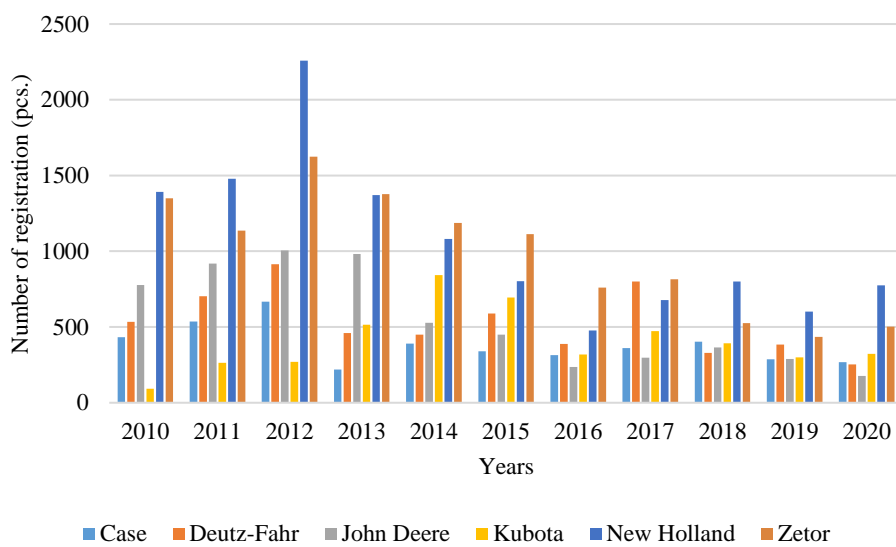


Figure 4. Number of registered tractors of selected manufacturers in Poland in 2010-2020 in the power segment 37-73 kW

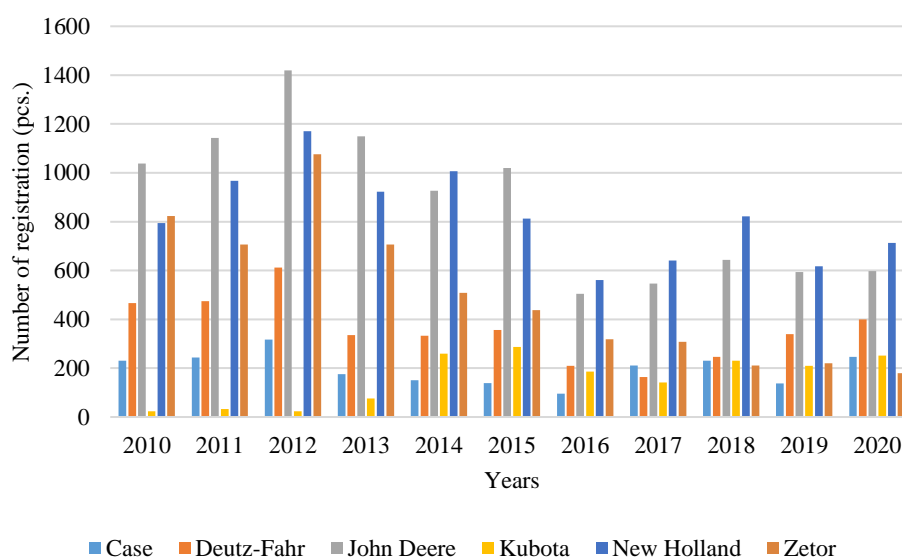


Figure 5. Number of registered tractors of selected manufacturers in Poland in 2010-2020 in the power segment of 74-132 kW

In 2010-2020, over 120,000 new tractors were registered in the power range of 37-132 kW, which accounted for 81% of all registrations in Poland. In this power group, 20,741 New Holland tractors were recorded in the analysed period, then Zetor – 16,322, John Deere – 15,609, Deutz-Fahr 9,738, Case – 6,394, and Kubota – 6,200. It is worth adding that there were 14,481 tractors of power lower than 36 kW registered in Poland in 2010-2020, with the highest number of registrations of Kubota (1,459), John Deere (816) and New Holland (409) predominating in this group. In turn, in the segments with the lowest numbers of registrations, i.e. 133-161 kW and over 161 kW, the total number of registered John Deere tractors was 2,948, New Holland – 2,375, and Case – 1,032.

The number of registrations of farm tractors can also be referred to as farmers' income generated in the reference period. According to the results of the Agricultural Census in 2020 (GUS, 2020), covering the previous decade, the number of farms decreased by nearly 200 000 in the said period. This contributed to the increase in the average area of individual farms. This situation can be attributed to the ageing of population in rural areas, and an insufficient number of successors to take over farms. Within the decade falling between the Census years, changes took place in respect of the holding of basic agricultural machinery. This, most of all, resulted from the progressing specialisation of agricultural production, and concurrent modernisation processes. Expenditure on equipment as part of the "Modernisation of Agricultural Holdings" action dominated the implementation of the Rural Development Programme between 2007 and 2013, and between 2014 and 2020. Investments in plant production machines, tools and devices had the greatest share in the said expenditure. In the first edition, the purchase of farm tractors accounted for 37% of the investment in agricultural equipment (Hornowski, 2019), whereas as regards the second edition, it was 29.6% (Final

Report MAARD, 2019). The Polish farmers own nearly 1 500 000 tractors and approx. 140 000 combine harvesters of various types. According to Statistics Poland, farming activities were the main source of income only in over 30% of all households with an agricultural holding user. The same share of such households had their main source of income from employment (30%), followed by old-age and disability pensions (approx. 16%), and non-agricultural activities (8%). Moreover, the percentage of households with employment as their main source of income was, for the first time, higher than the share of households with farming activities as their main source of income.

As can be observed based on the data listed in Table 2, the average monthly income (AMI) values were characterised by certain volatility in some years. Between 2010 and 2013, the income increased by 12.6%, providing additional PLN 566 in the average farmer's pocket. During this time, in two consecutive years, the prices of consumer goods and services grew by 4.3% and 3.7%. Additionally, the reduction of inflation to the level of -0.9% was recorded after 2013, and a drop in the level of average monthly income was seen in 2015.

Table 2.

Average monthly income (AMI) of an agricultural holding and consumer price indices in 2010-2020

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
AMI (PLN)	4477	4213	4749	5043	4568	4496	4933	6731	6787	7228	ND
Inflation (%)	2.6	4.3	3.7	0.9	0.0	-0.9	-0.6	2.0	1.6	2.3	3.4

**Author, according to GUS 2010-2020 and GUS 2021; ND - no data*

It is worth noting that the highest number of registrations of new farm tractors was recorded in the period with high inflation values, when 19 137 tractors were purchased, with an average monthly income of PLN 4 749, and the inflation level of 3.7%. The situation is confirmed by a positive correlation at the level of $R=0.716$, which indicated that along with growing inflation, the number of new registered farm tractors was on the rise as well. There was a steady downward purchase trend from 2012 until 2016 (8 429 tractors), after which income began to grow along with the number of registrations, despite deflation being maintained at the level of -0.6%. As mentioned above, the situation resulted from the transitory period between the subsequent editions of support schemes, including Rural Development Programmes.

However, Kutkowska's (2015) studies proved that financial support in the form of subsidies did not result in a significant differentiation of the profitability of agricultural holdings in individual area-payment groups. In contrast, Sass (2019) claimed that the subsidies awarded to the Polish farmers had a decisive impact on the income of their holdings, and were the source of funding for modernisation investments. According to Czubaka's studies (2012), farmers most frequently spent their direct payments on purchasing current assets for production (fertilizers, plant protection products, seeds, feed, and fuel). They allocated approx. 62% of their subsidies for these products. Around 30% of the funds were spent on activities related to the modernisation of agricultural holdings (capital expenditure). Market

analyses (2018) showed that the gradually improving economic situation in agriculture was a factor which contributed to the growing demand for agricultural equipment. In turn, the increased number of new farm tractors registered in 2017 in the European Union Member States was, to a certain extent, an outcome of a sharp increase in the number of registrations in December, i.e., in the period directly preceding the entry into force of new type-approval regulations. According to the results of the studies conducted by Kulawik *et al.*, (2020), it was shown that the period between 2012 and 2016 had witnessed a deterioration of macroeconomic conditions. Furthermore, inflation rates were growing (the growth rate slowed down between 2013 and 2016) and the increase in net salaries accelerated, in particular in 2017. Similar to the results of the conducted studies, the average annual net salary in the national economy during the period concerned grew by nearly 60% in relation to 2010. Between 2010 and 2013, and in 2017, a sharp rise in the prices of plant products and milk was reported. This resulted in the increasing value of production, which reached its peak level in 2013. As regards income generated by family agricultural holdings, its nominal and real values had been growing rapidly from the beginning of the decade until a sharp decline occurred between 2014 and 2015. In the final report (2019) entitled *“The Assessment of Implementation Results and Impact of the Rural Development Programme for 2014-2020 between 2014 and 2018: Competitiveness, Innovation, Knowledge Transfer”*, prepared by the Ministry of Agriculture and Rural Development, it was stated that the Polish farmers had significantly lower incomes than the average EU income. Income is growing at a considerably lower pace than across the EU. The income of a Polish farmer is nearly three times lower than the corresponding EU average. Between 2015 and 2018, the rate increased from EUR 4,425 (PLN 18,806) to EUR 5,672 (PLN 24,106) in Poland, while at the EU level – from EUR 12,388 (52,649 PLN) to EUR 14,227 (60,464 PLN). The authors of the report attribute the situation to lower productivity of the Polish agriculture, lower salary levels in Poland, and the structure of farming activities. The period between 2010 and 2020 saw substantial volatility of farming income. The lowest income generated by an agricultural holding after 2013 was recorded in 2015, while the highest level was recorded in 2019. It can be stated that the income generated by farmers was generally growing in the period in which the Rural Development Programme was being implemented. Moreover, according to the final report, direct payments continued to have the greatest effect on income.

After 2016, inflation grew by 2.6%, and the average monthly income amounted to PLN 6 787 in 2017. In relation to 2016, the income increased by a whopping 36.44% (PLN 1 798) in 2017. In annual terms, this gives income at the level of PLN 81 444 – Figure 6. Following that period, there was a continuing upward trend related to income, and it can be assumed that it was maintained in 2020, despite the lack of current data on the subject. The calculated coefficient of determination, $R^2=0.719$, also confirms that the value of the average annual income was growing each year.

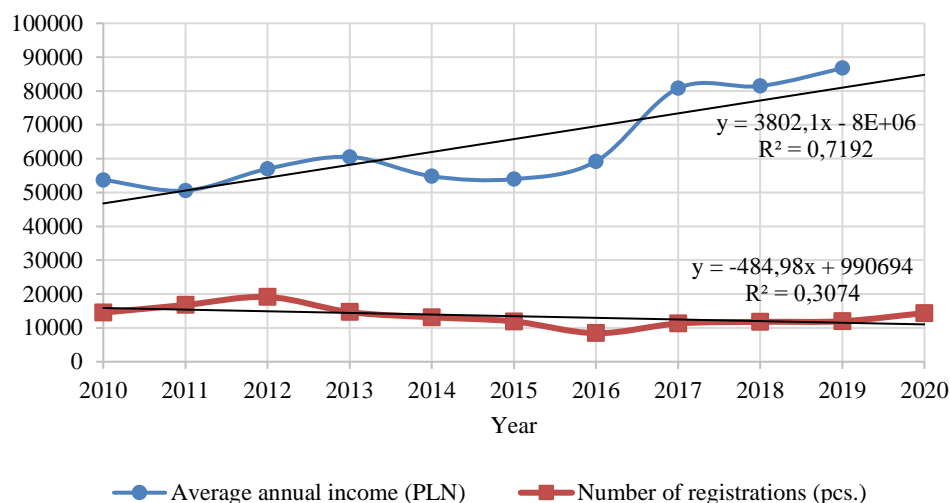


Figure 6. The average annual income of farmers vs. the number of farm tractor registrations in 2010-2020

Having analysed the data for all the years included in the study, from the perspective of the average annual income and the number of registrations of new farm tractors, it can be noted that no correlation has been shown between the average annual incomes and number of registrations ($R=-0.419$), or between the average annual income and inflation levels ($R=0.066$). In contrast, Hornowski (2015) in his studies showed an increase in the generated income following investments which allowed farmers to extend their area of agricultural land (lease) and livestock, which in turn directly contributed to the rise in the income generated from agricultural activities. During the decade between 2010 and 2020, the average annual income demonstrated an upward trend, while the number of registrations was decreasing. The trends were surely affected by the market being saturated by farming machines, which were purchased in the country or imported from abroad, and by the financial support schemes addressed to farmers. It is also worth stressing that the purchase of new tractors was most notable in the period when consumer price indices reached their peak values. Moreover, it is worth noting that in an average Polish family agricultural holding, technical tangible assets are usually replaced once by a single generation, approximately every 25 to 30 years (Loren-cowicz, 2011), which is very likely to translate into the increased sale volume of new farm tractors every two or three decades.

Conclusions

In the analysed period 2010-2020, there were 148,008 farm tractors registered in Poland. Their highest sales were recorded in 2012 at the level of 19,274 machines, while they were 55% lower in 2016 – 8,656 machines. The purchase of tractors was influenced by EU funds and waiting for new support schemes, as well as by the unfavourable situation in the crop

market. It is also worth mentioning that, despite the difficult situation related to the emergence of COVID-19, the registration of tractors in 2020 was only 25% lower, reaching a fairly good result at the level of 14,436 machines.

In 2010-2020, the highest number of tractors registered in Poland was of power within the range of 37-73 kW, which accounted for 49.07% of all tractors. The segment 74-132 kW was the second-best-selling group. From 2016 to 2020, an increase in interest in tractors with the lowest power, below 36 kW, was observed. Such vehicles accounted for 10% of all registrations.

Considering tractor manufacturers, the largest share was recorded in case of foreign brands, while the share of Polish manufacturers amounted to 3.98%. The following tractors dominated in the registration picture: New Holland, John Deere, Zetor, Deutz-Fahr, Kubota, and Case. They accounted for 57.61% of all tractors registered in the analysed period.

The general trend related to the volume of average annual income does not align with the trend of purchasing new farm tractors, while the highest number of registrations was recorded during the period in which inflation rates reached their highest values (confirmed by a positive correlation at the level of $R=0.716$).

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ANALIZA RYNKU NOWYCH CIĄGNIKÓW ROLNICZYCH W POLSCE W LATACH 2010-2020 W ASPEKCIE DOCHODÓW GOSPODARSTW ROLNIKÓW

Streszczenie. Celem pracy jest analiza zmian na rynku nowych ciągników rolniczych w Polsce oraz rocznych dochodów gospodarstw rolników pochodzących z tego samego okresu. Zakres badań prowadził się do rozpatrywania lat z okresu 2010-2020. Analiza rynku nowych ciągników rolniczych przeprowadzona była na podstawie ich sprzedaży mierzonej liczbą rejestracji. W zakresie pracy objęto sezonowość sprzedaży w układzie kwartalnym, popyt na wybranych producentów, a także strukturę mocy nowych ciągników rolniczych sprzedawanych w Polsce. Ciągniki nowe uznane były jako te, które zarejestrowano pierwszy raz w Polsce z tym samym rokiem produkcji i poprzedzającym. W latach 2010-2020 zarejestrowano w Polsce ponad 148 tys. nowych ciągników rolniczych. Największą liczbę sprzedanych ciągników zanotowano w 2012 r, najmniej zaś w 2016 r. Na polskim rynku przeważają ciągniki pochodzące z Europy Zachodniej, USA oraz Japoni. Wśród nowych pojazdów w analizowanym okresie najczęściej zarejestrowano ciągników firmy New Holland (23 780 szt.), następnie John Deere (19 453 szt.), Zetor (16 398 szt.), Deutz-Fahr (10 508 szt.), Kubota (7 674 szt.). Sumaryczny udział tych producentów w latach 2010-2020 wyniósł ok. 58%. Biorąc pod uwagę strukturę mocy silników w analizowanym okresie największy udział (49,07%) miały ciągniki o mocy w segmencie 37-73 kW oraz 74-132 kW (33,85%). Także od 2016 r. do 2020 r. zaobserwowano wzrost zainteresowania ciągnikami o mocy poniżej 36kW, które stanowiły 10% wszystkich rejestracji. Ogólny trend wielkości średniego rocznego dochodu nie jest spójny z trendem kupna nowych ciągników, zaś najwyższą liczbę rejestracji notowano w okresie kiedy wskaźniki inflacji osiągały największe wartości.

Słowa kluczowe: ciągnik rolniczy, rynek ciągników, sprzedaż ciągników rolniczych w Polsce, rejestracja, dochód