

IMPORTANCE OF CAPITAL INTENSITY IN HORTICULTURE

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Abstract. Although horticulture is an integral part of agriculture it has several distinguishing characteristics resulting from its potentially higher profitability and different use of the basic production factors, such as land, labour and capital. The common features of horticultural farms are the high level of real fixed assets in the structure of assets and high capital intensity of production. Therefore, the main goal of the article is to define the importance of the capital intensity in horticulture production. An effective tool to calculate the suitable for the individual needs of real fixed assets level should facilitate permanent monitoring of the production in terms of the economic calculation in order to optimize the range of the producers' investment so that they could avoid a financial loss.

Key words: horticulture, capital intensity

INTRODUCTION

Horticulture is an important crop production sector of our country, mainly because of its basic role in the food supply system and aesthetic functions. It is an essential source of goods both for trade and food processing industry. It also plays a vital role in the foreign trade, chiefly with Germany, Great Britain, the Netherlands and France and accounts for 32-35% of the whole Polish crop production export [Seremak-Bulge 2011]. Horticulture products, such as: both fresh and processed (mainly juice and frozen food) fruit and vegetables, ornamental plants, flowers and mushrooms are the goods attracting customers in Poland and abroad.

Capital intensity in the horticulture is an issue which should be always taken into consideration before any important financial decisions are taken related to investment

into fixed assets during the production process. It results from two main reasons. Firstly, the capital intensity determines the size of the involved capital necessary to develop and improve the production. Secondly, it is a significant factor increasing the economic risk of the production.

Although horticulture production is a part of the broadly understood agriculture sector, it usually needs more investment than typical agriculture production, both in the form of fixed assets and procedures boosting the quality and accessibility of the goods. Thus, the main goal of the article is to define the importance of the capital intensity in horticulture production.

MATERIALS AND METHODS

To fulfill the main goal, i.e. to identify the importance of the capital intensity in the horticulture production apart from the suitable, relevant literature some statistical data from GUS and Polish FADN were used. The analysis covered the period from 2004 until 2011. Comparative analyses were made basing on the information about agriculture and horticulture farms all over Poland. In order to watch the differentiation in the income between the two above-mentioned groups the method used to calculate the family agriculture farm income was shown, allowing for its most important criteria and following FADN methodological recommendations in 2004-2010. The amortisation and the balance of the surcharge and tax on the operational activity were subtracted from the value of the production. As a result a gross value added was received. By subtracting the amortization from it another income category was made, namely net value added. To get the family agriculture farm income the costs of external factors together with the balance of the surcharge and tax on the operational activity were subtracted from the net value added.

Next the changes in some selected economic features of the studied farms were determined, comparing the following items:

- Total costs (SE270) – all the expenses in the specific groups, the costs of the external factors (SE365) – allowing for the hired workers, mainly seasonal, rent and interest
- Own capital (SE501) – total assets reduced by the total obligatory financial payments
- Real assets (SE441)¹ – estimating the total farm value (including the land, machinery and equipment, forests and basic livestock)
- Gross investment (SE516) – the value of the purchased and made real assets reduced by the value of the real assets sold or given away free of charge during the financial year.

Basing on the suggestions of Meredyk [1997], Guest [2011] and Shaheen and Malik [2012] the capital intensity coefficient in the micro scale was established as the inverse of the real assets productivity [by Szymańska 2007] in the form of the ratio of the real assets (in the agriculture balance equivalent to real assets) to agriculture income (SE436/SE441).

¹ In the farms accounting fixed assets is the same as real fixed assets.

SELECTED FEATURES OF THE POLISH HORTICULTURE FARMS

Polish horticulture has been highly renowned for years in the international trade mainly due to the export of frozen vegetables, concentrated apple juice and processed tomatoes [Kubiak 2001, Nosecka 2001, Stefko 2011]. Even before the economic transformation it was one of the most dynamically developing and simultaneously very profitable sector of the agriculture [Krusze 1982, Jabłońska 1988, 1995 a, b, Wawrzyniak 2005]. The increasing importance of the horticulture within the agriculture and food production was also noticed by Olewnicki [2009] pointing out the growth of the fruit and vegetable production in the total crop production from 7.6% in 1965 to 23.2% in 2008, while the area used remained on the level of 3-4% of the agriculture area.

Horticultural production significantly differs from the other kinds of typical agriculture production, which is presented in the Table 1, specifying the area, working hours and debt.

Table 1. Selected features characterising horticulture and agriculture farms in Poland
Tabela 1. Wybrane cechy charakteryzujące gospodarstwa ogrodnicze i rolnicze w Polsce

Specification Wyszczególnienie	2008		2009		2010	
	horticulture ogrodnictwo	agriculture rolnictwo	horticulture ogrodnictwo	agriculture rolnictwo	horticulture ogrodnictwo	agriculture rolnictwo
Area (ha) Powierzchnia (ha)	4.0	23.1	4.1	23.7	5.7	49.9
Labour hours (h/ha) Praca (h/ha)	1 313	170	1 336	162	1 010	87
Assets (PLN/ha) Aktywa trwałe (PLN/ha)	75 238	11 877	102 934	22 132	75 641	17 823
Debt (PLN/ha) Zadłużenie (PLN/ha)	16 307	1 822	17 425	1 792	9 224	2 098

Source: own elaboration based on standard results from individual agriculture farms participating in Polish FADN [Wyniki standardowe... 2009-2011].

Źródło: opracowanie własne na podstawie danych z Wyników standardowych... [2009-2011].

The average area of the horticulture farms is significantly smaller than the average area of the other crop producing agriculture farms and is equal to 5.7 ha. The opposite relations can be observed for the other features. It proves both the diversity of the analysed sectors and the different use of the production factors, especially the labour and the capital.

The fixed assets (in the balance sheet understood as the material fixed assets) play a crucial role in the horticulture production, therefore the analysis of their efficiency is based on their productivity. Such an approach to both the agriculture and the horticulture production has been recommended by many authors including Gębska and Filipiak [2006], Szymańska [2007] and Zwolak [2010]. However, it does not reflect the complete image of the current and future involvement of the indispensable for production fixed assets. Incorporating the capital intensity into the economic calculation facilitates

the more in-depth analysis and provides additional possibilities to analyze and interpret the economic events in order to make more suitable decisions, both in the operational and investing activities. Using the productivity as the main factor of the economic analyses was caused by the limited availability of the data, as the calculation of the capital intensity must be based on the balance data. Due to the lack of the mandatory evidence of the economic events in agriculture most of the farms do not have such information. At the moment of the access of Poland to the European Union the Farm Accountancy Data Network (called the Polish FADN) started its operation providing information considerably increasing the diversity of the performed analyses. Thanks to the data from the international base an attempt was made to compare the fixed assets management between the Polish and European horticulture farms and their liquidity and solvency [Stefko 2011]. It mainly stressed out the huge disproportions and underlined the deficiencies of our producers. The common aspects linking both groups were the high ratio of the fixed assets (including buildings) in the property structure, the high capital intensity and a relatively small share of the mixed production (connected with keeping livestock).

Despite the availability of the data from the FADN base (the Polish and the international version) both the Polish and the EU's horticulture producers face similar challenges concerning the optimal management of the fixed assets, which was presented for instance by Goncharova [2007], thoroughly analysing the conditions and investing possibilities of the Danish greenhouse producers. Nevertheless, agriculture economists have difficulty in estimating the degree of the capital intensity and the effectiveness evaluation of the economic activities in the case of the horticulture producers not participating in FADN collecting data system.

PROFITABILITY AND CAPITAL INTENSITY

Because of its technologies the horticulture production requires increased expenditure on labour and capital, compared to the other kinds of agriculture production. The horticulture producers owning covers or mushroom-growing cellars have to invest much bigger amounts of money to start and run their production than those who use field technologies. Permanent crops need quite big expenditure as well. Apart from buildings, the use of specialized machines and devices becomes indispensable. It is also necessary to adhere to the European Union's standards and quality norms. In order to meet the market requirements horticulture producers take different measures, for example extending the period of their products availability. Nevertheless, this approach needs the appropriate facilities, such as stores and cool stores. Changing needs and expectations of customers require suitable products preparations before selling them. This situation generates other expenditure on washing, sorting and packing products. As a result of the dependence on the real capital the horticulture economic effectiveness improvement permanently needs investment activities related to the increase in the productive potential and its modernization.

The amount of the financial investment usually causes the increase in the cost of the production and potentially larger income. However, its level is not always proportional to the level of the invested capital.

As it is shown in Table 2 the income in horticulture farms between 2004 and 2009 significantly (by 30,000 to 40,000 zł yearly) exceeded the total output in agriculture farms. In spite of the significantly higher costs the income also rose in the other categories, such as: Gross Farm Income, Farm Net Value Added and in Farm Net Income. Despite the clear surplus of the income, the profit in horticulture farms was only slightly higher than in agriculture farms, which is a surprising fact. Given a longer period of possible production during a year (production under covers) the difference is amazingly small. In the horticulture farms it could have resulted from the higher inclusive cost and the cost of the external factors (mainly the expenses related to the hired workers). However, both the categories, which is shown in Table 3, were increasing definitely faster in 2004-2009 in the agriculture farms.

In both examined groups (except for 2009 in agriculture) any remarkable increase in the total fixed assets did not appear, which means farmers did not acquire any substantial amount of land, machinery or buildings between 2004 and 2009. The assets structure

Table 2. Differences in the income of the agriculture and horticulture farms (in thous. c.u.*)
Tabela 2. Różnice w dochodach gospodarstw rolniczych i ogrodniczych (w tys. c.u.*)

Specification Wyszczególnienie	2004	2005	2006	2007	2008	2009
Total output – Wartość produkcji ogółem						
Horticulture – Ogrodnictwo	50.9	57.6	57.5	61.6	66.9	61.4
Fields crops – Rolnictwo	18.6	19.7	21.6	27.2	27.3	20.5
Difference – Różnica	32.4	37.9	35.9	34.4	39.6	40.9
Gross Farm Income – Wartość dodana brutto						
Horticulture – Ogrodnictwo	22.3	26.4	27.5	29.7	30.0	29.4
Fields crops – Rolnictwo	11.4	11.2	13.6	17.4	16.0	13.4
Difference – Różnica	10.9	15.2	13.8	12.2	14.0	16.1
Farm Net Value Added – Wartość dodana netto						
Horticulture – Ogrodnictwo	16.1	19.2	21.1	23.0	21.8	22.4
Fields crops – Rolnictwo	8.3	7.6	9.8	13.5	11.3	9.5
Difference – Różnica	7.8	11.7	11.2	9.5	10.5	12.9
Farm Net Income – Dochód z rodzinnego gospodarstwa rolnego						
Horticulture – Ogrodnictwo	10.4	13.3	15.3	16.4	14.3	15.6
Fields crops – Rolnictwo	6.7	5.7	7.6	11.0	8.2	7.1
Difference – Różnica	3.6	7.7	7.7	5.5	6.1	8.5

*c.u. – currency unit.

Source: own elaboration based on standard results from individual agriculture farms participating in European FADN [Wyniki standardowe... 2005-2010].

*c.u. – jednostka monetarna.

Źródło: opracowanie własne na podstawie Wyników standardowych... [2005-2010].

Table 3. Changes in selected horticulture and agriculture farms (c.u.*)
 Tabela 3. Zmiany wybranych cech gospodarstw ogrodniczych i rolniczych (c.u.*)

Specification Wyszczególnienie	2004	2005	2006	2007	2008	2009
Total Input – Koszty ogółem (SE270)						
Horticulture – Ogrodnictwo	100	110.2	97.2	107.1	118.1	88.1
Fields crops – Rolnictwo	100	115.9	107.9	114.8	121.6	78.3
Total external factors – Koszty czynników zewnętrznych (SE365)						
Horticulture – Ogrodnictwo	100	109.5	98.5	112.2	121.8	92.6
Fields crops – Rolnictwo	100	122.4	116.5	117.7	130.7	76.6
Total Fix assets – Aktywa trwałe (SE411)						
Horticulture – Ogrodnictwo	100	103.6	91.8	107.6	109.5	104.9
Fields crops – Rolnictwo	100	107.0	106.8	116.0	117.2	155.0
Assets structure index (total fixed assets (SE441)/total assets (SE436)) Wskaźnik struktury majątku (aktywa trwałe/aktywa ogółem)						
Horticulture – Ogrodnictwo	100	100.0	98.9	100.0	101.1	102.2
Fields crops – Rolnictwo	100	100.0	98.8	100.0	100.0	111.3
Gross Investment – Inwestycje brutto (SE516)						
Horticulture – Ogrodnictwo	100	65.2	128.1	161.2	40.1	119.5
Fields crops – Rolnictwo	100	88.4	117.0	105.9	127.6	80.2
Capital intensive (total fixed assets (SE441)/farm net income (SE420)) Kapitałochłonność (aktywa trwałe/dochód rolniczy)						
Horticulture – Ogrodnictwo	100	80.7	79.8	100.4	126.0	96.1
Fields crops – Rolnictwo	100	127.7	79.0	80.8	157.5	177.5

*c.u. – current unit.

Source: own elaboration based on standard results from individual agriculture farms participating in European FADN [Wyniki standarowe... 2005-2010].

*c.u. – jednostka monetarna.

Źródło: opracowanie własne na podstawie Wyników standardowych... [2005-2010].

index also remained on the same level. However, the index of the capital intensity and the level of the gross investment fluctuated, demonstrating rather a jump in the changes of the studied period.

SUMMARY

The high capital intensity, both in the agriculture and horticulture farms, makes estimating and watching the changes in the production process in the aspect of opportunities to increase income particularly vital.

On the one hand the use of technologies requiring high capital investment contributes to the increase in the production cost, on the other hand it is supposed to generate higher income. The appropriate relation between the size of the involved capital and benefits the expected profits becomes a crucial condition of success. Therefore, it seems so important to give producers an effective tool to calculate the suitable level of their fixed assets. It should facilitate them permanent monitoring of the production in terms of the economic calculation in order to optimize the range of their investment so that they could avoid a financial loss.

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ZNACZENIE KAPITAŁOCHŁONNOŚCI W OGRODNICTWIE

Streszczenie. Chociaż ogrodnictwo stanowi integralną część rolnictwa, wyróżnia je nie tylko potencjalnie wyższa dochodowość, lecz także odmienny sposób wykorzystania podstawowych czynników produkcji, takich jak: ziemia, praca i kapitał. Cechą wspólną gospodarstw ogrodniczych jest wysoki poziom rzeczowych aktywów trwałych w strukturze majątku oraz duża kapitałochłonność produkcji. Z tego względu głównym celem artykułu jest określenie znaczenia kapitałochłonności w produkcji ogrodniczej. Skuteczne narzędzie do kalkulowania odpowiedniego do indywidualnych potrzeb poziomu środków trwałych powinno ułatwić producentom stałe kontrolowanie produkcji w kategoriach rachunku ekonomicznego, aby zoptymalizować wielkość ich inwestycji celem uniknięcia strat finansowych.

Słowa kluczowe: ogrodnictwo, kapitałochłonność

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