

APPLICATION OF AGRICULTURAL AVIATION OPERATIONS AS YIELD ENHANCEMENT FACTOR

The given article investigated the statistical relationship of the yield level and the level of aviation operations application by way of regression analysis. It was proved that correlation dependence exists between yield enhancement and the area cultivated by means of aviation which enables formation of justified marketing information for possible customers of the analyzed services.

Key words: agricultural aviation operations, marketing information, special-purpose airline, statistical relationship, regression, determination ratio.

Problem statement. *Contemporary state of Ukrainian market of aerochemical operations serves the basis for identifying the factors which affect the volume of such operations performed and the efficiency of the marketing support system in special-purpose airlines. In turn, performance of agricultural aviation operations directly depends on the amount of cultivated farmlands, so analysis of seeding area and crop yield dynamics is significant and their correlation under the condition of agricultural aviation operations.*

Analysis of recent research and publications. *Theoretical and practical aspects of agricultural aviation efficiency enhancement were considered by many foreign and home researchers including A.G.Dybir, V.M.Zagorulko, V.G.Koba, V.P.Kopychko, M.P.Matychyk, G.M.Mykhailov, M.I.Slavkov, O.V.Khudolenko, G.M.Yun, etc. However, the previous research presented narrow focus on thorough statistical analysis of yield changes compared to the previous period depending on the level of aerial cultivation application.*

Purpose of the article. *The article is aimed at revealing the principles of influence for agricultural aviation application on yield enhancement according to the regions of Ukraine by way of statistical analysis of data.*

Main statement. *According to production of main agricultural plants in Ukraine, the leaders in rating are crops and leguminous crops (45% of main agricultural plants total amount in 2010), which shows that Ukraine is a European breadbasket nation. Apart from that, Ukraine has a great potential to increase production of wheat, barley, flower seed oil, sugar and other agricultural products for export to the world markets. Although, this requires implementation of modern intensive technology for growing agricultural plants, with an integrated system of diseaseless and pest management as its integral part.*

An integrated system of pest and diseaseless management comprises a complex of preventive ecologically friendly control and economically beneficial organizational, housing, agrotechnical, biological, genetic, chemical measures and other methods.

On average, the losses of plant products resulting from diseases are around 30%, in times of epidemic, pests and weeds reproduction can exceed 50%, and sometimes complete crop failure takes place. Thus, without taking up preventive control even on high agrotechnical background it is possible to harvest only around 20-40 centner/ha winter wheat of low quality, whereas under relative protection the yield reaches 70-100 centner/ha. Therefore, every third and sometimes even every second hectare of cropland a farmer seeds to feed the pests.

Pest control is the most significant technological method of growing crops.

Application of aviation in agriculture enables timely and even fertilization, induction of growth-regulating chemicals, desiccants and defoliants, crop protection agents, etc. and prevents damage to seeding which occur with the use of ground technical equipment. As a result, incremental value for grain is only 30%, for other agricultural plants under 25% of their average productivity which allows performance of agricultural aviation operations on toll basis and recharging of the state budget [1].

Marketing is the best foundation for production management, enhancement of the housing entity's competitiveness on the market, forming its image in the socio-economic environment. In turn, the basis for marketing is formed by current and system analysis of the market, in particular of the clients and competitors which lets the enterprises develop efficient product and pricing strategies aimed at specified segments of consumers adding the enterprises a number of competitive advantages.

The foundation of marketing is made of marketing research. On efficient performance it is possible to arrive at the following conclusions: analyse the market, consumers, clients of production, their needs for specific product, therefore, to satisfy the consumer completely and obtain profit for the producers [2].

It was stated by the author that marketing activity of a special-purpose aviation enterprise should be carried out with the intent to affect the target market making use of the marketing complex, i.e. a set of marketing methods and tools. Applying systemic approach in this is mandatory since excluding at least one tool or method may result in loss of opportunities for increasing the volume of agricultural aviation operations.

One of such tools is marketing information. Collection of data for marketing information is executed in the process of marketing research: records, facts, statistical data, assessment of public opinion, and even unreliable facts which is explained by influence on the consumer coming from various factors.

Marketing information is the original element of marketing research with value attached to creation of conditions for gaining competitive advantage, decrease in level of financial risks, defining and accounting of changes in the external business environment [3].

Marketing information of a special-purpose aviation enterprise regarding agricultural operations should contain encouraging arguments for possible customers of such service, mainly agricultural enterprises. Creating the given type of information is viable after analysis of seeding area and crop yield dynamics and their correlation under the condition of agricultural aviation operations.

Table 1

Crops and leguminous crops in Ukraine

Region (Oblast)	2009				2010				2011			
	Total seeding, thousand ha	Yield, centner/ha	% to previous period	Aerochemical Works in % total	Total seeding, thousand ha	Yield, centner/ha	% to previous period	Aerochemical Works in % total	Total seeding, thousand ha	Yield, centner/ha	% to previous period	Aerochemical Works in % total
Ukraine	15469,7	29,8	86,1	5,0	14575,7	26,9	90,3	5,35	15321,3	37,0	137,5	4,65
AR Crimea	681,2	24,4	86,2	4,93	662,4	21,2	86,9	4,83	604,7	31,9	150,5	6,87
Vinnyska	836,4	37,0	90,2	5,24	843,7	36,9	99,7	7,72	860,1	49,3	133,6	4,81
Volynska	253,5	25,2	91,0	5,29	240,6	24,1	95,6	6,84	251,9	29,7	123,2	-
Dnipropetrovska	1078,2	26,1	76,8	3,16	1072,2	25,3	96,9	7,25	1120,3	30,8	121,7	3,51
Donetska	714,2	24,1	78,2	3,54	724,4	24,8	102,9	8,17	774,7	29,5	119,0	2,83
Zhytomyrska	397,3	31,1	105,1	9,1	369,4	29,4	94,5	5,8	383,7	39,3	133,7	5,06
Zakarpatska	83,2	36,3	98,6	7,72	77,8	32,8	90,4	5,34	85,7	37,6	114,6	-
Zaporizka	869,1	24,5	75,4	2,26	838,2	22,7	92,7	5,62	842,1	26,0	114,5	2,17
Ivano-Frankivska	123,8	32,5	100,3	8,82	118,6	29,2	89,8	4,87	135,3	39,6	135,6	-
Kyivska	644,3	38,5	96,3	7,37	606,8	33,0	85,7	4,76	615,7	45,2	137,0	5,47
Kirovogradska	862,0	29,4	81,4	3,73	822,1	28,9	98,3	7,38	847,3	40,9	141,5	5,66
Luganska	509,3	20,7	67,0	2,03	414,6	19,6	94,7	6,27	497,8	25,5	130,1	4,33
Lvivska	269,6	30,5	95,0	5,51	241,5	25,8	84,6	-	263,7	36,5	141,5	5,72
Mykolaivska	894,6	27,6	96,2	7,15	876,8	25,1	90,9	5,43	925,2	28,4	113,1	-
Odeska	1181,6	24,0	78,9	3,58	1147,6	25,5	106,3	8,65	1095,2	29,2	114,5	1,92
Poltavska	1011,3	37,9	86,7	5,2	925,6	30,8	81,3	3,56	980,3	51,6	167,5	7,81
Rivnenska	250,0	27,8	94,2	5,47	239,2	26,6	95,7	6,93	242,7	32,6	122,6	-
Sumska	654,6	30,6	85,7	3,92	600,3	22,1	72,2	-	658,9	38,3	173,3	7,92
Ternopil'ska	469,1	33,6	98,8	7,74	455,1	27,7	82,4	3,7	459,3	41,0	148,0	6,23
Kharkivska	947,5	26,7	68,8	2,12	677,4	18,7	70,0	-	938,5	37,0	197,9	8,46
Khersonska	738,9	23,9	72,6	2,43	685,3	22,1	92,5	5,57	765,1	32,4	146,6	6,17
Khmelnytska	537,9	31,6	95,8	5,7	553,5	31,5	99,7	7,94	541,3	40,3	127,9	3,78
Cherkaska	695,1	46,0	133,7	11,83	647,9	39,1	85,0	4,71	656,0	57,3	146,5	5,87
Chernivetska	124,4	38,2	96,0	7,0	129,0	37,9	99,2	7,51	129,4	45,8	120,8	-
Chernihivska	642,6	31,9	99,4	8,77	605,7	25,1	78,7	-	646,4	38,4	153,0	7,45

Table 1 [4] illustrates the statistical data of crop and leguminous crops seeding and yield according to the regions of Ukraine processed by the author, and the share of seeding cultivated by way of aviation.

Dynamics and value of economic indicators in Table 1 depend on a number of factors, so it is impossible to take account of them all. It is unnecessary as well. Normally, only a limited amount of factors affects the estimated economic indicator. For a special-purpose airline the most substantial factor is research of the influence level of agricultural aviation operations application on crop and leguminous crop yield.

Statistical dependence of the yield level on the level aviation application was estimated by way of regression analysis. In result, it was proved that a correlation of the yield level(Y) and amount of the cultivated land area by means of aviation(X) [5].

Using mathematical processing of the statistical data from Table 1 the linear, exponential and polynomial regression equations for 2009-2011 were obtained.

The choice of equation and type of regression was completed by utilization of the determination ratio R^2 . The closer the value of the ratio to 1, the more obvious the correlation between the economic indicators under study is.

Figure 1-3 represent the graphs and equations for the types of regression with the highest level of correlation and determination ratios for specific year.

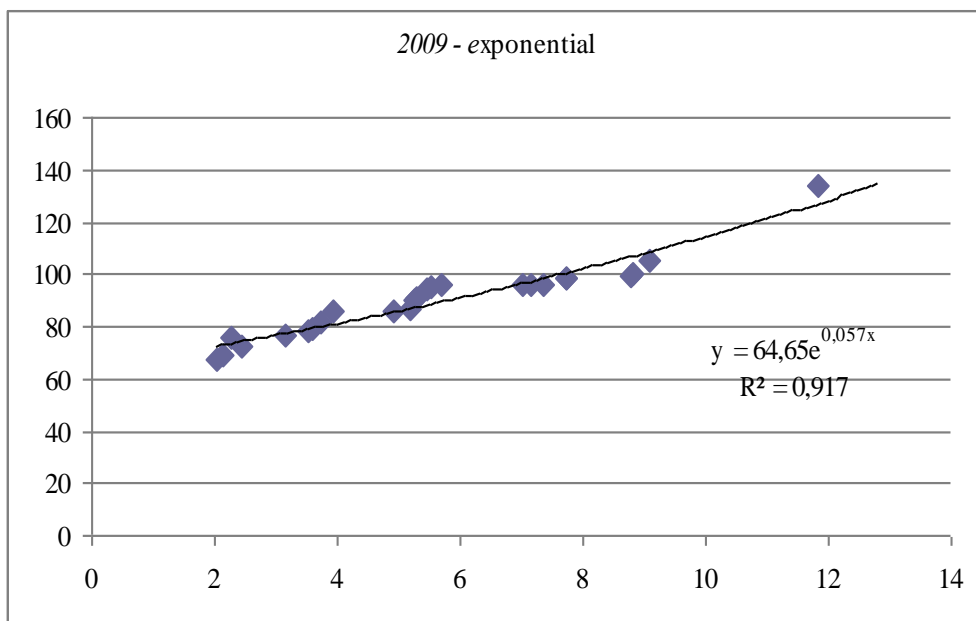


Fig.1. Exponential regression of correlation dependence in 2009

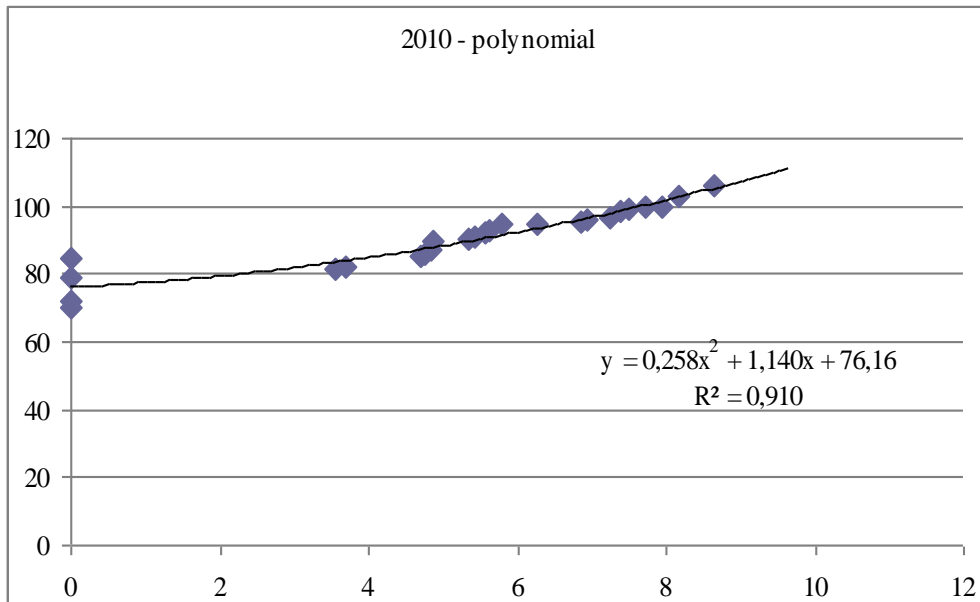


Fig.2. Polynomial regression of correlation dependence in 2010

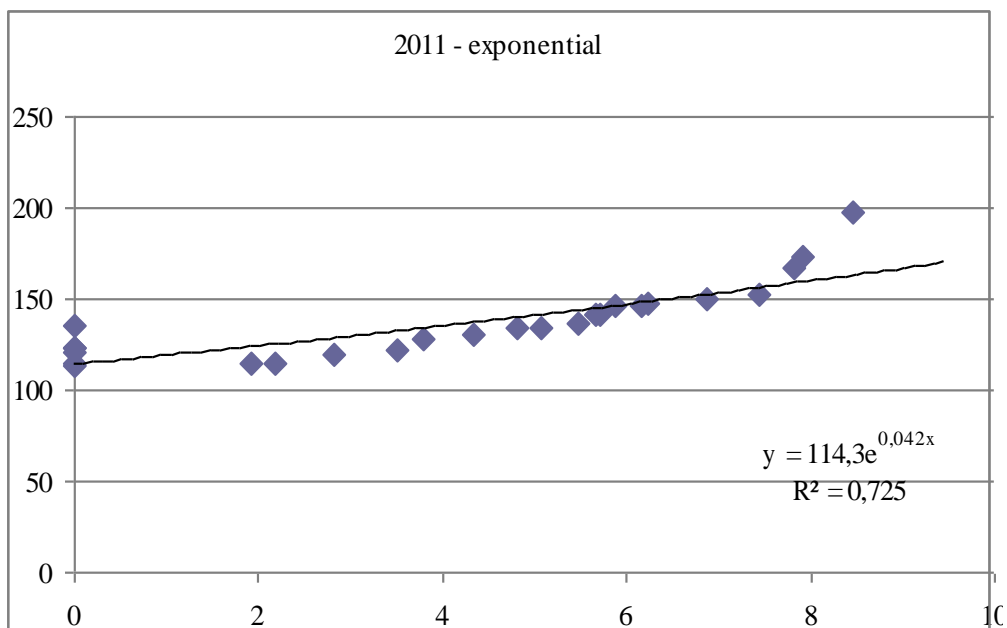


Fig.3. Exponential regression of correlation dependence in 2011

Comparing the values of determination ratios for the period 2009-2011, it is obvious that the ratio almost reaches the value of 1 in 2009, whereas the lowest values of the ratio are observed in 2011, although the values of the determination ratio equaling 0,725 is notably higher than the critical 0,6.

Conclusions. The foundation of marketing is made of marketing research, primarily client research. To ensure the influence on the market of agricultural aviation operations results of regression analysis shall be used. The results prove verify the correlation dependence of yield enhancement on the cultivated area of farmlands under the condition of agricultural aviation operations.

The correlation may form the basis for marketing information of a special-purpose aviation enterprise as an encouraging argument for possible customers of such service, mainly agricultural enterprises.

REFERENCE LIST

1. Михайлов Г.М., Марінцева К.В. Ефективність формування парку літальних апаратів для виконання сільгоспхімробіт. [монографія] / Г. Михайлов, К. Марінцева. – К.: ДП Видавництво «Зовнішня торгівля», 2010. – 220с.: іл. – бібліогр.: с. 180-200.
2. Ламбен Ж. Ж. Стратегический маркетинг. Европейская перспектива / Ламбен Ж. Ж. ; пер. с фр. – СПб : Наука, 1996. – 589 с.
3. Костромина Е.В. Авиатранспортный маркетинг. [учебник] / Е. Костромина. - 2-е изд., испр. и доп. – М.: Издательство: НИЦ Инфра-М, 2012. – 360 с.
4. Офіційний сайт Державної служби статистики України [Електронний ресурс]. – Режим доступу до док.: http://stat6.stat.lviv.ua/DKS/ukr/themes/themes_all.asp?pr=1
5. Эндрю Ф. Сигел Практическая бизнес статистика: Пер. с англ. [научно-практическое издание] / Эндрю Сигел – М.: Издательский дом «Вильямс», 2004. – 1056 с.: ил. – Парал. тит. англ..