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THE IMPACT OF GRAINS TRANSPORTATION REVENUES ON TOTAL REVENUE: THE CASE OF SERBIA

Ljiljana Kontić[1], Dragan Vukasović[2]

Summary

In this paper the values effects of grain transportation on total revenue have been analyzed. The subject of the study is one Serbian cargo company. Main aim of this research was to assess the impact of revenue from grain transportation on total revenue in order to extrapolated future trends in cargo sector. The starting hypothesis was that aforementioned revenue had significant influence on total revenue growth in observed period. Mixed methods research has been used for data collection and analysis. The results revealed that the movement of the total revenue growth in the coming years if they implement the necessary measures are in the extrapolation of this function presented, provided that all other variables remain unchanged. Limitation of the study were country's specific factors, and single case study analysis despise the fact that observed company had dominant market share. Future study will include other companies from similar transition countries.

Key words: *total revenue, the grain transportation, business result, modeling, agriculture sector*

JEL: *C4, L92, Q14.*

Introduction

Accounting systematically and continuously, provide the basis for a quality measurement results as the material basis to maintain earning capacity, growth and development of the company for rail transport. As a product of formal accounting treatment, processing, hiring and spending all factors of economic, total revenue is an expression of the performance of business activities taken for the realization of the business objectives. In the revenue statement total revenue and its structure is one of the key segments of

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managing business result.

World production and trade of cereals have grown over the last twenty years. In developed countries 75% of grain production is for animal food, but in developing countries over 90% of production is for human food. The grain is main source of the calorie value in peoples consumption. The level of consumption is determinate by production volume, climate conditions, and nutrition habits in observed country (Vlahović, 2015). The importance of agriculture in Serbian economy is higher than European countries, member of European Union (Simonović et al., 2012).

The main grain are: barley, corn, oats, rye, sorghum, and wheat. The leader in grain production is China (522 mill. tons or 20% of the world production).

An efficient transport system in agriculture means that transported material flows smoothly without the influence of the above and subsequent work operations and without loss of total quality. The specificity of this transport is not affected by transport and storage conditions, over 80% of the material undergoes a change in physical properties, the quality during transportation, and storage. Quality characteristics of grains of: moisture content, bulk density, by impurities, damaged grains, grain cracking, susceptibility to breakage, germination. In transport of cereals, there are standards for assessing the quality of goods.

The main aim of this paper is to assess the impact of revenue of grain transport on total revenue in one cargo company. Serbia is a case in point. The starting hypothesis is followed:

H_0: The increase of revenue from grain transport will increase a total revenue in Serbian cargo company.

The paper is structured as follows: next section introduced methodology and data. Second section devoted to theoretical background, Section 3 elaborated research context, Section 4 presented results and discuss them. Final part is devoted to conclusion of this study.

Methodology and data

The latest trend in study design showed integration of qualitative and quantitative methods i.e. mixed method (Creswell, 2003). The main advantage of mixed methods research are followed (Vitale et al., 2008):

- detailed analysis of collected data,
- providing the new insight in research phenomena, and
- enables confirmation of each information.

Gathering relevant and accurate data is critical to the success of any study (Vitale et al., 2008). The data in this study were collected from three sources: (1) national statistic database, (2) company's documents, and (3) observations of the company's activities.

Observation is used as a qualitative collection method in this research to provide context for quantitative data. Data was also generated from a vast array of company archival information that included financial reports, internal memoranda, and strategy documents.

This study used a case study, as the research strategy, which is appropriate because a pilot case (Yin, 2009). Moreover, one review found that case studies were the most popular qualitative research strategy primarily due to its potential to generate novel and groundbreaking theoretical insights (Piekkari et al., 2009).

The brief review of the Company named SK is presented in Section *Research Context*.

Quantitative methods embodied descriptive statistics, regression analysis, ANOVA, and econometric modeling. Statistical methods have been used to formulated a regression model. Descriptive statistics includes methods of collection, processing and presentation of information, as well as methods for determining the parameters of the basic set. Inferential statistics methods include explaining the variability of the phenomenon with the help of statistical indicators and statistical inference based on a sample.

Transport of grain by rail is seasonal i.e. there is the large variation in transport. Therefore, it is critical to systematize transportation the accounting information of the business income then to display them on a quarterly basis. The presentation of data on quarterly base can show a clearer picture of the movement of these two variables.

Operating result arises as a result of differences in the value of the relationship of matching revenues and expenses, realized in a particular accounting period. Each of these two categories of aggregated value expressed from whose mutually opposed relationship stems operating result represents the size of the complex to the amount of which depends on many factors. Thus, the total income depends on the size, type and structure of the transport of cargo, and the conditions of competition in the market as well as the height of the price of transport.

On the other hand, the amount of expenses is determined by the type of transport capacity transport, prices, quality and cost consumption of inputs and transport efficiency work.

Here are listed only a small number of factors, in addition, there is often a degree of dependency relationships between certain factors of income and expenditure. For these reasons, the management of total revenue is a complex job that requires caution and careful use of analysis of total income in the process of decision making and accurate periodic planning and control of the execution plan of total revenue. Provided with two complementary instruments therein which identify problems and directs the directions of their research and the resolution is to analyze the structure of the total revenues. It is a test of the acceptability of certain business decisions and periodic plan of total revenue, from the standpoint of the basic objectives and criteria.

Flexible planning and control of total income and its structure requires adjustments of realized the scope of activities, which requires detailed information that does not exclude needs, but requires the use of the possibilities projections of an approximate value.

Theoretical background

In the international trade of agriculture products, Serbia participated with 0.10% (Vlahović, 2015). It is important to point that agro industry has great potentials in Serbia regarding soil, human potentials, agro ecology, capacity of industry and others. The export of grain with 24% of total agro industry goods in Serbia had significant portion.

Bilateral cooperation at region can be benefit for increase exchange of agriculture products. At the period 2007-2011, Serbia had surplus of of approximately 288.6 million USD, especial in the exchange of grain (Cvijanović et al., 2012).

To increase export of grains from Serbia, it is necessary to implement concrete action such as the following (Vlahović, 2015):

- To increase physical volume of production,
- Change in agriculture structure,
- Introduce subventions for inputs,
- Increase the quality of products,
- To create a brand
- To tailored export programs regarding customer needs,
- Growth of organic food production,
- To intensive marketing activities,
- Competition growth.

The production of grain in Serbia was 10.8 million tons in 2014. Total revenue was over four billion US dollars (48% was revenue from grain). In 2014, the dominant culture is corn (8 mill. tons), followed by wheat (2.4 mill. tons), and barley (323,000 tons).

Therefore, some studies in agriculture in Serbia have been focused on corn and wheat (Mutavdžić et al., 2016; Stevanović et al., 2012).

One study has determined the development of the production of wheat and corn by Serbian regions (Stevanović et al., 2012). The criteria were the characteristics of land capacities, volume of production and economic development. The cluster analysis pointed on two major regions. First cluster located in South East Serbia and there are developing region. Second cluster is developed one located in Vojvodina, South Backa district ((Stevanović et al., 2012).

The analysis of corn and wheat prices in ten years period (1994-2014) revealed that average price of corn had been varied by 30% although average price of wheat has been varied by 20% (Mutavdžić et al., 2016). The researchers, using econometric model, predicted prices of corn and wheat in period 2016 to 2020 as followed: expected price of maize will be from 77 euro/ton to 199 euro/ton, and predicted price of wheat will varied in the interval from 77 euro/ton to 159 euro/ton (Mutavdžić et al., 2016).

In Serbia, maize is a basic food for animals. The main producers are individuals and families. The profitability of the maize production is determinate by ratio price of maize to costs.

The decrease of wheat production is evidenced in past years in Serbia. The wheat is a main ingredient of bread production. Wheat yield is 3.9 tons per hectare, which is at the level of the European average.

The trade of both culture, maize and wheat, has been realized through organized network. The leading buyer is Direction of good reserves, mills, and companies which trading grains. One study showed that sales revenues in both sales channels for the agricultural products growing (Vukadinović et al., 2017).

There is linear correlation between production volume of corn and wheat and national income from agriculture in Serbia (Stevanović, 2009).

"There is potential for loss throughout the grain harvesting and marketing chains. During stripping of maize grain from the cob, known as shelling, losses can occur when mechanical shelling is not followed up by hand-stripping of the grains that are missed. Certain shelters can damage the grain, making insect penetration easier. For crops other than maize, threshing losses occur as a result of spillage, incomplete removal of the grain or by damage to grain during the threshing. They can also occur after threshing due to poor separation of grain from the chaff during cleaning or winnowing. Incomplete threshing usually occurs in regions with high labor costs, particularly at harvest time, when labor is too scarce and expensive to justify hand-stripping after an initial mechanical thresh. Certain mechanical threshers are designed only for dry grain" (available at http://www.cargohandbook.com/index.php/Grain).

It is important to note that the grain are produced on seasonal basis. In many countries there is only one harvest per year.

"There have been numerous attempts by donors, governments and technical assistance agencies over the years to reduce post-harvest losses in developing countries. Despite these efforts, losses are generally considered to remain high although, as noted, there are significant measurement difficulties. One problem is that while engineers have been successful in developing innovations in drying and storage these innovations are often not adopted by small farmers. This may be because farmers are not convinced of the benefits of using the technology. The costs may outweigh the perceived benefits and even if the benefits are significant the investment required from farmers may present them with a risk they are not prepared to take. Alternatively, the marketing chains may not reward farmers for introducing improvements. While good on-farm drying will lead to higher milling yields or reduced mycotoxin levels this means nothing to farmers unless they receive a premium for selling dry grains to traders and mills. This is often not the case" (available at http://www.cargohandbook.com/index.php/Grain).

The main condition of efficient grain transport is to create low costs as well as quality of grain. The portion of transportation cost in total costs can reach 30%. Transportation

cost depend on destination, volume, speed, and cost of transportation vehicle. In this study, we focused on railway transport of grain.

According to Association of American Railroads (2016), railroads are critical factor in grain transportation.

There are numerous benefits from investing in railroad, but the main are: positive impact on real income, lower trade cost, and increase international trade (Donaldson, 2010).

The U.S. Department of Agriculture's National Agricultural Statistics Service publicized the following data on grain production and consumption: "The USA average annual production from 2006 to 2015 was 542 million tons" (Association of American Railroads, 2016, p. 1).

According to same source, "the value of grain production —the average price received by farmers for grain multiplied by grain production — has trended higher over the past 15 years. Meanwhile, rail revenue from grain as a percentage of the value of farm production has been trending downward over the same period. The most recent couple of years have gone against these trends because grain prices have fallen since 2013" (Association of American Railroads, 2016, p. 10).

Table 1. presents goods transportation in Republic of Serbia in period 2013-2015.

Table 1. Goods transportation in Republic of Serbia

Year	Goods transportation in tons	Tons/km in mil.
2013	24348	7505
2014	24709	7612
2015	26554	8014

Source: Statistical Office of Republic of Serbia (2016)

EBRD Transition report (2017) revealed that most positive effects in railways sector have been evidenced in Croatia and Slovak Republic. The major shift in cargo transport were in Poland. Ukraine made positive steps in modernization and restructuring railways sector. They used Poland's model and the same leading manager. Table 2 illustrates sector indicators in agribusiness and railways transportation in selected transition countries.

Performance of agribusiness in Serbia is less than three that is similar to other transition countries (i.e. 3- on scale from 1 to 5). Railways got grade 3, good that is average grade. Other transition countries selected from EBRD Transition report got grades from 2+ to 4-.

Table 2. Sector indicators in agribusiness and railways in selected transition countries in 2016

Country	Agribusiness	Railways
Croatia	3	3-
Estonia	3+	4
Hungary	4	3+
Latvia	3	4-
Lithuania	3+	3
Poland	3+	4-
Slovak Republic	3+	3+
Slovenia	4-	3
Albania	3-	2
Bosnia and Herzegovina	3-	3+
Bulgaria	3	3+
Cyprus	3	N/A
FYR Macedonia	3-	3-
Greece	4+	3-
Kosovo	2+	3-
Montenegro	2+	2+
Romania	3	3+
Serbia	*3-*	*3*
Russia	3-	3

Source: EBRD Transition report (2017)

Research context

The "Serbian Railways" is a joint stock company, placed in Belgrade. The main activities are engineering activities and related technical consultancy. The major shareholder is the Republic of Serbia. At the end of 2015, 137 employees worked in the Company.

On July 2015, the Government of Serbia made a decision to conduct a organizational restructuring. Therefore, the organizational decomposing of "Serbian Railways" embodying the establishment of three joint-stock companies: "Serbian Railways Infrastructure", "Wagon Serbia" and "Serbia Cargo".

The main results of the organizational restructuring are increased productivity, better working moral, decrease of employees' fluctuations, and growth of efficiency and effectiveness in the Company (Kontić, 2007).

The conventional railway transport consisted of wagon-load consignments. The transport of wagon-load consignments intended to the market of large quantities of goods such as bulk freight, chemicals, products and semi-products in the area of metallurgic, construction and civil engineering industry, freight on pallets, etc.

Various services such as of combined transport of containers (length: 20 feet or more), trailers, semi-trailers, swap bodies, road vehicles (rolling road) and other intermodal transport units, in block trains, full load container trains or individual consignments

of containers are provided by Company SK. The transport is realized both in freight wagons owned by railway and in private O freight wagons.

In Table 3. a brief Income statement in the observed Company SK is presented.

Table 3. Income statement in Company SK

No	Description	1.1.-31.12.2016		Plan 2017
		Plan	Realization	
I	REVENUES	**10.423.867**	**10.656.161**	**10.177.139**
1.	Business revenues	10.263.630	10.374.289	10.055.205
2.	Financial revenues	89.141	37.007	40.361
3.	Other revenues	61.096	224.398	77.472
4.	Retained profit	10.000	20.467	4.100
II	EXPENSES	**10.162.023**	**10.137.108**	**10.120.866**
1.	Business expenses	9.979.436	9.731.487	9.637.254
2.	Interest expenses	31.752	45.337	101.057
3.	Other expenses	41.220	290.616	342.353
4.	Lost	109.615	69.668	40.201
III	PROFIT/LOST BEFORE TAX	**261.844**	**519.053**	**56.273**

Source: Business Report SK (2017)

Results with Discussion

Observation of Company SK provided the following information from the department of accounting and variables related to the total income and operating revenues from the transportation of grain in ten years.

In this study, quantitative methods that have been used including descriptive statistics, regression analysis, ANOVA, and econometric modeling. The results of descriptive statistics presented in the Table 4.

Table 4. Descriptive statistics

Variables	TOTAL REVENUE
Mean	5122856850,0000
Median	5128326500,0000
Mode	230623000,00[a]
Std. Deviation	2173973071,61702
Variance	4726158916115925000,000
Skewness	-0,522
Kurtosis	0,827
Minimum	230623000,00
Maximum	9718373000,00

Source: Authors' calculation

Regression is calculated as a method of statistical analysis that we have two statistical series that express information in a homogeneous characteristics of different phenomena or on the different characteristics of the same phenomenon.

Table 5. Regression analysis

Model Summary The independent variable is Value of grain transportation

R	R^2	Adjusted R^2
0.220	0.048	-0.003

Source: Authors' calculation

The results of ANOVA are presented in Table 6.

Table 6. ANOVA

The independent variable is Value of grain transportation

	Sum of Squares	df	Mean Square	F
Regression	8930436031423.662	2	4465218015711.831	0.942
Residual	175389761697097.440	37	4740263829651.282	
Total	184320197728521.100	39		

Source: Authors' calculation

Variance analysis has enabled testing the hypothesis H_0 that $\beta = 0$, as well as to test linear regression. In this case, it is necessary to prove that middle values μ for any X are linear.

If F distribution are less than $F_{(\alpha;1 \text{ i } n-2)}$ the hypothesis H_0 can be accepted.

In this case F = 0.942 shows that they is not statistical significant differences between variables (see Table 7).

Table 7. Variance analysis

Coefficients	Unstandardized Coefficients		Standardized Coefficients	t
	β	Std. Error	β	
Value of cereal transportation	-4.262	65.342	-0.042	-0.065
Value of cereal transportation ** 2	3.179E-7	0.000	0.260	0.407
(Constant)	4787259416.145	1089146412.516		4.395

Source: Authors' calculation

If two independent variables were observed, and if they can establish a regression model square shape of a parabola, then it is a simple parabolic correlation square shape of a parabola.

Regression equation expresses the average measure of variation depending on the variable size of Y as a function of changes that have occurred within the size of the independent variable X. The equation of the simple linear regression of the curvilinear shape of the parabola to the square dependence of the total revenue from the value of

the transport of grain as follows:

$$Y = 4787259146.145 - 4.262X + 3.179^{-7}X^2$$

where is:

Y - total revenue

X - value of grain transportation

Based on the distribution of the diagram it can be concluded that there is a curvilinear correlation square shape of a parabola, because the original pairs of data lines can be adapted in a parabolic curve of the second degree. It can be seen that the correlation is weak, because the points in the diagram of dispersion not grouped around an imaginary parabola that is interpolated between points in the diagram of dispersal.

On the basis of the accounting information which is used in a simple curvilinear regression model, based on the obtained model function is made of the same extrapolation to predict the movement of the total revenues, depending on the movement of the operating revenue of transportation of grain.

If the value of the transportation of grain increase by 5% in January 2018 compared to the last quarter of 2017, total revenue will amount is follows:

$$Y_{2018/I} = 4787259146.145 - (4.262x66719920) + (3.179^{-7}x66719920^2) = 1.33445x10^{12}$$

If the value of the transportation of grain increase by 1% in January 2019 compared to the first quarter 2018, total revenue will be:

$$Y_{2019/I} = 4787259146.145 - (4.262x66719913) + (3.179^{-7}x66719913^2) = 1.36118x10^{12}$$

If the value of the transportation of grain increase by 1% in January 2020 compared to the first quarter 2019, total revenue will amount to:

$$Y_{2020/I} = 4787259146.145 - (4.262x67387112) + (3.179^{-7}x67387112^2) = 1.38845x10^{12}$$

From the extrapolation model it can be concluded that the movement of the total revenue growth in the coming years if they implement the necessary measures are in the extrapolation of this function presented, provided that all other variables remain unchanged. Here comes the theoretical value, which means that in practice to the real model can be reached only by combining and introducing the model more dependent variables and the same observed in their mutual interaction.

Conclusion with Recommendations

Total income of the company for cargo transport by rail represents the end result of many decisions planning and control by managers, related to the use and combination of resources available in the global market where the company achieves its mission. Analysis of the total revenues required knowledge of the total revenue and its structure

and operation of the factors that influence the change in these functions. Since this is on the operation of a number of one-way or opposing factors which are, caused by the change of the total revenue from its structure and the functions of which follows at the end of the final result of the operation of arrival analysis that synthesizes all of these effects is a complex management undertaking. In an effort to provide as accurate as possible answers to the behavior of the total revenue and its structure under the influence of various factors and circumstances, economic analysis in theory is turned on and the statistical methods that are used in the analysis, and the projection of future developments of economic parameters.

In this paper, the model free curvilinear regression analysis and ANOVA test in regression analysis is used in order to project the total revenue in one cargo company depending on trends in operating income resulting from transport of grain.

The management of cargo company in statistical analysis can see a powerful tool to improve the performance of enterprises and the projection of the economic parameters in the future.

Main limitation of proposed model is the theoretical value of revenue, which means that in practice, the real model can be reached only by combining and introducing the model more dependent variables and the same observed in their mutual interaction. Future study will include more factors in the theoretical model proposed in this study.

The production and transportation of grain is a growing business in the world. Serbia could take better position regarding its potential, but it is necessary to implement significant changes. Some recommendations are the following:

- To increase grain production by more investment in agriculture,
- Serbian strict law against genetically modified organisms can be promote by aggressive campaign (e.g. Serbian grain are GMO-free product), and
- Decrease a weather risk exposed by farmers.

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UTICAJ PRIHODA OD TRANSPORTA ŽITARICA NA UKUPNE PRIHODE: STUDIJA SLUČAJA IZ SRBIJE

Ljiljana Kontić[3], Dragan Vukasović[4]

Rezime

U ovom radu analizirani su efekti dodate vrednosti od transporta žitarica na ukupne prihode. Predmet istraživanja bila je jedna kargo kompanija iz Srbije. Osnovni cilj rada bilo je proceniti uticaj prihoda od transporta žitarica na ukupne prihode kako bismo predvideli buduća kretanja u kargo sektoru. Početna hipoteza bila je da gore pomenuti prihod ima značajan uticaj na rast ukupnog prihoda u posmatranom periodu. Kombinovani metodi istraživanja korišćeni su za prikupljanje i analizu podataka. Rezultati su pokazali da se može očekivati rast ukupnog prihoda u narednom periodu, pod uslovom primene neophodnih aktivnosti ibez promena u drugim varijablama. Ograničenja studije tiču se specifičnih opštih faktora i obuhvata jedne kompanije iako je njeno tržišno učešće dominantno. Buduća istraživanja obuhvatiće nekoliko država iz sličnog tranzicionog okruženja.

Ključne reči: *ukupan prihod, transport žitarica, poslovni rezultat, modeliranje, poljoprivreda*

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ECONOMICS OF AGRICULTURE

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