

Alternative network businesses and approaches of operative income prediction within YouTube channel case

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Abstract

Through the article, we shall be identifying new methodologies for Fundraising calculation through various projects to provide young people with the skills necessary to assess business plans and develop a funding strategy for an entrepreneurial venture with the help of YouTube channel. Considering the economic situation due to COVID 19 many youths are finding employment opportunities almost non-existent, but taking into consideration that many youths have innovative ideas for starting their own business but lack the skills and the financial stability to realize their ideas. Through this article, we shall delve into the author's approaches to analyzing and forecasting returns of funding available across the entrepreneurial life cycle for learn how to identify the most appropriate source for each stage, particularly for alternative network businesses within YouTube channels. Taking into consideration the importance of research and development in today's society away from the traditional markets as a result of the article we create a methodology that is accessible to all interested in business development and funding opportunities for identifying and working on innovative ideas taking into consideration digital opportunities which open new markets, identify opportunities in digital transformation time and COVID 19 crisis which will lead to better employment opportunities and security.

Keywords

Networking business, digitalization, alternative financial approaches, YouTube channel, incomes, monetization, profitability, forecast, Google AdSense

1. Introduction

The Covid crises has created social problems and economic issues which have long-term negative impacts on society especially business and socio-economic sustainability. However, life has to move on and what we have learned from this crisis is that new opportunities have been identified which will change the way we work and to prepare ourselves for new opportunities. It has also exposed the need for further IT knowledge and use to further facilitate online study and work. In such conditions, the role of social networks is growing rapidly in the modern world. The most popular service that provides users with services for storing and displaying their video resources is YouTube video hosting, founded in 2005. It is an important platform for users to communicate with each other and with certain expert environments. According to the global ranking in the average number of visits per

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month, in 2019, YouTube video hosting ranked second in the world (24.3 billion visits per month). In the first place was the site google.com (60.5 billion visits per month). Also in the top 10 sites in the world were social networks Facebook, Twitter, and Instagram [1]. At the same time, it should be noted that the development of social networks in the world is geographically specific. For example, YouTube became one of the first social platforms to be blocked in China due to the government's strict censorship policy. To date, over 10,000 websites have been blocked in China, including Facebook, Twitter and even Google, including Google Maps and Gmail [2, 3].

2. Analysis of recent publications and definition of research objectives

The problem of web analytics of Internet resources has been studied by such domestic scientists as: I. Egorova [4], I. Mudra [5], A. Istomin, I. Ponomarenko [6-8] and others [9-11]. But, despite the high practical significance of this issue, the scope of scientific work on this subject is quite limited. This is what determines the relevance of real research [12, 13]. The commercial basis of YouTube is advertising, the revenue from which in 2019 amounted to more than \$ 15 billion, or almost 10% of Google's total revenue [14]. The built business model [15] also financially stimulates authors to develop their channels through the production of quality and useful content and productive interaction with the audience. It is managed through a creative studio, in particular, the analytics section. YouTube provides complete statistics on the results of the promotion of the channel as a whole and individual videos on dozens of indicators. The most important of them are singled out, however, the method of their analytical processing is not publicly available.

3. Development of methods for forecasting business income on YouTube channel

Through statistical analysis of data and comparisons, we found the relationship between the main indicators of YouTube analytics, which is schematically shown in Fig. 1.

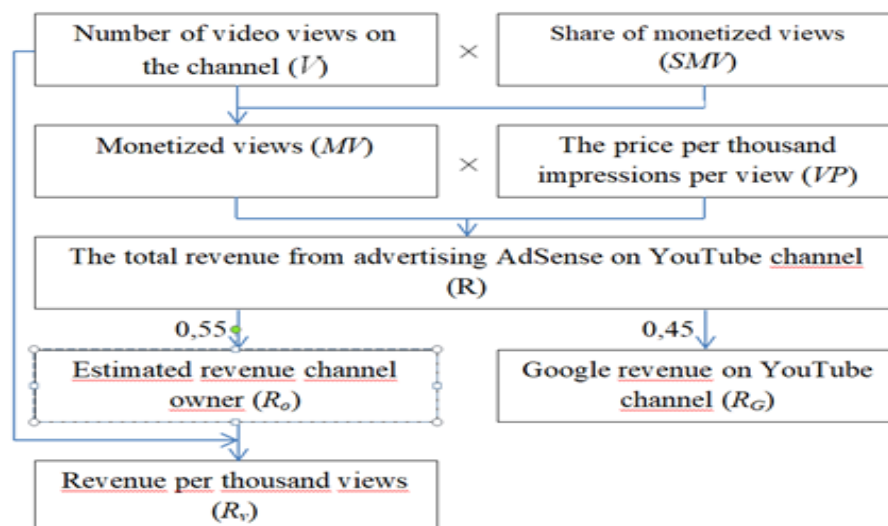


Figure 1: Some main indicators of YouTube analytics correlation

As you can see, the main indicator of YouTube analytics is the number of video views on the channel. Views are considered monetized if they are accompanied by at least one AdSense ad unit. Not all, but only a certain proportion of them are monetized. This share is not a constant value and depends on many factors. Consider them in more detail.

3.1. The popularity of the niche occupied by the channel among viewers

Advertisers are interested in broadcasting advertising to a larger solvent target audience. Each topic occupies its own market capacity, taking into account such features as: the country in which viewers live; their gender and age; the types of devices and operating systems used for browsing; traffic sources, etc.

It should be noted that by placing ads on the YouTube channel, Google AdSense seeks to maximize its conversion. That is, advertising is considered the most successful if it allows the viewer to go to the advertiser's site and perform a set of targeted actions. For example, you bought a product or browsed certain web pages. This is possible only if the theme of the ad coincides with the theme of the YouTube channel, that is, arouses the interest of viewers.

Thus, the wrong choice of niche at the beginning of the channel significantly affects its profitability in the future.

3.2. The number of advertisers who want to promote their brand or products

It depends on:

- The general economic situation in the country;
- The seasons, which directly affect the volume of advertising budgets of companies. It is known that at the beginning of the year, advertising budgets are limited, gradually increased, and maximize at the end of each year;
- Sales seasons, which fall most in October-December each year;
- Cycles of the political life of a country, when on the eve of regional elections the share of political advertising increases significantly, etc.

COVID-19, general quarantine restrictions in many countries in the first half of 2020, including the transition to distance learning, contributed, firstly, to a significant increase in educational video views, and secondly, to a reduction in the share of monetized views due to complex economic situation, uncertainty and reduction of advertising budgets of many companies.

3.3. Viewer loyalty to the channel

This is measured by the following set of factors:

- Quantity, quality, and dynamics of subscribers. Owners of some channels use questionable methods to promote them, in order to increase the number of subscribers. Such a random audience significantly reduces the quality of the channel from the standpoint of Google AdSense, because it is not interested in watching future videos;
- The intensity of interaction between viewers and the author of the channel through comments and video evaluation;
- The average duration of video viewing, which directly depends on the quality of the material, informativeness, and interest of the audience. For educational videos, this factor also depends on whether the viewer has received an answer to the question for which the viewing was performed. If the answer is given at the beginning of the video, it reduces its average viewing time. On the other hand, an excessively long introductory part can also worsen this figure;
- The number of views among subscribers at the beginning of a new video can affect its promotion, when YouTube automatically recommends it to new viewers, and so on.

3.4. Channel promotion with SEO-optimization

One of the main components of traffic on the channel is search traffic. From the point of view of monetized views, incorrect SEO optimization can worsen this indicator. If the title, description, and

search tags don't match the content of the video, it helps reach a non-target audience. Accordingly, your interaction with it and your conversion with advertising will deteriorate.

It should be noted that Google does not reliably disclose all factors and their impact on the promotion of the channel. The above classification was obtained personally by the authors based on his own experience.

Depending on supply and demand, advertisers pay Google a certain price for a thousand impressions on their ads, while users watch videos. Thus, a channel's total revenue from AdSense advertising consists of the product of the number of monetized views and the cost per thousand impressions per view.

The income is distributed between the owners of YouTube channels and Google in the ratio of 0.55 / 0.45. In terms of analytics, it is called the estimated income of the owner.

If we divide the estimated income of the owner by the number of views, we get another key indicator - the income per thousand views. This indicator is the most informative for channel owners, and is shown in Fig. 1 diagram shows the mechanism of its formation.

Further analytical processing should include statistical analysis of the dynamics of the considered key indicators. Educational activity, which is the main direction of the researched resource, during the calendar year has a certain cyclical nature, which is associated with the organization of the educational process. This directly affects the dynamics of video views, which is shown in Fig. 2.

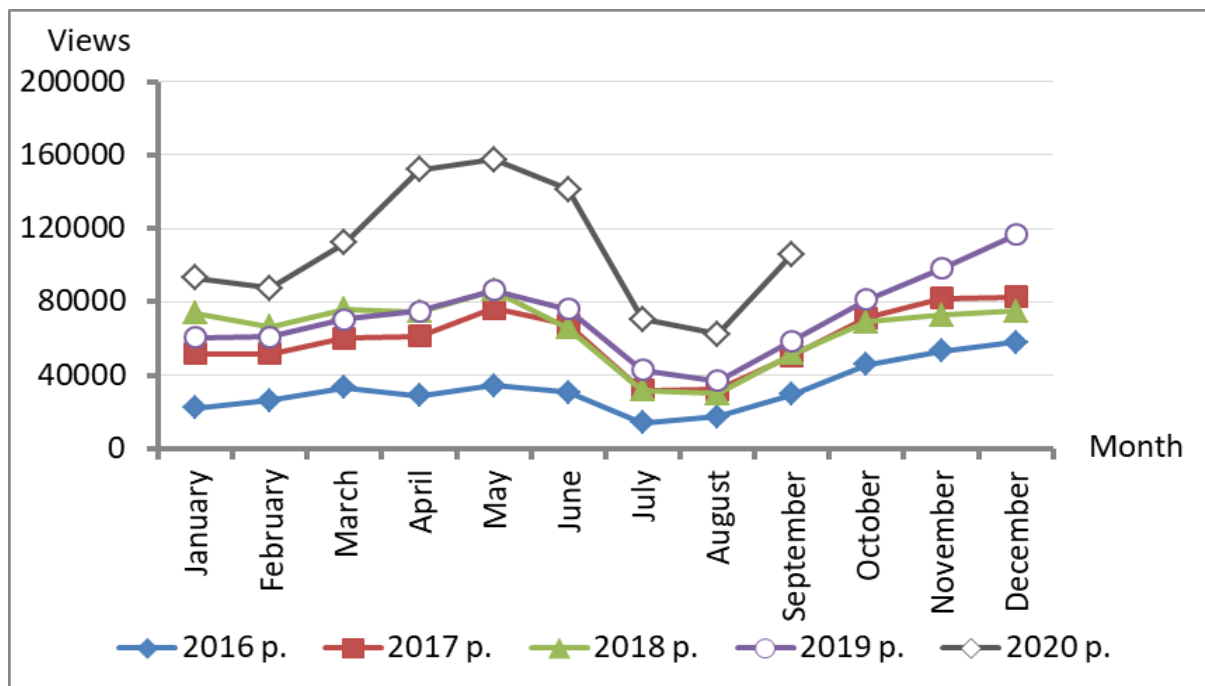


Figure 2: Recurrence of reviews by years, during 2016-2020

This resource has existed since the end of 2014, however, small statistics of views at the beginning of the life cycle, which increases the impact of random factors, did not allow to speak about the presence of any dependence for this period. However, since 2016, the monthly statistics of video views on the channel exceeded 20 thousand, so these data were included in the review. Accordingly, from fig. 2 it is possible to allocate some tendencies in dynamics of the investigated indicator:

1. Video views during the year are cyclical. From January to May each year there is an increase in the target. Further, from June to August there is a long-term decline caused by summer vacations. The resumption of growth dynamics begins in September and lasts until the end of the year;
2. Each following year, there was a gradual increase in average monthly views, while maintaining the above cyclicity. The slowdown in 2017-2019 was caused by the low activity of the authors and a small number of new videos;

3. In COVID time 2020, due to the mass transition to distance learning, the popularity of the channel, compared to other years, has increased almost 2 times. In fact, this means the viability of this niche.

Given these trends, we can conclude that there is a general trend in the development of this web-resource. In addition, it is characterized by seasonal fluctuations with a period of 1 year. Cyclical development is a characteristic feature of YouTube channels and other areas. Therefore, the analytical approach considered in the work is relevant when conducting statistical analysis of any similar web-resource.

The methodology for predicting the number of views is based on the fact that this time series contains both a systematic component and random deviations. In turn, the systematic component is formed on the basis of the general trend and seasonal fluctuations. That is why the priority is to determine this trend using the least squares method. For this purpose, linear, power and exponential forms of dependences were studied.

Regarding power regression, it took the form of an increasing convex curve, where the growth rate slowed down over time. Given the existing dynamics of the target indicator, this dependence did not reflect the existing trends in the phenomenon under study.

The main choice was based on linear and exponential forms of dependence. The latter, taking into account the seasonal component and according to Fisher's criterion, turned out to be the most adequate input data. Its analytical form is given in formula (1).

$$Pc = a_0 \times e^{a_1 x} = 30314,831 \times e^{0,023x}, \quad (1)$$

where: Pc - the estimated number of views on the channel per month, units; x - the ordinal number of the time interval.

The corresponding dynamics of views on the channel in 2016-2020 and the constructed exponential trend are shown in Fig. 3.

As you can see from Fig. 3, in contrast to the power dependence of this exponent is concave and increases the growth rate over time. In the context of the transition to distance learning and increasing the emphasis on self-searching information, this trend is most true.

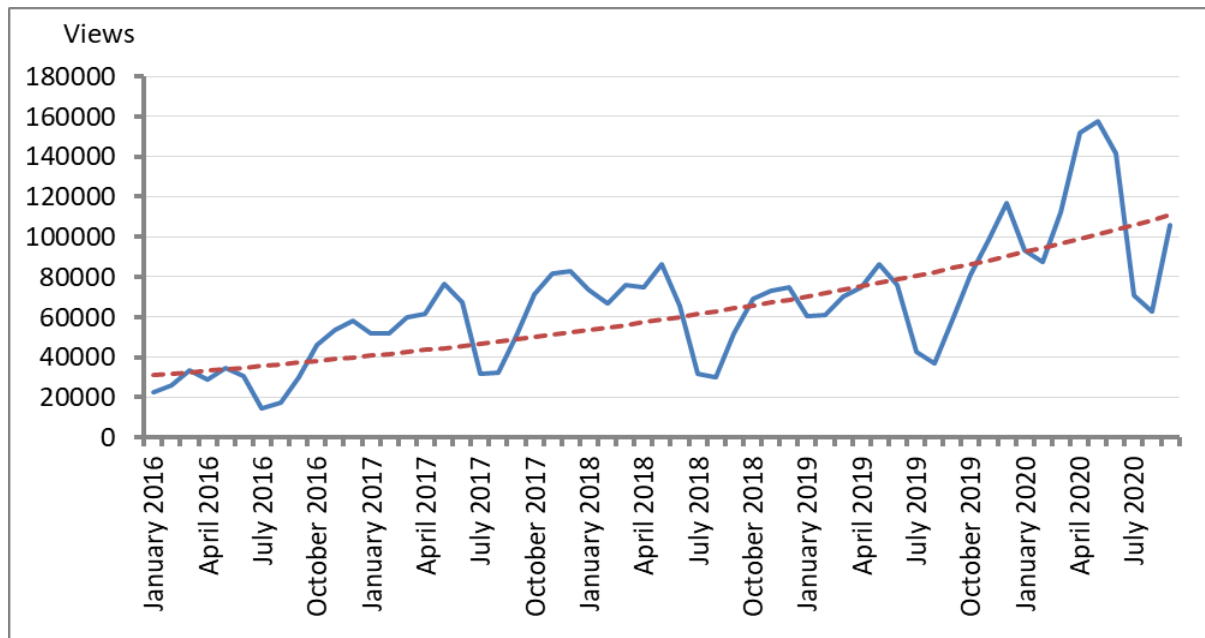


Figure 3: Exponential trend in the number of views on the channel during 2016-2020

To predict seasonal fluctuations relative to the general trend, monthly seasonality indices were calculated. To do this, during 2016-2020, the corresponding relative deviations of the number of views from the trend values were first calculated. Further, on their basis, the calculation of average deviations for each month of the year was performed. Thus, the calculated seasonality indices show

how many times the average monthly views of videos differ from Transparency and are given in table 1.

The table 1 shows that in the first half of the seasonality indices are greater than 1 and are growing. This means that actual views exceed Transparency in both value and growth. However, starting from June, their dynamics change to the opposite and in July-August they reach an annual minimum. Growth resumes in September and lasts until the end of the year.

Table 1
Seasonality indices of video viewing according to 2016-2020

Month	Seasonality index
January	1,048
February	1,012
March	1,183
April	1,305
May	1,434
June	1,159
July	0,561
August	0,533
September	0,860
October	1,156
November	1,293
December	1,355

To predict the number of views on the channel, you must first perform a long-term calculation of the values of Transparency for the future. Given that the duration of the forecast cannot exceed 1/3 of the observation base, we will limit its duration to the end of the current year and 2021. The next step involved adjusting the forecast values of the general trend, taking into account seasonal cyclicity. For this purpose there was used products of Transparency and seasonality indices, in accordance with the months, see table 1.

The obtained results of forecasting the number of views on the channel, taking into account the general trend and seasonal fluctuations are shown in Fig. 4. As you can see, during 2016-2020, the calculated values of Transparency described the input statistics well enough.

To verify the adequacy of the constructed model, Fisher's criterion was used, according to which the inequality $F_{\text{obs}} > F_{\text{tbl}}$. In our case, with 95% reliability, the model corresponds to the dynamics of views, because $(F_{\text{obs}} = 219.61) > (F_{\text{tbl}} = 3.16)$.

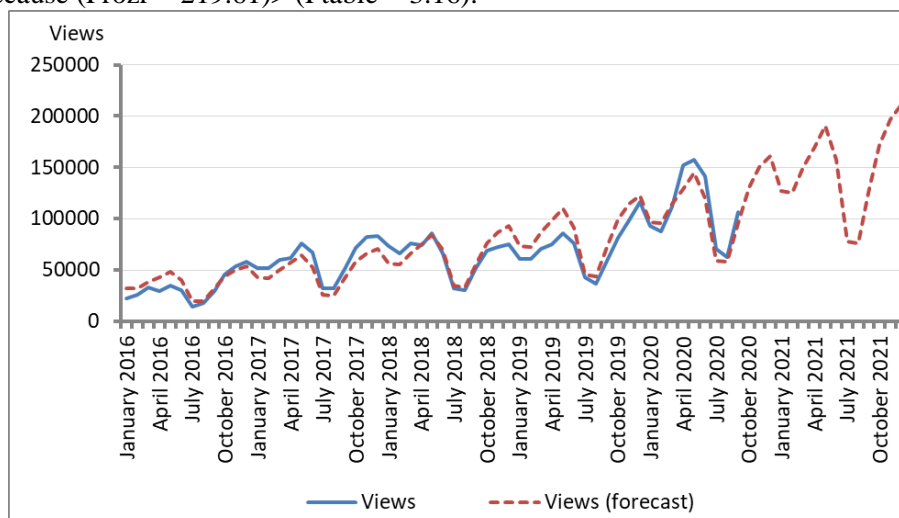


Figure 4: Forecasting the number of views on the channel taking into account the general trend and seasonal fluctuations

For comparison, if we determine the general trend in the form of a linear relationship, then Frozr = 185.64, which indicates a lower level of compliance with the input data than the exponential curve.

The next indicator that directly affects the revenue from business activities at the YouTube channel, according to Fig. 1 is the share of monetized views (*SMV*) among their total number. It is known that not all video views are accompanied by ad impressions. This indicator depends on the number of advertisers who promote products and services that in their content meet the interests of viewers and the theme of the channel at the same time and can take values from 0 to 1. In our case, during 2016-2020 share of monetized views (*SMV*) change from 18 % to 60%, gradually increasing. Moreover, over the past year, its growth rate began to slow down, Fig. 5.

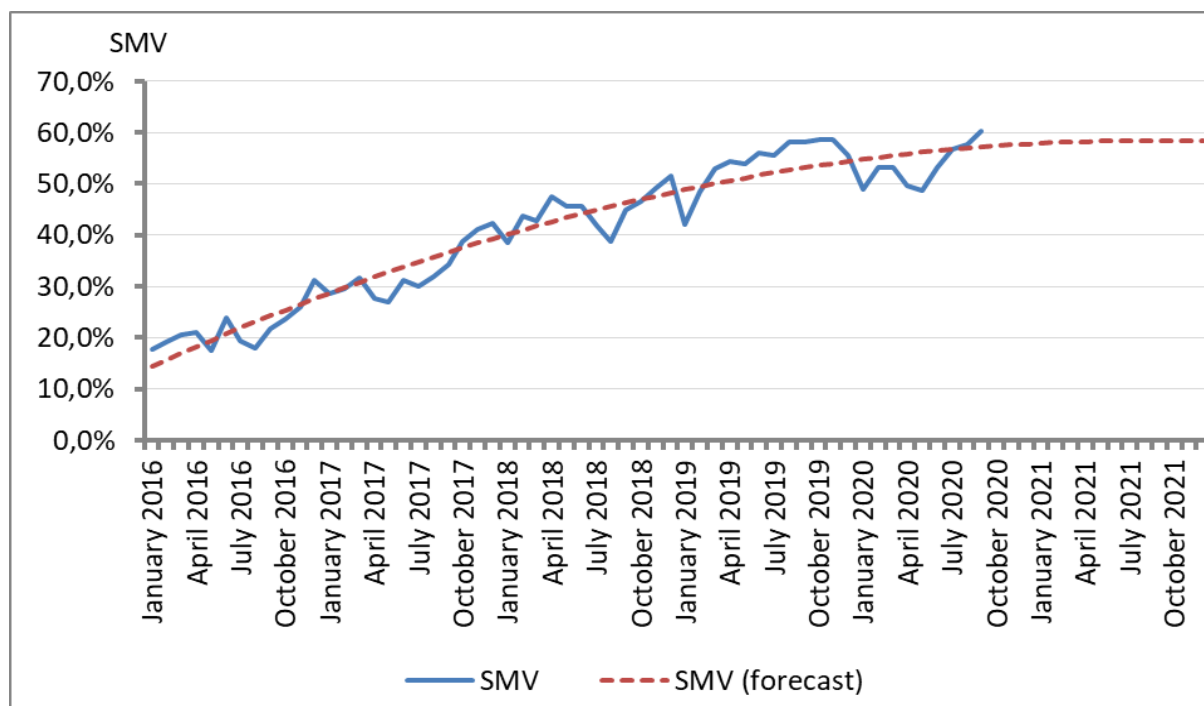


Figure 5: Forecasting the share of monetized views

Figure 5 shows that clearly expressed seasonal fluctuations in this case were not observed. That is why the forecast was reduced to finding a general trend by the method of least squares. The most adequate input was a polynomial of the second degree, which has the form:

$$SMV_{est} = a_0 + a_1x + a_2x^2 = 0,13083 + 0,01325x - \frac{9,67753}{10^7}x^2, \quad (2)$$

where SMV_{est} - the estimated value of the share of monetized views per month, units; x is the ordinal number of the time interval.

The calculated curve at the end of 2021 reaches the saturation stage and takes the value of 58.4%, which corresponds to the current trend of this indicator. However, in a year this forecast will need to be clarified, as SMV_{est} will pass the extreme and begin to decrease. Checking the adequacy of model (2) using Fisher's test showed that with 95% reliability it well characterizes the dynamics of the studied indicator: $(F_{est} = 354,20) > (F_{tab1} = 3,16)$.

Thus, having data on the projected number of views V_{est} on the Transparency channel and the share of monetized views of SMV_{est} , by multiplying them, the number of monetized views of MV_{est} is calculated, the calculation of which is given below.

The advertiser pays a certain price per thousand impressions per view (VP). This indicator is not a constant magnitude and is determined automatically by auction. Its formation is based on such factors as: region, type of ads, channel popularity, etc. The product of MV and VP generates total revenue from AdSense advertising on YouTube (R). However, the dynamics of VP in 2016-2020 does not allow us to forecast this indicator for next year, due to the high level of variation under the influence of random factors, Fig. 6.

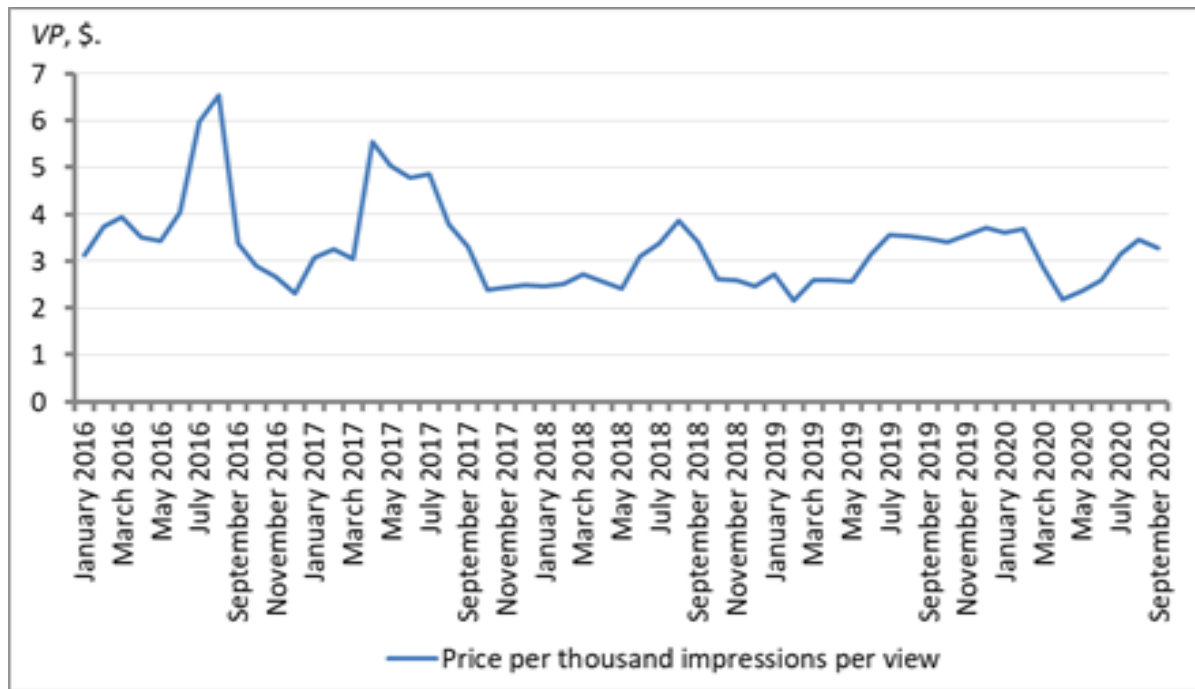


Figure 6: Price dynamics per thousand views: 2016-2020, USD

As can be seen from Fig. 6, in 2018-2020, the scope of VP variation decreased significantly compared to previous years and remained at a constant level in the range of \$ 2. up to \$ 4. Fluctuations do not have an annual cycle. Thus, in 2016-2019 it was possible to observe the maximum values of the price in April-July. In other months of the year there was a long decline. However, in 2019-2020 this trend no longer took place. Given all the circumstances and in order to perform long-term calculations, it is proposed to use the average price for the last 3 years, which was equal to USD. In this case, the monthly estimated values of profitability indicators, due to price averaging will not be true. Therefore, we will reduce them to an annual measurement.

The total revenue from advertising (R) is automatically distributed between the owners of YouTube channels (YouTube) and Google (R_G) in the proportion of 55% / 45%. In turn based on estimated revenue (R_o) and number of views (V), YouTube analysts calculate revenue per thousand views (Rv). This performance indicator is the most important and understandable for users, fig. 7.

Its overall dynamics throughout the study period was positive due to the growing share of monetized views. At the same time, the first half of 2020 was marked by a sharp decline due to the VP .

Summing up the results of previous research, the relationship between the main indicators of YouTube analytics takes the form:

$$Vest = a_0 \times e^{a_1 x} = 30314,831 \times e^{0.023x}, \quad (3)$$

$$SMVest = a_0 + a_1 x + a_2 x^2 = 0,13083 + 0,01325x - \frac{9,67753}{10^5} x^2$$

$$MV = Vest \times SMVest,$$

$$R = \frac{MV}{1000} \times \overline{VP},$$

$$R_o = 0,55 \times R,$$

$$R_G = 0,45 \times R,$$

$$Rv = \frac{R_o}{V} \times 1000.$$

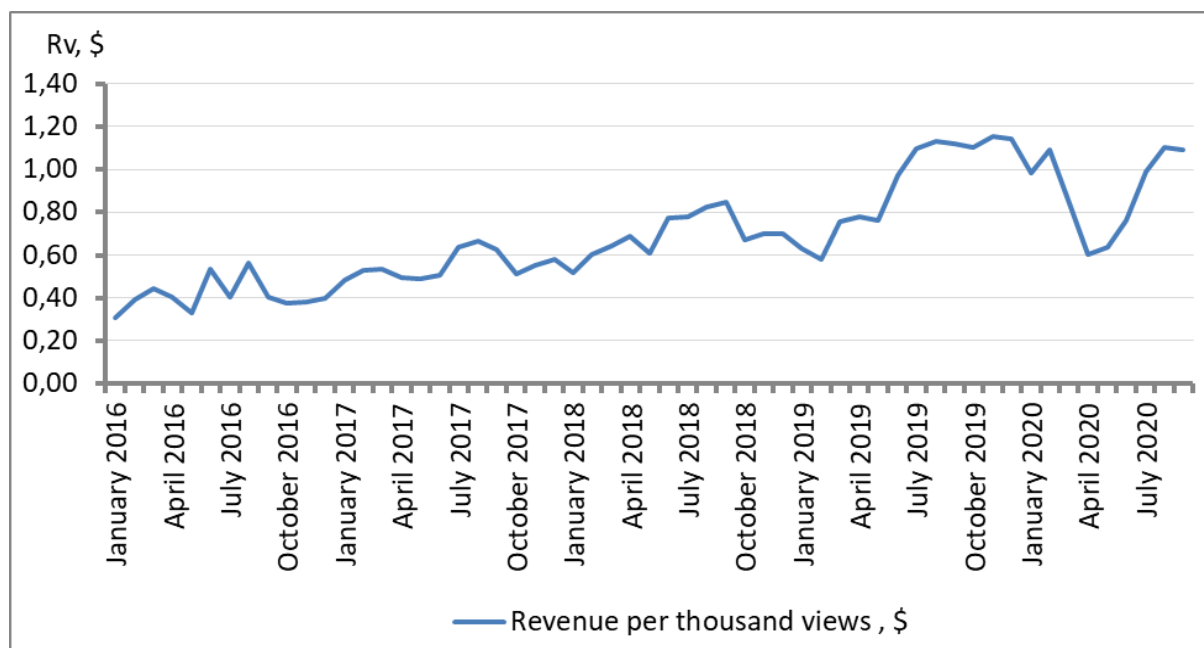


Figure 7: Dynamics of revenue per thousand views in 2016-2020, USD

Analytical calculations show that in 2020, the income from YouTube channel business activities should be about \$ 1,240 if the average price per thousand impressions per view remains at \$ 2.95. Similarly, in 2021 the income will be 1680 dollars. The factor of its growth above the forecast level are the systematic production of educational video content.

4. Conclusions

In this research paper, we consider the problem of web analytics of Internet, and proved, that despite the high practical significance of this issue, the scope of scientific work on this subject is quite limited.

Through statistical analysis of data and comparisons, we found the relationship between the main indicators of YouTube analytics, which include: number of video views on the channel, share of monetized views, monetized views, the price per thousand impressions per view, the total revenue from advertising AdSense on YouTube channel, estimated revenue channel owner, google revenue on YouTube channel, revenue per thousand views. Further analytical processing include statistical analysis of the dynamics of the considered key indicators.

Thus, the scientific novelty of this work is the development of methods for statistical analysis of the YouTube channel based on the constructed causal relationship between analytics and forecasting methods, taking into account the seasonal component.

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