Media content monetization model on the example of micropayments

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Abstract. The article provides a variant of the site content monetization model. It indicates the mechanism for the passage of micropayments. A presented simulation model is necessary for assessing the convergence of the unit economy where a user is a UNIT (web content consumer). A mechanism for selecting metrics that affect the margin value is applied. As a result of experiments with versions, various alternatives of the projected income were obtained without taking into account fixed costs (income from a paying user for different conversion values) and a variant of unit-economy convergence was found. The study made it clear that the constructed simulation model provides a visual opportunity to work with metrics, to obtain and compare the results of unit-economy calculations. Moreover, unit economics, as an analytic method, is becoming popular for presenting information to investors and effective for digital projects. It showed the prospects of this area at the project planning stage.

1. Introduction

Nowadays, the introduction of new technologies leads to the digital transformation of the telecommunications industry. Strategies, business processes of mass communication media (media) are changing [1]. The media is actively rebuilding and creating a digital content sales system. Various models of media monetization are being implemented. According to the source of receiving funds, they can be divided into two groups. The first one is an advertising model characterized by low-quality content, it is conditionally free for a user and the second one is a content delivery model characterized by better content when users pay for access to information [2].

Both large platforms and individual sites with projects uniting groups of authors are offered in the Internet, media content. Platforms carry aggressive, targeted advertising while generating significant profits. The consumer’s fee for using the platform’s content is the time spent for unnecessary advertising and the loss of personal data.

There is another view on the development of the Internet. For example, at the end of 2019, a new project related to the idea of an eco-Internet was launched. It means that a network is free of misinformation and invasion of privacy, where the main value is quality content [1].
Coil, Mozilla, and Creative Commons are currently supporting content monetization. They launched a project with the help of which they plan to change the economy of the Internet. The Grant for the Web Foundation, funded and led by Coil in collaboration with Mozilla and Creative Commons, is a $100 million fund designed to empower individual creators, encourage open standard monetization providers and enable users to support content, which they appreciate directly [3].

Despite philanthropic projects, the main source of funds should be the audience of web resources, that is, the end-user interested in the information. There are many ways to make money on media content, and a combination of them is possible. Consider a model of adding additional content for micropayments to a paid subscription [5].

2. **Micropayment transmission mechanism**

It is to be possible to pay for content that is not currently monetized or monetized at very low rates. In this case, a user, in addition to the content he needs, will receive confidentiality for the micropayment. Web sites should not track users based on the payments they make and receive detailed information about the user's browsing history [5, 6]. Moreover, advertising content may be removed from the page for micropayment for a user.

Web monetization here is designed to provide small payments, not to be confused with those used in traditional e-commerce. On the Internet, there are different options for receiving payments from users. Therefore, it is necessary to introduce the mechanics of such payments. The flow diagram in a simplified form offers a mechanism for passing micropayments on a web page (Figure 1).

![Sequence diagram of data flows for micropayment.](image)

**Figure 1.** Sequence diagram of data flows for micropayment.

The content of the sequence diagram of data flows among a client, resource and payment server:
A met tag containing a payment index is added to the site. The browser (user agent) analyzes the tag to determine where it is necessary to send payments.

A browser uses its internal web monetization agent to calculate the appropriate payment rate for the site.

A browser generates a unique session identifier for this payment.

A browser receives a unique destination address and a shared secret key for the session from the site’s WM receiver.

A browser begins to initiate payments to the site at the estimated rate from the user’s WM provider while a site page is in focus.

A browser generates a unique session identifier for this payment.

A browser receives a unique destination address and a shared secret key for the session from the site’s WM receiver.

A browser, in turn, sends an event informing the page about the payment.

A page can connect to its own backend systems to verify that the payment has been received. All this is done using the session identifier to match the incoming payment stream with the session identifier generated by the browser in the context of the current page.

Then, it is possible to go to the model for calculating the project introducing the mechanism of micropayment.

### 3. Model for calculating a content monetization project with micropayments

The Powersim package was selected to create a model, that is used for visual system-dynamic modeling. This development environment makes it possible to see on the same diagram the structure and equations of the model, as well as its behavior [7]. The behavior of the model is determined from simulation experiments (simulations) with the model and can be used not only to analyze the model itself, but also to improve understanding of the behavior of the simulated system in various situations [3]. At present, there are various models for monetizing content. The model of premium content as an add-on of valuable and time-consuming content on top of free with an affiliate program is the most promising. Suppose that a resource working on a monthly fee model plans to add a model using micropayments for additional media content. A part of the page information is accessible to a user and indexed by search engines. Moreover, the premium part is offered for micropayment. These conditions will affect the values of the parameters set.

Let us develop a simulation model for calculation with the basic metrics of unit economics (Figure 2).

It is possible to take unit economics and Goldratt’s theory of constraints to determine the prospects of the business at the idea stage. Unit economy is a method of economic modeling that helps to determine the profitability of the business by calculating the profitability of a business unit (a unit of goods or one client) [6]. Moreover, it is possible to control a small number of aspects of the system according to Goldratt’s theory. It will help to achieve an effect that exceeds the result of simultaneously affecting all or most of the problem areas of the system at once or in turn.

The basic formula for assessing the convergence of unit economies is applied:

\[
CM = UA \cdot (ARPPU \cdot C1 - CPA),
\]

where: CM (Contribution Margin) is income excluding fixed costs; UA (User acquisition) is number of users involved; C1 (Conversion to first purchase) is conversion to the first purchase, i.e., the percentage of those who first became a buyer from the user; CPA (Cost per Acquisition) is cost of one attracted user to the top of the funnel, i.e., to the landing page. It is calculated as the ratio of marketing costs to all users; ARPPU (Average Revenue Per Paying User) is revenue from a paying user minus costs, i.e., revenue per paying user.
ARPPU is defined as the average income per user, excluding marketing costs, divided by the coefficient of the first conversion. We can also determine a number of repeat purchases by the average check by multiplying.

\[
CPA = \frac{\text{Marketing costs}}{UA}, \quad (2)
\]

\[
ARPPU = \frac{ARPU}{C1}, \quad (3)
\]

\[
ARPPU = APC \times AvP, \quad (4)
\]

Where: ARPU (Average Revenue per User) is average revenue per user, excluding marketing costs; AvP (Average Price) - the average check, the amount that users pay on average for our purchase. It is determined by the ratio of income to the number of orders; COGS (Cost of Good Sold) is costs for each sale, its cost. These are variable costs that increase in proportion to sales; APC (Average Payment Count) is a number of repeat purchases, the average number of purchases per paying user for a certain period of time (by default it is considered for the entire lifetime). It is determined by the ratio of the total number of orders to the number of customers.

\[
AvP = \frac{\text{Revenue}}{Orders}, \quad (5)
\]

\[
APC = \frac{Orders}{Buyers}, \quad (6)
\]

where: B (Buyer) - buyer, customer. The number of customers from the total flow of users is determined by the formula:

\[
Buyer = UA \times C1, \quad (7)
\]
\[ ARPU = ARPC \times C1, \]  

(8)

where: ARPC (Average Revenue per Customer) is average revenue per customer. This is an indicator of how much we earn from sales for the selected period, excluding marketing costs:

\[ ARPC = (AvP - COGS) \times APC - 1sCOGS, \]  

(9)

4. Calculation of model efficiency

For calculation, we expose metrics, given that these are micropayments and the resource are already known on the network (we lay down a lower cost for attracting one user). The affordable price attracts more users.

Set the following metrics with a period of 1 day (Table 1):

- The expected number of visitors to the site of our project — UA.
- Expected conversion to the first payment of C1;
- Cost of goods (COGS);
- Expected average number of purchases from one customer — APC (Average payment count)
- Cost per user acquisition — CPA (Cost per acquisition).

**Table 1.** Indications of the calculation of the simulation model with a profitability indicator: marginal income (for the period of 1 day).

| UA   | C1  | B   | AvP | COGS | APC | CPA | ARPPU | APRU | Rev   | CM   |
|------|-----|-----|-----|------|-----|-----|-------|------|-------|------|
| 15 000.00 | 2.00% | 3 000.00 | 150.00 | 50.00 | 3.00 | 11.00 | 450.00 | 9.00 | 1 350 000.00 | -300 000.00 |

It is clear that scaling the audience will lead to scaling of losses when Contribution Margin turned out to be negative. The project will be unprofitable. Therefore, it is necessary to analyze what values of the Contribution Margin metrics will be positive and the project will become profitable.

Let us increase the price of micropayment, for additional content, on the page up to 100 rubles. The versions, changing the conversion of C1 and the calculation period by 30 days are presented in Table 2.

**Table 2.** Indications for calculating key indicators using a simulation model (for the period of 30 days).

| UA       | C1  | B   | AvP | COGS | APC | CPA | ARPC | ARPPU | APRU | Rev   | CM   |
|----------|-----|-----|-----|------|-----|-----|------|-------|------|-------|------|
| 150 000.00 | 1.00% | 46 500.00 | 300.00 | 50.00 | 3.00 | 10.00 | 750.00 | 900.00 | 9.00 | -45 500.00 |
| 150 000.00 | 1.50% | 68 250.00 | 300.00 | 50.00 | 3.00 | 10.00 | 750.00 | 900.00 | 13.50 | 225 375.00 |
| 150 000.00 | 2.00% | 90 900.00 | 300.00 | 50.00 | 3.00 | 10.00 | 750.00 | 900.00 | 18.00 | 693 000.00 |

The desired positive income result has been achieved. Let us see if all metrics have reliable values. An average user check on the resource will be 300 rubles, given that the user was interested in the add-on content and he made 3 repeat purchases. Revenue from a paying user, net of costs, doubled from 450 rubles up to 900 rubles.

Other metrics can be changed. It will lead to different final results.

The changing metrics using the tools are displayed on the control panel (Figure 3).
The result looks realistic, but, perhaps, the conversion value, that is, the first time users made a purchase, is slightly overestimated.

The information can be displayed in not only the table, but also graphically (Figure 4).

Let us look at the ARPU metric. Each user of the product brings this income. It makes no difference whether he pays or not. This indicator allows refining the analysis of the opportunities for generating income and company growth at the unit level.

It is necessary to note the value of the ARPPU metric to analyze the results obtained. ARPPU is satisfied at characterizing re-payments, since if they are made. A number of payers do not increase, but income grows. Moreover, ARPPU shows user satisfaction with the proposed product.

It is necessary to know what product metrics affect growth. It is clear that if ARPU is less than the cost of the involved user, then there will be no growth, but there will be losses [8]. Moreover, scaling the audience will lead to scaling of losses. Check the calculation.

5. Model effectiveness calculation verification with ROI

Consider the ROI (LTV=18, CPA=11, ROI =64%) to test the effectiveness of the model for simplicity, adding the LTV metric to the calculations:

$$ROI = \left( \frac{LTV-CPA}{CPA} \right) \times 100\%.$$ (10)

where: ROI (return on investment) is return on invested capital or rate of return is a measure of financial efficiency used to assess the effectiveness of investments (after or during the investment period) or to compare the effectiveness of various investments (before capital distribution); LTV is turnover from a visitor for some time, in other words a function of time.

$$LTV = ARPU \times LT,$$ (11)

where: LTV (Lifetime value) is turnover from the client for the entire life time LT (Life time).
The profit in this case is small, but the costs are covered and we can try to scale the business. This indicator is an analogue of the unit economy used in practice more often.

6. Conclusion
As a result, it is possible to say that a model with micropayments for media content on the Internet can be successfully used, since a project based on it can be profitable based on the above calculations [9]. The using of the unit economy is advisable for calculating the model of future business, since it is possible to find out how much we need to attract customers; how much each of them will cost and how many units of goods we need to sell in order to cover fixed costs.

A deep analysis of the results for all possible metric values is possible using this simulation model. Therefore, this model can be applied to break-even analysis of the project.

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