

# The differences of conversions in working with target audience at different decision-making funnel levels

Anastasii I. Klimin

*Graduate school of business and management*

*Peter the Great St.Petersburg*

*Polytechnic University*

*Saint-Petersburg, Russia*

*klimin\_ai@spbstu.ru*

Dmitrii V. Tikhonov

*Graduate school of business and management*

*Peter the Great St.Petersburg*

*Polytechnic University*

*Saint-Petersburg, Russia*

*dvtikhonov@spbstu.ru*

Anastasia I. Ryushenkova

*Graduate school of business and management*

*Peter the Great St.Petersburg*

*Polytechnic University*

*Saint-Petersburg, Russia*

*ryushenkova\_ai@spbstu.ru*

**Abstract**—The article presents the results of a study analyzing the conversion rate at different levels of the purchase funnel in the educational market. A theoretical model of the purchase funnel and its surrounding environment is shown, assumptions about the reasons for differences in conversion rates are made, and a classification of marketing activities is proposed. A statistical inference of the hypotheses was carried out; the difference between the conversion rates to the target at zero and the next levels of the purchase funnel was statistically proved. The leads about the impossibility of verifying the consumer movement through the purchase funnel without analyzing most sources in a consistent system are made. The proposals for the use of marketing communication theory for various levels and elements of the purchase funnel were made. The study is based on collected unique statistics with a sample size of more than 50,000 records

**Keywords** — purchase funnel, conversion rate, education market, leads, communication theory

## I. INTRODUCTION

Since the term “purchase funnel” (purchase funnel, E. St. Elmo Lewis, 1898) appeared, there is a conception how any buyer goes through several steps before making a decision and committing an action. The term is also has options for designation in the form of a “marketing funnel”, “decision funnel” etc. In the classical form, the idea is realized in the form of hierarchical models of communication. The most famous of them is AIDA (William W. Townsend, 1924), its variations AIDAS, DIBABA, AIMDA and others [1,2]. From a marketing point of view, modern communication theories suggest that along with rigid hierarchical models, there are some forms implying horizontal distribution of information (hierarchical and combined communication models; models using the Share-AISAS level (Dentsu, 2006)) [3,4]. In connection with this, theoretical approaches that develop modern marketing models, for example, relationship funnel have emerged. All current studies show that, due to the large amount of information and its non-linear distribution, the buyer can get into the purchase funnel at any level. It assumes the desired result for the product owner of the communication campaign by passing several steps of the planned purchase funnel [5,6]. Certainly, the customer’s getting all the way through the purchase funnel is more desirable with a view to assessing the impact of advertising campaigns, the LTV (lifetime value) theoretical

and practical development and applying the CRM principles (IBM, 1995) [7,8,9]. It means that it is easier to measure and predict such behavior. However, such approaches are often impossible in practice, since the initial lead generation (upper stage of the purchase funnel) may consist of sources that do not allow the potential customer data to be recorded. This means that the conversion to the next purchase funnel steps cannot be appreciated. Databases comparison on a digital footprint can only show averaged statistics, and the classical marketing research methods at the last stage of the purchase funnel give a very serious distortion [10,11,12,13].

At the same time, the purchase funnel study is obviously necessary for many reasons: from conversion comparing for successive advertising campaigns to evaluating for different target audiences. It is also obvious that for each commodity and geographic market the purchase funnel will have its own characteristics, including for the individual organization operating in this market. This condition is determined by external market conditions (the strength of competition, the type of consumers, for example) and internal (marketing tools used, communication goals, for example).

The purchase funnel specificities in the higher education market will be reviewed in this article (within Russia and separately St. Petersburg). The main purpose of the study is to assess differences in conversions at various stages of this funnel to understand the differences in the choice of marketing tools for each.

The basic research hypotheses are formulated in a manner:

A. The applicants’ leads conversion increases with progress through the purchase funnel stages;

B. The applicants’ admission conversion increases with progress through the purchase funnel stages.

The first hypothesis expresses the logical idea that acquaintance with higher education institution will obviously attract less applicants than a short-term university visit. Moreover, it attracts even less than participation in a specialized educational project and long-term contact with a university (the examples are given sequentially and will be disclosed later). The second hypothesis expresses the idea that potential applicants who have gone through several

purchase funnel steps are more involved, motivated and competitive, which makes their success rate higher. In addition, all this happens among the same target audience.

As the result, it is necessary to solve the following number of issues in order to test the formulated hypotheses and achieve the goal:

- A. to describe the stages of the purchase funnel and its features within the established system;
- B. to collect statistical data necessary for estimating conversions for each stage of the purchase funnel;
- C. to select an adequate statistical criterion for assessing differences in conversions and test hypotheses;
- D. to make conclusions on the results of testing hypotheses, assess the validity of the results obtained;
- E. to make assumptions about the use of certain marketing tools at different levels of the purchase funnel.

## II. DATA AND METHODOLOGY

It should be noted that the hypotheses and the objectives of the study were formed based on the statistical data accumulation and information systems introduction.

The Basic data is the statistics on potential applicants and applicants, who already have submitted their document into Peter the Great St. Petersburg Polytechnic University for 2016-2018 (this article will consider the bachelor's level of education). There are the characteristics of the database:

1. The database of applicants for 3 years (the general aggregate of university applicants for the specified period). The sample size is 33301 for 2 years (2017 and 2018) and 47589 for 3 years. The database for 2 years is used for data analysis, since the following figures are attributed and valid only for this period.
2. The database of potential applicants, collected during various events, which the university held to promote its educational programs and attract students. The sample size is 6081. In this database, 2526 people from the base of applicants (7.6%) are attributed.
3. The databases of individual events that have, inter alia, intersections with the base of potential applicants - a total sample size of more than 4,000 people, a total number-7 base:

- Leads collected on partner sites with CRM systems on the Internet;
- Databases of own and collaborate Olympiads;
- Database of special projects conducted by universities and partners.

The maximum sampling error for the potential applicants' database is 1.2% with a 95% probability. The error of the applicants' database does not require evaluation, as it is the general totality of one of the purchase funnel levels.

The sampling errors will be taken into account during the assessing differences in conversions. The standard statistical procedures are used for it: testing hypotheses about the difference in general shares in independent samples using the Student's t-criterion; ANOVA analysis of variance to assess differences in shares within a single purchase funnel level.

This study is based on the analyze of the conversion from applicants to students in the databases of actual and the potential applicants, to assess the representativeness of the database. In the first case, the weighted average conversion over 3 years is 31.8%, and in the second - 37.8%. This is a statistically significant difference, which shows how the hypothesis of equality of two shares is rejected ( $H_0: w1 = w2$ ): p-level = 0.000 (hereinafter, the estimate is made up to thousandths with a 95% probability on a two-sided criterion, the package "Statsoft STATISTICA" and the procedure "Difference between two proportion"). In addition, this difference well illustrates the hypothesis. The potential applicants' base includes only leads, while the actual applicants' base may include candidates not from the purchase funnel in question.

Moreover, the conversion of students from applicants over the observed 3 years falls (35, 32 and 29 percent, respectively) with an increase in the applicants' number and maintaining the number of budget places. This tendency is observed at all levels of education.

The open-source R package was used with attributes in rows and arrays to conduct multidimensional statistical analysis for processing the main arrays of data

There is description of the purchase funnel given. First and important thing to note is that within the purchase funnel there are levels between which exists a conversion (CR is the ratio of the number of people who have switched to the next level to the number of people at the previous level, percentages).

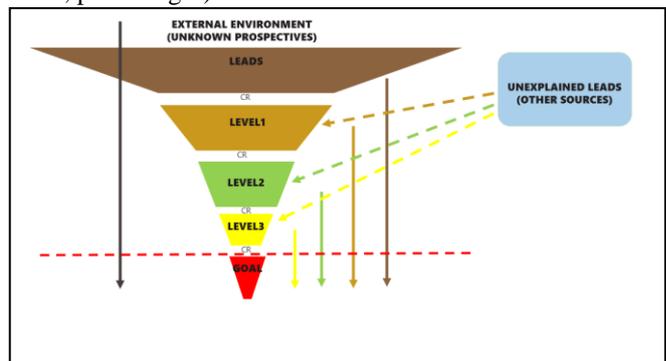


Fig. 1. General view of purchase funnel for university

External environment represents a large proportion of unknown or unidentified applicants. They can be immediately on Level3, however there is no the ability to understand how they got there (the only possibility is tracking the digital trace) and how to evaluate their path. Leads level (Level 0) means that the person is attributed to the database. All people who have left their contact details at the events of the university and partners fall into this level.

This category includes events where contact with the university / its representatives do not exceed 3 hours (educational exhibitions, career guidance meetings, conferences, tours, etc.). Level 1 shows the activities that involved a potential applicant in the tackling the issue within the framework of the university's event. As a rule, the solution of issues and the contact lasts 1-5 days in the form of an intensive course (hackathons, special practices, retreats and workshops, etc.). Level 2 – is the most complete

and serious involvement in scientific and technical creativity of potential applicants. It assumes the long-lasting and regular communication between the possible applicant and the university during the certain period of time up to 2 years, or supporting projects which were developed at the special events earlier (preparatory courses, engineering schools, educational shifts, online courses, support for business incubators, etc.). Level 3 - applicants (people who apply for admission). There are also parallel purchase funnels (Unexplained leads), which help people to get on 1,2,3 Levels, without conversion from previous ones. Level "Goal" stands for successful university entry (in all cases: with or without tuition fee; full- time/part- time/ distance learning, because the student's involvement makes him or her pay for the education). The red dashed line means that the educational service illustrates the principles of two-way marketing, in contrast to the purchase of many goods: the quality strongly depends as on the contractor, as on the customer. This is also relevant for the conversion of applicants into students: engagement, participation in events, receiving points and the passage of the entire purchase funnel may not be enough to achieve the goal.

Indeed, the base of potential applicants allows us to calculate conversions on the Leads - Level 3 and Level3 – Goal transition, the base of applicants is between the Leads, Unknown and Goals, and the special bases will allow to calculate the Leads-Level3-Goal, Level1-Level3 path conversions, Level2-Level3-Goal. Transitions between higher levels cannot be estimated, since there are parallel purchase funnels.

**III. RESULTS**

Let's begin with the presentation of the general results in the base of the potential applicants. Figure 2 shows the generalized purchase funnel, it is noted that the first Leads level includes all the collected contacts, not only the Leads level from the theoretical funnel, but also Level 1 and Level 2 (see fig. 1). CR1 is taken for designation - the conversion of contacts into applicants and CR2 - the conversion of applicants into students.

Thus:

$$CR1:PS/L=2526/6087=41\%$$

$$CR2: S/PS=2526/6087=38\% \quad (1)$$

(PS–number of prospective students, L – number of leads (on each level or summary), S – number of students).

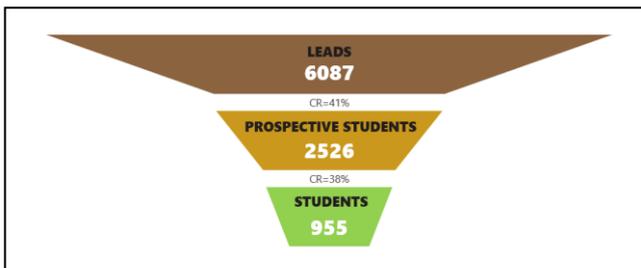


Fig. 2. Purchase funnel for prospective students

It turns out that according to our hypotheses, conversions 1 and 2 will be lower in terms of Leads (denoted by L0, so as not to be confused with the total number of leads), and higher in Level 1 and Level 2.

$$H0:CR1(L2)>CR1(L1)>CR1(L0)$$

$$H0(1):CR2(L2)>CR2(L1)>CR2(L0) \quad (2)$$

About 50 events are attributed in the database; if you cut off the events with a small number of leads, then 25 events will be remained. For the hypothesis testing, we select 3 events with the largest sample size from each level of the purchase funnel. The names of events, their organizers and venues were not disclosed. The choice of 3 events is stemmed from the difficulties with their classification within the current base of potential applicants.

TABLE I. SUMMARY STATISTICS PER LEVEL AND PERFORMANCE

Level and Event / Metrics	N	PS	CR1	S	CR2
<b>Level 0</b>	<b>15291</b>	<b>3091</b>	<b>20,2%</b>	<b>1108</b>	<b>35,8%</b>
Exhibition 1	928	306	33,0%	103	33,7%
Exhibition 2	785	168	21,4%	61	36,3%
Online Portal	13578	2617	19,3%	944	36,1%
<b>Level1</b>	<b>843</b>	<b>458</b>	<b>54,3%</b>	<b>191</b>	<b>41,7%</b>
Open Doors Day	571	349	61,1%	147	42,1%
Workshops (Centre for Gifted Children)	110	37	33,6%	16	43,2%
Retreat	162	72	44,4%	28	38,9%
<b>Level2</b>	<b>2170</b>	<b>1043</b>	<b>48,1%</b>	<b>410</b>	<b>39,3%</b>
Preparatory Courses	632	226	35,8%	90	39,8%
Engineering School	41	18	43,9%	7	38,9%
Polytechnic Contest	1497	799	53,4%	313	39,2%

TABLE II. ESTIMATION OF THE DIFFERENCE IN CR1

Levels	Level 0	Level 1	Level 2
Level 0	0,002	0,000	0,000
Level 1		0,001	0,031
Level 2			0,000

\* F-test values are located along the main diagonal; the remaining cells of the table are p-level values.

TABLE III. ESTIMATION OF THE DIFFERENCE IN CR2

Levels	Level 0	Level 1	Level 2
Level 0	0,000	0,013	0,082
Level 1		0,000	0,272
Level 2			0,000

\* F-test values are located along the main diagonal; the remaining cells of the table are p-level values.

In order to understand that the activities within the sales purchase levels are homogeneous and belong to the same level, taking into account the sample size and conversion, an ANOVA test  $H0: w1 = w2 = w3$  was conducted for each

level and for each CR. F-test results are close to zero (critical values 3 and above), which means accepting of the null hypothesis (there are no differences within the levels). Tukey HSD Test (Hurlbort, 2006; Zar, 2010) was additionally applied to assess the reliability, confirming the findings at a significance level of 0.05 [14].

The results of testing the hypothesis of equality between characteristic shares for two levels of conversion and three levels of purchase funnel at a level of 0.05 show the following:

1. The difference in conversions in applicants was confirmed for all cases of verification.
2. In assessing the CR2, the proportion of a sign on Level 2 is not statistically distinguishable from Level 0 and Level 1. At the same time, Level 1 and Level 0 have different shares.
3. CR1 for Level 1 is greater than Level 2.

**IV. DISCUSSION AND CONCLUSION**

The assumptions and limitations which distinguish the purchase funnel from the classic sales funnel, adopted in this study, will be discussed again. Firstly, CR2 – the conversion into students, depends on a sufficiently large number of external factors (successful passing of the exams, financial capabilities, geography, etc.). Secondly, in this example we do not have a purchase funnel, that is why we can not evaluate the movement of customers through the levels of it, but there are contacts of different levels and level crossings. In addition, there are parallel purchase funnels, which do not belong to us but they also provide our conversions. Thirdly, buyers have different capacity to participate in events, which is also stemmed from the external factors [15].

Accordingly, the results will be discussed and conclusions will be based on the context of the the formulated hypotheses and tasks which were set in our work.

1. Hypothesis 1 and hypothesis 2 are confirmed in the part that the conversion from Level 0 (primary leads, cold contacts) differs from the conversion of Level 1 / Level 2, if these levels are combined, i.e. talk about any degree of customer involvement and participation. This means that there is a demand for more accurate criteria for activities classifying, (for example, short-term contact with a direct visit to the university can be more effective in terms of conversion than a retreat for 1-2 days).

2. There is a theoretical model of purchase funnels for educational services presented, and it demonstrates different funnel levels, parallel funnels, and the presence of unforeseen leads that determine the need of environmental analysis tools use.

3. The standard statistical procedures have shown their suitability for hypothesis testing and analysis. As the part of the study, customer clusters also were identified, perception cards and portraits of students were built. On the determined level of relevance all obtained results are valid.

4. The analysis of the results showed the demand for a separate system building in order to track conversions in the

purchase funnel, which includes a CRM system, digital data analytics (web services data), business analytics of offline activities, machine tracking systems of repetitions within a common system for understanding customer traffic and evaluating sources of their appearance.

5. These findings and conclusions allow to fulfill the purpose of the study: to offer various marketing tools for different levels of purchase funnel. To illustrate this, the distribution of recommended elements of the promotion complex for each case can be considered in the table below.

**TABLE IV. PROPOSED COMPONENTS OF THE MARKETING COMMUNICATIONS COMPLEX**

Own marketing funnel		Parallel marketing funnels		External environment	
Level	Promotion	Level	Promotion	Level	Promotion
0	Events Interactive Direct Word-of-mouth PR	0	-	-	Advertising PR Word-of-mouth
1	Direct Interactive	1	Advertising Events Interactive		
2	Direct Interactive	2	Word-of-mouth Events		
3	Sales promotion Personnel selling	3	Direct Marketing Interactive Advertising		

Components of the marketing communications complex are specified according to F. Kotler (Kotler, Keller, 2014). It is important that the most appropriate components for each case are indicated in the table, not all the expected. For example, Events and Experience and Interactive marketing are the basis of the proposed model, so they should be used at all levels, as the study showed that participation in the events and personal involvement are affecting the increase of conversion, also at the stage of transition from the level of applicants to the level of students [16,17].

The personalization is not implied by external environment, therefore such mass elements as advertising, PR, and word of mouth are used. Parallel (not funded by our purchase funnels) is considered from the point of view of work on attracting leads to a specified level. Therefore, event marketing is present at levels 1 and 2. At the third level, direct marketing is used more than personal selling, since the consumer here has not often contacted our brands and does not know the principles of communication. In their own purchase funnel, levels 1 and 2 at this stage of studying the issue do not differ due to the conversion equality hypothesis adoption. At the third stage, incentive measures and personal selling can already be applied. It is important to note, that word-of-mouth marketing is one of the most important at all levels and funnel components.

Proposed solutions require testing on samples at different levels and target audiences. The system of end-to-end business analytics can be recommended as the basis for further research.

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