

MARKETING STRATEGY OPTIMIZATION IN FMCG MARKET

The article contains the results of applying marketing mix modeling based on Data Science technologies for FMCG companies. The market share in packages (sales level) was modeled using regression analysis depending on the key elements of the marketing complex (price, place, promotion), seasonality and media activity of the competitors in all communication channels. Econometric modeling helps to assess the return of media investment by calculating the level of sales generated by media activity in each communication channel and comparing it with the level of media investment, respectively. The influence of distribution on the company's position in the market and media efficiency has been studied in detail. There is a connection between distribution and media response: less distribution affects the decline in media performance, and vice versa. In conditions of low distribution, it is important to increase the presence in regional communication channels through media pressure in critical sales regions for FMCG brands and try to increase distribution levels nationally. The article contains an assessment of price sensitivity (elasticity) and recommendations for optimizing pricing policy to increase market share by volume or by value depending on the company's goals. The price elasticity curve was determined by estimating the impact of the price index on the level of sales in packages and deals in money using econometric modeling and simulations of sales levels depending on different options of the price index vs competitors. Based on the research, recommendations for optimization of the marketing and media strategies to maximize sales of FMCG companies are formed. Marketing mix modeling and Data Science provide the most efficient ways to achieve business KPIs.

Keywords: marketing mix modeling; Data Science; regression; FMCG; marketing strategy.

INTRODUCTION

The food market or the market for consumer goods (fast-moving consumer goods – FMCG) is one of the most competitive today [1]. Mass consumer goods have a low cost, but because they have significant sales volumes and have a high frequency of consumption and use, the total profit in some product categories is relatively high. FMCG marketing requires special, depending on the frequency of sales, product portfolio, and product range management, logistics, advertising, etc., which increases the relevance of the research of the marketing activities of FMCG companies.

The consumer goods market is dynamic, so to achieve and maintain leadership, businesses need to respond quickly to change, adapt flexibly to new developments and make operational decisions with maximum efficiency. To achieve high business results and success in the FMCG market, it is necessary to have an idea and information about the product and market prices, provide consumers with a broad product line, develop an effective and well-grounded marketing strategy, taking into account that consumers of FMCG tend to make impulsive or a pre-planned purchase decision. Unlike durable goods, FMCGs are much cheaper, and to increase the efficiency of economic activity, companies in this area have to constantly maintain a high level of turnover and consumer involvement [2].

The competitive environment in which enterprises operate requires them to ensure efficient operations with sufficient profitability. Today's marketing focuses much attention on creating fair and smart marketing and tracking the relationship between marketing mix elements and sales. The modern marketing system of any company emphasizes the development of an optimal marketing activities plan that will satisfy both the manufacturer and the consumer [3].

Modern consumers of FMCG products do not need physical products alone. They need a positive customer experience of interaction with the company and its product. That is why the marketing of consumer goods is aimed at building brand value through active advertising activity in all channels of communication. The concept of brand value implies a unique offer of the manufacturer, which forces the consumer to choose his product from among a number of competitors [4, p. 4-5]. To ensure the high value of the

proposal is possible only through implementing a strategic approach in marketing [5, p. 173].

An important issue in developing a marketing plan is the assessment and forecast of market capacity, the expected level of sales depending on the planned marketing activity. An overly optimistic assessment will lead to excessive costs, and a pessimistic assessment hinders development and limits its market potential [2].

When analyzing the market and calculating the sales forecast, it is necessary to take into account a number of important aspects: product range; time period; the influence of seasonality; market segment; a group of controlled factors (such as price or advertising activity); a group of uncontrolled factors (such as exchange rate, weather conditions, the impact of COVID-19, etc.); competitive environment, etc.

In the conditions of permanent growth of competition in the FMCG market [6], the successful solution of the problem of choosing an effective marketing and media strategy by the manufacturer is one of the critical conditions for gaining a competitive advantage. Marketing and media strategy in the system of international marketing occupies one of the key places. There is significant potential for optimization for companies that deeply analyze the market to find practical solutions and increase their competitive advantage.

There is a direct connection between investment and economic growth, which is realized as an important factor in ensuring business development—the more intensive the investment, the faster the reproduction process, the more dynamic market shifts. Advertising acts as a new substance in attracting investment and managing consumer behavior. In its economic essence, advertising is a mechanism for informing, persuading, and encouraging action. Effective advertising takes a key place in forming marketing strategies [7, p. 177-178].

The complexity and ambiguity of the principles of marketing costs in enterprises require a clear understanding of socio-economic and political processes in the country, continuous collection of information by the company, it is analytical processing through in-depth data processing and modeling, and feedback through the formation of effective marketing decisions and optimization of marketing activities. Decisions on the approval of the marketing budget should be based on the company's strategy and activities to

achieve them [8, p. 53]. Analyzing the indicators of enterprise development in the market and opportunities to expand its presence, increase competitiveness, maximize profits and improve the enterprise management system, an increasingly important issue is the analysis of the internal and external environment of the enterprise, improving the management mechanism through the modeling of marketing activities (marketing mix modeling) to find ways to improve the business strategy of the company on the FMCG market.

Making an informed decision on the choice of marketing and media strategy, its development using a systematic approach allows the company to succeed in the market. Based on this, there is an urgent need to improve the strategy of marketing activities and mechanisms for managing its components, and Data Science technologies are the tool that opens up endless opportunities in these directions [9, p. 36].

The **object of research** is the marketing activities of enterprises. The **subject of study** is modeling and optimization of marketing results depending on the chosen marketing strategy.

LITERATURE REVIEW

The theoretical and practical issues related to the trade marketing of FMCG are covered in the works of foreign and domestic scholars, such as I. Ansoff, L. Balabanova, J. Berman, P. Drucker, D.V. Evans, S. Garkavenko, O. Golubkova, R. Fatkhutdinov, O. Kanishchenko, R. Kaplan, F. Kotler, N. Kudenko, A. Mazaraki, V. Orlynska, A. Starostina, A. Voychak and many others.

The FMCG market has been one of the leading sectors of the economy for the last few decades. The growth of this category largely depends on increasing consumers' income and reaching by products and services to end consumers through marketing channels. Proper coverage of the marketing channel is an effective tool for stimulating demand and retaining existing customers, and attracting new customers. Sudev et al. [10] provide a detailed look at the satisfaction and dependence on the marketing channel by FMCG companies.

Marketing plays an essential role in offering goods to the consumer, especially following consumer preferences. Forming a variety of marketing strategies helps to attract all segments of consumers. The research of Sardana et al. [11] investigates the reasons for the growing popularity of promoted FMCG brands. Pandian [12] seeks to explore the core marketing strategies used by FMCG to engage consumers in purchasing goods, measure the influence of promotion on purchasing decisions, and identify factors that influence consumers to buy FMCG. Descriptive Statistics, factor analysis, and multiple regression were used for research. The results showed that the strategy of multi-branding and promotion plays a vital role in attracting consumers to purchase products, as appropriate marketing strategies attract consumers. Trihatmoko [13] proved that the effectiveness of entering the market by new products through a product marketing strategy and marketing complex would depend on customers and the peculiarities of market competition.

The purpose of Saqib's et al. paper [14] is to create and test a positioning taxonomy for the FMCG market. There were developed four distinct positioning strategies: value for money, being local, premiumization, and product attributes. FMCG's brand marketing manager believes that stimulating the sale of consumer goods at a higher level and with a higher frequency than usual can improve the company's position in the market [15]. However, competitors can always respond to the company's actions, which requires continuous work to promote the product among consumers with effective parameters.

Margin management is a crucial aspect of decision-making in marketing. Wilkins et al. [16] argue that there are several alternatives for rising production costs: higher prices or lower product quality. They try to find out the consumer trade-off preferences in terms of price and product quality for different FMCG products.

Madan's article [17] focuses on the research of properties that induce a purchaser's confidence in the acquisition of a product and structure their relationship with demographic variables and brand choice by data analysis with confirmatory factor analysis and structural equations modeling (SEM).

Promotion, one of the 4Ps of the marketing mix concept, is a key component of the marketing ecosystem. Recent research found that from 20 % to 50 % of promotions lead to no noticeable sales rise or worse. Zeybek et al. [18] established the influence of promotions on business results with a time series model that recorded a change in sales vs. the total number of products in promotions. Although at the first stage, promotions were positioned as short-term activities to achieve rapid sales growth, nowadays, businesses recognize promotions as essential tools for creating sustainable sales performance, and they should be used for decision support models and systems aimed at optimizing the aspects of marketing activities.

The study by Freo et al. [19] pays attention to the responses of consumers and enterprises to economic downturns. In particular, it examines how advertising activity as a marketing tool has been used to support the business during the downturn in the business cycle and whether advertising has led to significant additional sales growth by using autoregressive distributed lag models. In general, advertising has a substantial impact on the choice of brands, and competitor's advertising activity influences negatively.

Rapid technological change brings progress to every management sector. For that reason, marketing activities also strive for effective instruments of promotion. All media channels have their own advantages and are increasingly expanding their impact on the consumer. Digital is one of the main marketing communication channels, as it provides great opportunities to build long-term relationships between companies and their customers and is considered one of the most cost-effective and efficient instruments to accelerate and prompt customer engagement. Habib tries to investigate the factors that influence consumer purchasing decisions (including media activity) using a structural model with maximum likelihood estimation [20].

John et al. [21] explored the usage and application of social media among retailers to achieve six strategic marketing goals: "customer involvement, interaction, intimacy, influence, insights, and impacts". The study offered guidance on how brands can better manage their content on social media to build profitable customer relationships. Madlberger et al. [22] explored the impacts of social media content attributes, such as images, text features, and retargeting campaigns, on clickthrough rates (CTRs) by analyzing data from an e-commerce A/B testing. CTR ultimately ensures the profitability and success of the business, so the research results allow conclusions about the optimized allocation and adaptation of social media content. Shilovsky focuses on the brand community of FMCG retailers, as companies need to use content to influence both consumer involvement and employee brand involvement, which is expressed in likes, comments, and shares. A theory-based typology of content characteristics has been developed, including what and how brands express. Paper [23] sheds light on how content

affects the involvement of consumers and employees in the brand on social networks.

The goal of the research by Ahmed et al. [24] is to consider the effectiveness of online advertising in digital media as a strategic tool for building brand sustainability. Authors examine the positive influence of various online media channels, such as email marketing, mobile phone marketing, search engine optimization, company's websites, and social media marketing on the efficiency of online advertising in digital media through the SEM, exploratory factor, and confirmatory factor analyses.

Consumer buying behavior refers to the process of consumer decision to purchase a product. Making this decision begins with gathering information related to the goods, studying its attributes, pros, and cons, and then making the final decision to buy the goods. The purpose of Choudhary's et al. study [25] is to empirically investigate and derive the impact of social media on consumer buying behavior using the techniques such as factor analysis and linear regression analysis. The contribution of regression analysis to marketing decision-making is quite substantive, but there are alternative technologies. Dawes et al. (2018) [26] show evidence-based methods that have been described to be useful for forecasting in marketing.

Consumer consumption and behavior are changing. Today, consumers are finding alternatives and expecting consistent, integrated, and identical experiences, regardless of the sales channel they use, while smoothly switching between channels. As a result, there is a need for better integration of digital and physical experiences in retailing, i.e., in omnichannel [27]. Many brands and alternatives make it difficult to keep customers in the FMCG market. In addition, there is no absolute customer loyalty, as most customers divide their purchases between several almost tantamount brands. Günesen et al. [28] test different machine learning algorithms to predict the outflow behavior of the most valuable part of the current FMCG brand customers. Predictive modeling, RFM analysis and K-Means clustering techniques are used to create meaningful insights for business and marketing campaigns. Finally, it can help to achieve additional profit by improving customer retention by using practical intelligence from the outflow forecasts.

The main purpose of the research by Raza et al. [29] is to explore the influence of marketing on customer loyalty and customer satisfaction in the FMCG market with Partial Least Square method to SEM. The results exposed that marketing has a statistically significant impact on customer satisfaction.

Seeded marketing campaigns (SMCs) have become a part of the marketing activities of many FMCG companies to encourage influencers to discuss brands and acquaintances to create additional value. Thus, this phenomenon is quite important, and research by Dost et al. [30] makes a significant contribution to understanding how the FMCG SMC interacts with classic marketing tools in assessing the efficiency of such efforts, their usefulness, and how to manage them. The analysis shows that SMCs can increase total sales by approximately 3–18 % during campaigns.

Khalil [31] examines the interface of primary marketing and quality concepts to FMCG consumers through a quantitative research strategy. Marketing elements, i.e., product, price, place, and promotion, are exogenous variables. The author has developed a modeling tool to measure the quality perception of FMCG consumers as an endogenous variable. AMOS was used to create a structural model and test hypotheses. The research results show that all marketing

elements, except product, interact with the quality perception of FMCG consumers.

The FMCG marketing phenomenon reproduces all elements of the marketing complex (4P's), so it is believed that each element has a high degree of complexity. Trihatmoko at his research [32] tried to identify the reaction of buyers in the business segment to the offer of a new product related to the situation of the marketing environment and promotion; and further, uncover product performance and its features as a tool for assessing the success of new products.

Trihatmoko et al. [33] reveal the marketing environment for pricing strategies in a competitive business climate, product and financial performance in addition to assessing the success of the product based on pricing strategies. The marketing context of price is formed on the basis of the marketing environment of product and consumer marketing competition, while the productivity of the product is defined by the environment of business and competition.

Krishnamurthy [34] investigates how companies in the FMCG market use sales and distribution management strategies. The FMCG industry is highly competitive and is dominated by large multinational enterprises. This market is described by frequent launches of products, and distribution takes a key place in providing coverage and visibility to the end consumers.

The results of scientific research can be used to develop effective media and marketing strategies to maintain optimal market share and competitive advantage. The experience of foreign countries and domestic practices prove the need to determine the features of marketing planning in the consumer goods market, the definition of trade marketing as a mechanism for reaching the target audience [2]. Implementation of marketing mix modeling and data analysis is also crucial, as there is significant importance for businesses to understand the effectiveness of their marketing spending for rising sales and for optimizing the allocations of marketing budgets. Approaches of intelligent analysis open up many opportunities in the management of marketing activities of any enterprise.

Unresolved parts of the overall problem. Despite the significant achievements of the Ukrainian and international scientific community, many issues in the marketing mix modeling implementation for finding the ways of marketing and media strategy optimization for sales growth, connections between marketing mix elements and sales, and cross-influence of marketing mix elements remain unresolved. The problems of general marketing planning are well studied, but in the scientific literature, the features of marketing planning in the market of consumer goods, which is characterized by a high level of competition and the need for continuous rapid response to environmental influences, are insufficiently covered. The data-based optimization and forecasting mechanism for setting optimal prices for products, level of distribution, and media strategy (media mix by communication channels taking into account its prioritization by expected ROMI) requires more thorough research. After all, an effective marketing strategy, as well as improving the management mechanism, is a determining factor for increasing product sales of any company [3]. Therefore, finding data-based solutions to this issue is quite essential.

Formulation of tasks and goals of the article. The goal of the research is analysis the impact of key elements of the marketing complex (price, place, promotion), seasonality, media and trade activity of the competitors on sales and share of market of one of the FMCG companies in Ukraine based on econometric modeling using regression analysis, as well as the development of recommendations

for optimizing the marketing and media strategy of a particular brand. The tasks of this article are to get acquainted with the peculiarities of the development of marketing for FMCG industry, the specifics of marketing mix modeling in this area, and to outline ways to improve the efficiency of the marketing strategy of companies in the FMCG market.

METHODOLOGY

The research was deployed following the analytics model and research concept presented on Figure 1, where the CRISP-DM methodology takes the central place and describes the process through 6 key stages: "Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation and Deployment" [35]. The process has cyclic nature and the opportunity of a flexible switching between stages in any order when the need occurs. The key learnings from the previous cycle can lead to new business tasks, which will positively impact future data analysis processes.

The study includes the results of marketing mix modeling (economic and mathematical modeling by regression analysis) of the dependence of sales (volume and value share of the market) of a particular brand on the FMCG market on the main factors influencing the dynamics of a brand's business results (Fig. 1). Among the key factors of influence are: the distribution of trading networks (percentage of stores in which the product is available for consumers), pricing policy (the ratio of the brand's price (price index) compared to the average market price of competitors in this category), media activity of the brand and its competitors in all communication channels (Television, Internet, Radio and Outdoor advertising) and others. All influencing factors were selected by analyzing the correlations with levels of sales and analyzing correlations by significance.

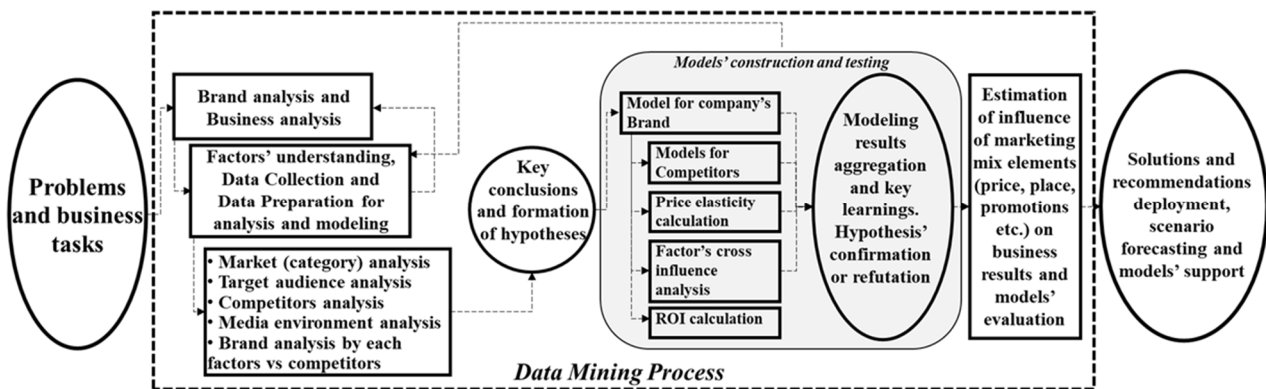


Fig. 1. The proposed concept of marketing mix modeling implementation for FMCG market

Source: constructed by the authors.

An experiment for one of the FMCG brands will demonstrate how with the help of a regression model and other Data Science technologies, it can explore what factors and to what degree influence a company's business performance (sales or share of the market in the category). Data on all variables for the period from 2018 to 2021 were collected in a monthly breakdown for all brands in the relevant category [36–38]. Due to confidentiality, all indicators in the paper will be normalized from 0 to 1. It is necessary to analyze in detail the dynamics of each of the variables, assess their impact through the construction of model to understand the impact of each factor on sales.

We have constructed a multiple regression model, which has the structure like presented below:

$$MS = Constant + Seasonality + a_1 * Distribution_1 + a_2 * Distribution_2 + a_3 * Distribution_3 + a_4 * Distribution_4 + a_5 * Price_index + b_1 * Adstock(TV) + b_2 * Adstock(OLV) + b_3 * Adstock(Display) + b_4 * Adstock(OOH) + c_1 * Adstock(TV_Compet) + c_2 * Adstock(OLV_compet) + c_3 * Adstock(Display_compet) + c_4 * Adstock(OOH_compet) + c_5 * Adstock(Radio_compet),$$

where *MS* – market share – brand's share of the market in Volume; *Seasonality* – additive seasonality for each month; *Distribution* – the percentage of stores in which the product is available for consumers, for each sales key unit (SKUs) respectively; *Price_index* – the ratio (index) of the brand's price compared to the average market price of competitors

in this category; *TV* or *TV_Comet* – TV activity of the brand or its competitors, respectively, in the target rating points (TRPs) in %; *OLV* and *Display* or *OLV_compet* and *Display_compet* – the digital activity of brand or its competitors in video and display formats on the Internet, respectively (in impressions); *OOH* or *OOH_compet* and *Radio_compet* – out of home and radio activity of the brand or its competitors, respectively (in the number of advertising placements); *Adstock* is the immediate, prolonged, and delayed effect of advertising activity on consumer buying behavior, which indicates the impact of all media activity over time. For example, *Adstock* for *OLV* activity was calculated as follows:

$$Adstock(OLV_i) = OLV_i + a * Adstock(OLV_{i-1}),$$

where $(1-a)$ describes the memory decay of the advertising message.

For the constructed multiple regression (econometric model) for the share of the market, which was estimated by the method of least squares, the main hypotheses about the adequacy of the model, the significance of the coefficients for all factors, the presence of heteroskedasticity and autocorrelation were tested.

As a result, we have built an adequate model, which has high-quality indicators, determines the influence of various media and marketing factors, and helps to develop recommendations for marketing strategy. The average error was within 5 %, and R^2 was 96 %. All factors are significant, and the model is characterized by a lack of autocorrelation and heteroskedasticity, which

contributes to the practical relevance of the constructed model and its value for implementation in real business for the optimization of marketing activities.

The regression model makes it possible to determine the factors that influence sales, as well as the extent of this impact; to estimate the elasticity of sales for each factor; to realize forecasting of the target metric depending on the different marketing and media plans taking into account the market situation; to form recommendations on the optimal/necessary levels of each factor to achieve the business KPIs; to compare the impact of various factors for the company's brand and competing brands.

Marketing mix modeling is a tool for assessing the return on media investment (ROMI) by calculating the level of sales generated by media activity in each communication channel and comparing it with the level of media investment, respectively. In addition, understanding the effectiveness of each communication channel makes it possible to form an effective media strategy for the brand, considering the competitor's environment.

Assessing the influencing factors allows to calculate sales elasticity to each factor and, as a result, to determine the optimal range for each of them, considering their marginal utility (for example, to estimate price elasticity and determine the optimal level of the price compared to competitors). So, for the development of recommendations for optimal pricing, an approach based on machine learning technologies was developed to define the optimal range of the price index (price compared to the average price of competitors) to maximize market share in packaging or market share in value depending on the company's goals. This approach helps to regularly refine the optimal price index, considering the dynamics of competitors' prices, monitoring, and estimating its impact on sales.

The high level of competition in the market, rising prices for advertising, the desire to constantly increase sales among companies make it necessary to find effective marketing solutions. To achieve these goals, it is required to

actively use the data available on the market, using machine learning and data mining. Data Science is a highly effective tool for improving the efficiency of marketing activities of companies, its optimization, and greater validity [9].

Data analysis and modeling using Data Science methodology create a basis for finding effective marketing and media solutions and developing an effective marketing strategy for the company's growth in the future. The model and regular process of data analysis become a convenient tool for making strategic and operational marketing decisions, taking into account the results of monitoring the effectiveness and performance of the advertising campaigns, price elasticity analysis, distribution analysis, analysis of the influence of marketing factors on brand sales, evaluation of winnings and losses and scenario forecasting at different variants of activity in the communication channels and other elements of a marketing mix.

RESULTS

At the first stage of the research, it is necessary to analyze the peculiarities of the brand and the category for which the exploration is prepared to determine all the factors that affect the final performance of the business. In this case, we conducted research on the food brand of one of the main FMCG companies in Ukraine. This brand has a weak position on the market due to the high level of competitiveness and recent market emergence. The brand is gradually losing its position under the onslaught of those brands that have active media and trading support.

Organic level and distribution changes for main SKUs have the highest contribution to sales and accumulate about 44 % of sales. Advertising activity leads to a significant share of sales – about 16 %. The contribution of the changes in the price index is around -21 %. The competitors' activities (both media and trade) have a strong negative impact, which on average, leads to a loss of 19 % of sales during 2018–2021 (Fig. 2).



Fig. 2. Model's decomposition and factors' contributions

Source: author's calculations based on data from [36-38] (data indexed due to confidentiality).

Pricing policy. Changes in the price index (price promotion realization) generate a significant short-term boost in sales. During 2018–2021, the brand raised its prices more slowly than competitors, which led to a drop in the ratio of the brand's price compared to average market prices (price index). The average brand's price is higher than the price of competitors by ~40 %, which negatively influences on the dynamics of volume market share (price index is a negative influencing factor). The brand presents a premium market segment. Ukrainians are a nation that tends to save, so the rising of prices slower than competitors leads to switching from other brands to this company and improvement of volume market share in this period.

However, when we analyze the price, a certain level of price growth can lead to a drop in sales in volume but generate an additional level of sales in value when a price growth compensates for a drop in sales volume and vice versa – significant growth in price can lead to a considerable fall in sales volume, and the revenue of the company will be markedly decreased. Therefore, there is a capacity for

optimization depending on the price elasticity of sales and market share in value and in packaging. Depending on the business's goals – growth of value market share (revenue and profit) or growth of volume market share (sales in packaging and penetration among consumers), pricing policy recommendations will be fundamentally dissimilar.

Based on the constructed regression model, we can receive the curves of market share in money and share of market in packaging depending on the price index, as the model coefficient at the price index discloses how share of market will vary with growth of price index by 1 point (the nature of the relation is linear in the case of building a linear regression or nonlinear otherwise).

The price index connects the value market share and the share of market in volume. Since the rate of change of volume market share does not correspond with the rate of change of the price index, there is a nonlinear connection between the price index and the value market share, which leads to a zone of optimization depending on the company's goals.

In the example of this brand, the optimal value of the price index to maximize sales and value market share was – 1.0–1.2 (Fig. 3), which means that the brand should have equal prices to the market or be more expensive up to +20 % to average market prices to receive the maximum level of revenue and profit. Depending on the company's objectives, this methodology becomes a flexible tool for marketing, as it makes it possible to develop the pricing recommendations to achieve the goals of both share of the market in value and in volume.

Distribution is the primary driver of a brand's sales. This brand is a part of a group with distribution less than 30 % (low level of brand availability for consumers). Of course, the proper distribution level is an essential part of effective brand growth because the presence on the shelf is a significant sales factor for all market segments. There is a strong positive correlation between the distribution level of the brand and its share of the market: higher distribution leads to higher market share and sales level. Brands, which increase their distribution and product range, are improving their position in the market, so it is relevant to work on distribution expansion.

Changes in the distribution during the analyzed period provided significant fluctuations in the brand's position on the market. Distribution of this brand dropped twice in 2021, and, as a result, the volume MS has also decreased

significantly. In such conditions, the influence of competitors trading promo activity is growing, and the effect of media activity is limited.

Media activity of the brand and its competitors. One of the main factors in sales growth is the active brand's promotion through media activity, as advertising is a key way of communication between manufacturers and the end consumers. According to the All-Ukrainian Advertising Coalition (VRK) [38], in 2021, the volume of the media market increased by 27 % and amounted to 31 bln UAH.

The Ukrainian FMCG industry continues to expand aggressively. Simultaneously, it is immensely competitive, and in the struggle for the consumer, FMCG companies are forced to actively promote their products through advertising activity. The key channels for the advertising activity of the FMCG market have long and stable been Television and Digital. FMCG companies' advertising investments shows a steady increase. Still, the volume of activity has been declining due to a significant inflation rate and the rising cost of advertising tools in recent years [38]. So, there is a necessary preconditions among companies to find and create data-based ways and solutions of optimization and improvement of media strategy and business performance based on in-depth analysis of all available market data using Data Science technologies.

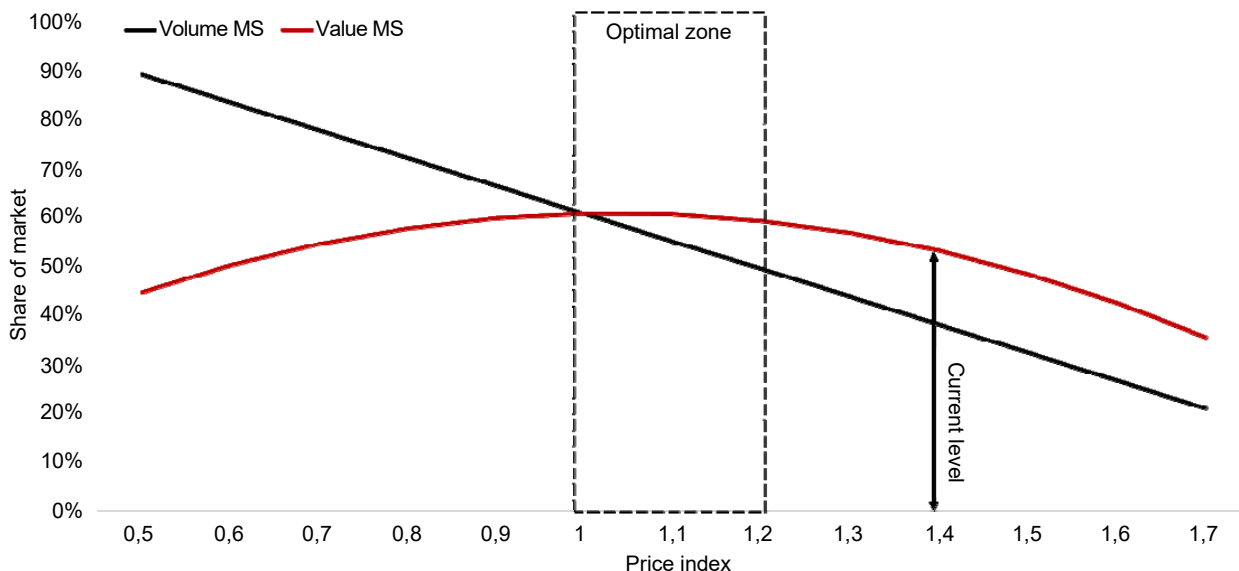


Fig. 3. Price sensitivity from marketing mix modelling implementation for FMCG brand

Source: author's calculations based on data from [36-38] (data indexed due to confidentiality).

The contribution of media activity changed during 2018–2021 from 13 % to 17 % due to changes in the media mix (only digital support or a wider media split with TV and OOH, different split by video and display advertising in digital). Media activity generates a strong positive influence on sales, and digital is the primary driver among communication channels (up to 15 % of sales generated by digital activity in previous years). Among digital instruments, online video (OLV) produces the most significant impact – 9 % in 2018-2021, and display advertising accumulates up to 4 % in the factors' contribution.

Additionally, competitors' media activity leads to a drop in sales level from 4 % to 11 %, so the contribution of competitor's media support is quite low, and, as a result, there was a considerable incremental growth of sales due to advertising support, as own media activity compensates the

negative influence of competitor's advertising activity (from 4 % to 13 % of sales in 2018–2021). Despite this, it is quite important in the future to control the share of voice (SOV) in communication channels and maintain a competitive placement with market players because the higher the media support a brand uses during the year, the higher sales it leads.

TV and Digital support ensure the improvements of the brand's position on the market, but each media channel's memorability of advertising messages is different. TV activity has the highest long-term effect on business results, as the media response distributed by several months after an advertising campaign on TV (Fig. 4), memory decay for Digital is quite higher. So, TV activity is advisable to use for general image campaigns and Digital is recommended to use for continuity support.

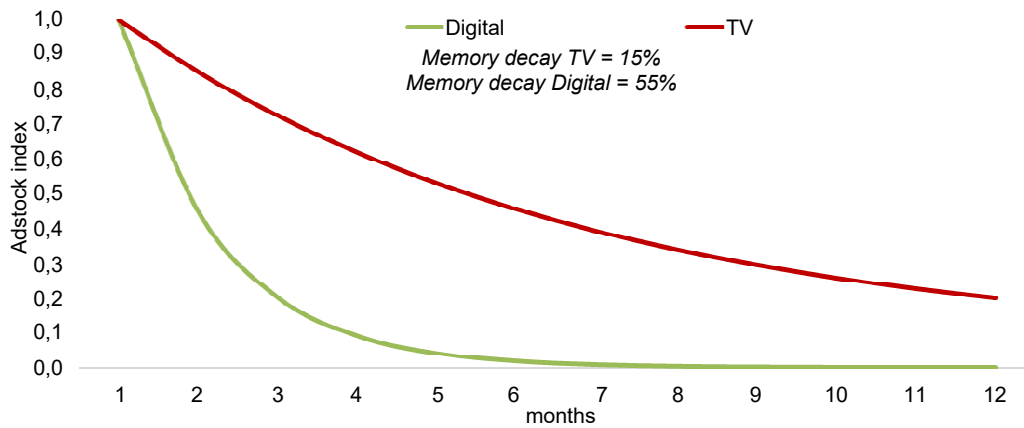


Fig. 4. TV and Digital Adstock distribution

Source: author's calculations based on data from [36–38] (data indexed due to confidentiality).

We estimated the current efficiency of media activity based on econometric modeling and calculated the ROMI for this brand according to the following equations:

- $ROMI_{general} = \text{Sales received from media in UAH} / \text{General Media Investment};$
- $ROMI_{TV} = \text{Sales received from TV in UAH} / \text{TV Media Investment};$

- $ROMI_{Digital} = \text{Sales received from Digital in UAH} / \text{Digital Media Investment}.$

As a result, Digital activity is the main driver for sales growth among communication channels, and the display shows the highest efficiency in ROMI (Fig. 5).

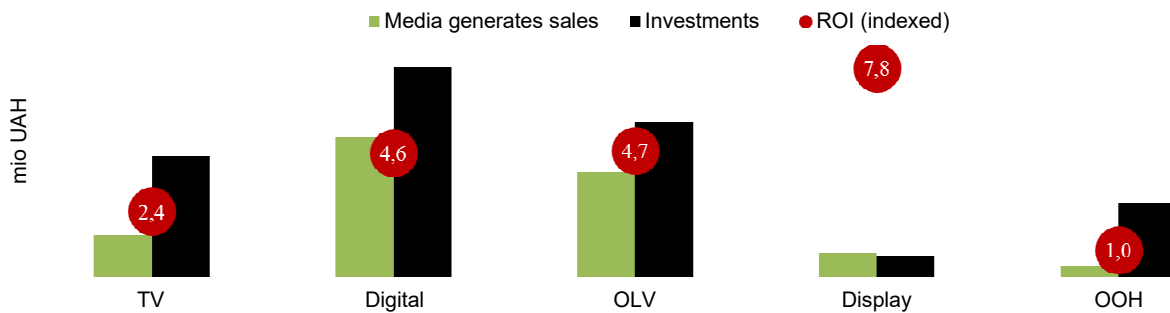


Fig. 5. ROMI by communication channels in 2018–2021

Source: author's calculations based on data from [36–38] (data indexed due to confidentiality).

Taking into account the media responses by each communication channel and their marginal efficiency, and capacity for reach-building by media activity, there are opportunities to develop the benchmarks for optimal media investment by each media channel monthly.

However, it is essential to note that the response to media activity and its efficiency depends on a large number of factors, both media and non-media (for example, distribution). To test this hypothesis, similar econometric models were constructed for other brands in this market, and it was proved that there is a strong influence of distribution on the

efficiency of advertising activity: the lower the level of distribution of trading networks, the lower the efficiency of media support, as the exciting target audience coming to the store can't make a purchase of products due to their absence (Fig. 6). The analyzed brand has a low level of distribution, which has a negative effect on the performance of media support. So, low distribution is a barrier for the consumer to find a brand and buy the product, and, as a result, the media response might be relatively higher in the case of distribution growth (Fig. 6).

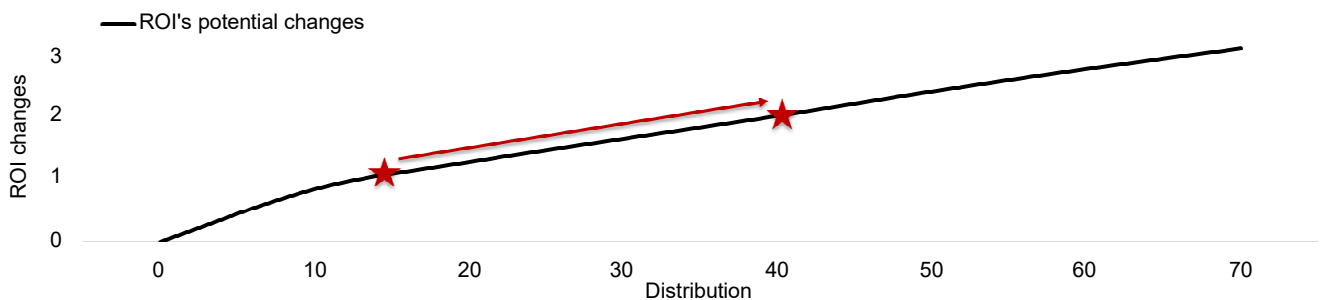


Fig. 6. Influence of distribution on media response

Source: author's calculations based on data from [36–38] (data indexed due to confidentiality).

According to Figure 6, the best solution is to improve the distribution on a national scale or to concentrate media support in the regions with the highest distribution. In these conditions, in the first step, it is relevant to focus advertising activity in Digital on the top 10 cities in the country, as they will help to achieve the highest media efficiency and more cost-effective business growth. Still, it is necessary furthermore realize long-term work on the distribution level on a national scale to ensure long-term growth of business indicators. Such a decision will help to increase ROMI by more than 70 %.

It is vital to explain that such recommendations and learnings cannot be taken concurrently for all businesses on the market, as the results are a combination of many factors and conditions that are established at each time, which necessitates a personalized approach in each situation [39].

CONCLUSIONS

Effective marketing activities lead to optimal short-term and long-term business growth, and improvement of the company's position in the market. Marketing mix modeling forms a basis for evaluating marketing mix elements' contribution and their optimization separately and considering the synergistic effects due to the description of business results depending on all factors of influence.

The key conclusions and suggestions for marketing strategy, taking into account the optimization of each element of the marketing complex, are:

1. Continuity media strategy with optimizing weekly reach on the frequency of more than 1 with several strong campaigns.

2. Price promo is one of the key sales drivers, but it is advisable to maintain the price index in the optimal range. The optimal level for Value MS maximization is 1,0–1,2.

3. Distribution is the main reason sales have decreased in recent years, and the low level of distribution negatively influences the current ROI by media instruments. The distribution growth and concentration of media support in the regions with the highest distribution level are recommendable solutions. The potential ROI will be higher in case of future distribution growth.

4. The activities of competitors (media and trade) generate a significant negative influence, so it is best to maintain competitive SOV and parity trade activity.

5. Video placement on TV and Digital generates the most significant impact on sales. Still, the ROI of the Display format is relatively high, so it is relevant to maximize placement by display format (taking into account their marginal efficiency) and as a next step to optimize activity with video support in Digital. So, it needs to expand its presence in Digital as a communication channel with the highest ROMI to build a broad coverage of the target audience.

Thus, the marketing mix model allows for investigating each factor's contribution to the brand's sales and developing recommendations for each of them. The mathematical model in the conditions of regular support and development of the operational and strategic marketing decisions support system becomes a convenient tool for the management of business results. The proposed concept allows uncovering the optimal mix of marketing elements to achieve the highest business performance. The ongoing model's support maximizes each factor's influence, which finally provides the opportunity to achieve the desired business results for the minimum budget or the highest business results for the available funding.

So, the marketing mix models and data analysis allow to estimate the volumetric impact of all the drivers influencing consumer sales for a particular brand (the relationship between sales, seasonality, price, distribution and advertising);

to evaluate the optimal values of distribution, price and media investments; to clarify frequently of the optimal price index considering the dynamics of market prices and monitoring its influence on sales; to measure the performance of each media channel and each media campaign in terms of impact on the brand volumes and its ROMI; to generate media mix recommendations (the most influential media mix, the most effective media pressure for TV and Non-TV media, the optimal effective fighting), to evaluate the winnings and losses, etc. The marketing mix modeling acquires the highest value in the case when it evolves into a system for regular business and marketing simulations and the possibility of making forecasting future dynamics of key business indicators considering different scenarios for elements of the marketing mix. Therefore, there is an ongoing process of marketing optimization for sales growth due to the improvement of ROMI, and enhancement of the company's position in the market due to forming an effective marketing strategy.

DISCUSSION

The research findings evidence high effectiveness for solving real business challenges and support the solving of marketing problems daily. The proposed concept of marketing mix modeling empowers the ways of the most effective achievement of business goals through the implementation of intelligent technologies. As proof of the idea, the fulfillment of mathematical modeling and deep data analysis for decision support improved the media response and ROMI by 70 % for this Ukrainian FMCG brand.

The proposed concept was proved for one of the Ukrainian FMCG companies. Still, the key conclusions of the research can be used in strategic marketing and media planning of Ukrainian and international companies of different market categories to solve actual tasks of the global FMCG market and to further improve of the data-based methodology of marketing planning. The areas of future development include the opportunities to cover additional marketing indicators, test the efficiency of various advertising messages, and construct different marketing mix models for sales on a regional scale. This will make it possible to find other hidden insights, that will help to improve the decision-making process and develop a more effective business development strategy.

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ОПТИМІЗАЦІЯ МАРКЕТИНГОВОЇ СТРАТЕГІЇ НА РИНКУ FMCG

Представлено результати моделювання маркетинг-міксу для FMCG компаній на основі технологій Data Science. Частка ринку в упаковках (рівень продажів) моделювалася за допомогою регресійного аналізу залежно від головних елементів комплексу маркетингу (ціна, дистрибуція, просування), сезонності та медіа-активності конкурентів. Економетричне моделювання допомагає оцінити віддачу від медіаінвестицій шляхом розрахунку рівня продажів, згенерованих медіаактивністю в кожному каналі комунікації, і порівняння його з рівнем медіаінвестицій. Детально вивчено вплив дистрибуції на позицію компанії на ринку та медіаефективність. Існує зв'язок між дистрибуцією і віддачею від медіаактивності: менша дистрибуція впливає на зниження ефективності медіа, і навпаки. В умовах низької дистрибуції важливо збільшити присутність у регіональних каналах комунікації за допомогою медіатиску в основних регіонах продажу FMCG-бренду та намагатися підвищити рівень дистрибуції в національному масштабі. Дано оцінку цінової чутливості (еластичності) і рекомендації щодо оптимізації цінової політики для збільшення частки ринку в грошах чи упаковок залежно від цілей компанії. Криву цінової еластичності визначено шляхом оцінки впливу індексу цін на рівень продажів в упаковках і продажів в грошах за допомогою економетричного моделювання та прогнозування рівня продажів залежно від різних варіантів індексу цін порівняно з конкурентами. На основі проведеного дослідження сформувано рекомендації щодо оптимізації маркетингових та медіастратегій для максимізації продажів FMCG компаній. Моделювання маркетингового комплексу та Data Science забезпечують найефективніші способи досягнення основних показників ефективності бізнесу.

Ключові слова: моделювання маркетинг-міксу; Data Science; регресія; FMCG; маркетинг, стратегія.