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**Riabchenko, I.**, *Affiliated Honorary Research Fellow, Fil. Dr. Jan-U. Sandal Institute, Finstadjordet, Norway*

**ORCID ID:** 0000-0001-6181-0611

**e-mail:** provost@janusandal.no

### **Statistical Marketing Efficiency in a Complex of Behavioral Economics and Marketing**

**Abstract. Introduction.** Behavioral economics is an essential tool for understanding and predicting the behavior of consumers and organizations and can be used to support the development of innovative marketing strategies. This article examines the role of behavioral economics in marketing and explores the concept of statistical marketing efficiency (SME) to measure marketing campaigns' effectiveness. By analyzing the behavior of consumers and organizations and using techniques such as "SME", marketers can better understand the factors that influence purchasing decisions and create more effective marketing strategies.

**Purpose.** The article generalizes the theoretical and practical aspects of behavioral economics in the modern world, marketing activities. This study developed marketing tools for evaluating marketing activities.

**Results.** This research has examined the impact of various factors on consumer behavior and the effectiveness of different marketing strategies in different market segments. We have also explored the relationship between behavioral economics and marketing efficiency and the importance of considering consumer behavior when developing marketing campaigns. Our analysis has demonstrated the value of using statistical techniques such as "SME" to measure the effectiveness of marketing efforts. Overall, our findings highlight the importance of considering consumer behavior in marketing and the value of using behavioral economics and statistical analysis to support the development of effective marketing strategies.

**Conclusions.** The scientific novelty of the obtained results lies in the justification of the theoretical and practical foundations of forming an effective tool for determining the effectiveness of marketing activities, namely:

1. The concept of behavioral economics as a component of marketing was defined and clarified.
2. A methodology was developed for evaluating the effectiveness of marketing activities.

**Keywords:** behavioral economics; marketing; innovation; statistical marketing efficiency; marketing strategies.

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**Рябченко І. С.**, кваліфікований почесний науковий співробітник, філ. д-р Ян-У. Інститут Сандал, Фінстаджордет, Норвегія

### **Маркетингова статистична ефективність у комплексі поведінкової економіки та маркетингу**

Поведінкова економіка є важливим інструментом для розуміння та прогнозування поведінки споживачів та організацій і може використовуватися для підтримки розробки інноваційних маркетингових стратегій. У цій статті розглядається роль поведінкової економіки в маркетингу та досліджується концепція статистичної ефективності маркетингу (SME) для вимірювання ефективності маркетингових кампаній. Аналізуючи поведінку споживачів і організацій і використовуючи такі методи, як «SME», маркетингологи можуть краще зрозуміти фактори, які впливають на рішення про купівлю, і створити більш ефективні маркетингові стратегії.

У статті узагальнено теоретичні та практичні аспекти поведінкової економіки в сучасному світі, маркетингової діяльності. Це дослідження розробило маркетингові інструменти для оцінки маркетингової діяльності.

Проаналізовано вплив різних факторів на поведінку споживачів і ефективність різних маркетингових стратегій у різних сегментах ринку. Досліджено зв'язок між поведінковою економікою та ефективністю маркетингу та важливість урахування поведінки споживачів під час розробки маркетингових кампаній. Наш аналіз продемонстрував цінність використання статистичних методів, таких як «SME», для вимірювання ефективності маркетингових зусиль. Загалом наші висновки підкреслюють важливість урахування поведінки споживачів у маркетингу та цінність використання поведінкової економіки та статистичного аналізу для підтримки розробки ефективних маркетингових стратегій.

Наукова новизна отриманих результатів полягає в обґрунтуванні теоретичних і практичних засад формування ефективного інструментарію визначення ефективності маркетингової діяльності, а саме:

1. Визначено та уточнено поняття поведінкової економіки як складової маркетингу.
2. Розроблено методикою оцінки ефективності маркетингової діяльності.

**Ключові слова:** поведінкова економіка; маркетинг; інновації; статистична маркетингова ефективність; маркетингові стратегії.

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**Formulation of the problem.** The current state of the global economy is complex and diverse. The global economy is trying to recover from the pandemic, which significantly impacted the global economy in 2020. While some countries have successfully recovered from the pandemic and are showing significant economic growth, others face difficult economic conditions and a decline in economic activity.

One of the main problems of the modern global economy is the inequality in living standards and access to resources in different countries and regions. This attracts the global community's attention and creates complex political, social, and economic problems that impact the development of the global economy.

The modern global economy is also facing several problems, such as climate change, instability in the energy market, overuse of resources, dependence on foreign resources, and others. These problems significantly impact the stability and development of the global economy and need to be addressed at the level of international cooperation.

In the modern world, the development of innovative technologies and business models is also observed, which significantly impacts the structure and development of the global economy. Innovative technologies, such as the Internet of Things, blockchain, artificial intelligence, etc., create new opportunities and prospects for business and economic development but also raise complex questions about ensuring cybersecurity, protecting consumer rights, and protecting personal data.

There is also a trend towards globalization and the integration of markets in the modern world, which creates new opportunities and risks for business and the economy. In this context, behavioral economics is an essential tool for understanding and predicting the behavior of consumers and organizations in the modern world, which can help create innovative marketing strategies. Behavioral economics focuses on studying the factors that influence the behavior of consumers and organizations, including their decisions to buy goods and services. It can help support innovative marketing strategies that consider the specific behavior of consumers in different market segments.

**Analysis of recent research and publications.** Well-known researchers in the field of economics, psychology and behavioral economics are H. A. Simon, R. H. Thaler, C. R. Sunstein, J. P. Balz, A. Tversky, D. Kahneman, R. Sutherland, Tor Nørretranders. Some of the notable contributions and research areas of these researchers include:

Simon H. A.: Herbert A. Simon was an American economist and political scientist who was awarded the Nobel Prize in Economics in 1978 for his contributions to the field of decision-making and bounded rationality.

Thaler R. H.: Richard H. Thaler is an American economist and behavioral economist who was awarded the Nobel Prize in Economics in 2017 for his contributions to the field of behavioral economics and the development of the concept of "nudge theory".

Sunstein C. R.: Cass R. Sunstein is an American legal scholar and behavioral economist who has made significant contributions to the fields of law, economics, and political science.

Balz J. P.: John P. Balz is a behavioral economist who has made significant contributions to the field of behavioral economics and marketing.

Tversky A.: Amos Tversky was an Israeli psychologist and behavioral economist who made significant contributions to the fields of psychology and economics, and was known for his work on decision-making and judgment.

Kahneman D.: Daniel Kahneman is an Israeli psychologist and behavioral economist who was awarded the Nobel Prize in Economics in 2002 for his contributions to the field of behavioral economics.

Sutherland R.: Rory Sutherland is a British advertising executive and behavioral economist who has made significant contributions to the field of behavioral economics and marketing.

Tor Nørretranders: Tor Nørretranders is a Danish author and futurist who has written extensively on the topics of innovation, creativity, and the future of technology.

Overall, these individuals have made significant contributions to economics, psychology, and behavioral economics, and their work has helped shape our understanding of decision-making, consumer behavior, and marketing. There are still many areas of research to explore in these fields, and we still have a lot to learn about combining behavioral economics with marketing and developing the concept.

**Outline of the main research material.** Therefore, the question "Why do we buy certain goods or how does price affect decision making?" is studied by behavioral economics, which is based on the principles of psychology, sociology, and the natural sciences and seeks to explain how we make decisions in life. Let us look at the works of the founders of behavioral economics in more detail.

Behavioral economics originated in the 1950s in the United States when American economist and cognitive psychologist Simon Herbert attempted to bring economics and psychology together to explain certain decisions made by people. In his works [1, 2, 3], he mainly wrote that people do not have the energy and resources to optimize their choices and instead make choices based on past experiences. Meanwhile, classical economists have adhered to and continue to adhere to the approach that people are naturally rational, and they make the most advantageous and justified, from an

economic perspective, decisions, striving to maximize their benefit.

Applied aspects, such as how we buy goods and perceive advertising, are also studied by behavioral economists. In their observations, behavioral researchers Richard H. Thaler and Cass Sunstein, in their observations [4, 5], noticed that people behave irrationally, are prone to emotions, and temptation, make purchases they cannot afford, etc. Scientists have developed the theory of “nudging” – one of the key concepts in behavioral economics [6]. It has also gained popularity due to consulting governments in various countries in applying behavioral approaches in designing citizens’ behavior. Thus, through the introduction of interventions or “nudges” that influence the decisions made by people and companies, governments sought to find a way out of the 2008 crisis, and transnational corporations use knowledge of behavioral economics in marketing their products and/or in the design of their employees’ behavior.

Starting in 1974, Daniel Kahneman and Amos Tversky published a series of articles that showed that people do not behave rationally in uncertain situations, making purchases that are not needed in the long term and relying on emotions during purchase decisions. The financial crisis of 2008 provided an opportunity for behavioral sciences, including economics, to become more well-known as they provided the best explanation for what was happening at the time [7, 8].

Rory Sutherland, Vice President of Ogilvy United Kingdom and an expert in consumer behavior, in his work “The Surprising Power of Ideas That Do not Make Sense” [9], states that if our world more accurately reflected nuances, economics would be a subfield of psychology. Moreover, we fully agree and believe that behavioral economics is an integral part of marketing, specifically innovative marketing, and it is essential in today’s world to develop marketing strategies for promoting innovative products taking into account the current scientific achievements in the field of innovation, management, finance, psychology, and technological progress.

Based on the above, we can conclude that interdisciplinary approaches, which are advisable to use in innovation marketing, contribute to a deeper understanding of marketing problems and improve the ability to manage marketing activities at the enterprise effectively, and the use of behavioral economics in innovation marketing is unique, as it combines forms of human behavior.

The human brain has evolved to process large amounts of information. Professor of Philosophy at the Copenhagen Business School, Tor Nørretranders, has shown that our brains can subconsciously analyze around 11 million bits per second [10]. At the same time, our rational conscious mind can work on the edge of 50 bits per second. Our brain constantly makes decisions by

analyzing large amounts of information we do not even notice. More than 95% of all the decisions we make in life are made unconsciously, turning off the light, breathing, boiling water, driving a car along a standard route, etc. Our brain has evolved over thousands of years to recognize various signals we receive from the outside and make decisions based on them. However, as long as we are safe, as long as there is no threat to our lives, and we have the opportunity to focus on something, we can make decisions consciously when we have faced with a situation of uncertainty or risk that our brain falls back on its subconscious decision-making process and relies on heuristics and biases.

Given that the conscious process such as reading academic or professional literature, describing the product, its technical characteristics, methods of influence, competitive advantages, and areas of application, as well as an algorithm of actions in case of violation/deviation from the standard of use, all require us to engage our conscious, which is slow and energy-intensive [10]. That is why it is so difficult to introduce a new innovative product to the market, thus opening new markets, as consumers use their cognitive abilities, and the process requires the individual to concentrate while familiarizing themselves with the product. Our brain quickly gets tired and resists in every way to save resources, so we believe that it is advisable to propose a logical-structural diagram of Statistical Marketing Efficiency with a list of questions that will help the marketer in an accessible form and non-intrusively, interact with consumers, taking into account the peculiarities of their behavior and the characteristics of the product.

Answers to the questions should be given from the perspective of “Statistical Marketing Efficiency” and the position of “fear of loss”, known as “Fear of missing out – FOMO”.

First, we note that “Statistical Marketing Efficiency” is a set of quantitative indicators used to justify positive or negative changes in the consumer’s life after purchasing or not purchasing a new product.

During the stage of familiarization with the product, specialists in the field of marketing are offered to segment their target audience, interest it and provide the most accessible answers to the following questions from the consumer’s point of view: “What problem will this product help me solve?”, “Will the innovative product be a substitute for many existing ones?”

At the stage of ignoring the product: “How will my life change after buying the new product?”, “In what way can this product improve my life and/or business?”

The third stage of buying a product aims to provide the consumer with answers to such questions: “How long and effectively can I use it?”, “Will this product become an integral part of my life?”, “What emotions will I get during the purchase and use?”. We believe that this

practical approach will help a modern marketer more effectively interact with consumers, thereby optimizing advertising messages and increasing the perception of product information.

Statistical Marketing Efficiency (SME) is one of the quantitative indicators used to evaluate the results of marketing actions and determine their effectiveness. The formula used to calculate SME is based on a statistical method called “standard deviation”.

Standard deviation (also known as “variance”) is a statistical measure used to determine how far values deviate from the mean in a sample of data. Standard deviation is calculated as the average of the squares of the deviations of all the values from the mean. The formula for calculating standard deviation looks like this:

$$\text{Standard deviation (SD) is calculated as:} \\ \text{SD} = \sqrt{\frac{\sum(X - \bar{X})^2}{N}} \quad (1)$$

Where: SD – standard deviation, X – value of the indicator in the data sample,  $\bar{X}$  – mean value of the indicator, N – number of values in the sample,  $\sum$  – sum.

Standard deviation (SD) measures the dispersion of values in a data sample and helps determine how far these values deviate from the average. The greater the standard deviation, the greater the dispersion of values in the sample. Therefore, the formula for Statistical Marketing Efficiency (SME) uses standard deviation (SD) as one of its component elements.

So, the formula for statistical marketing efficiency (SME) is:

$$\text{SME} = \frac{(\text{SD})^2}{\bar{X}} \quad (2)$$

Where: SME – Statistical Marketing Efficiency, SD – Standard Deviation,  $\bar{X}$  – Mean value of the indicator statistical marketing efficiency.

SME is used to evaluate the results of marketing actions and determine their effectiveness. The higher the SME value, the more meaningful the marketing actions. However, it should be noted that SME is just one of the indicators that can be used to evaluate the effectiveness of marketing actions, so it is not the only way to evaluate the results.

For example, a company produces a new type of absorbent for wiping stains and odours in household conditions. It wants to determine whether this product is more effective than existing market alternatives. To do this, the company organizes a study in which 200 consumers participate who will use different absorbents to wipe stains and odours. One hundred consumers receive the new absorbent, while 100 receive the standard absorbent. After a certain amount of time, the company collects data on the effectiveness of the absorbents and concludes whether the new absorbent has greater effectiveness than the standard. The Statistical Marketing Efficiency (SME) formula is used for this.

Algorithm:

Choose a random group of consumers who will use the new sorbent. This group will be called “Group A”.

Choose a random group of consumers who will use the standard sorbent. This group will be called “Group B”.

Determine consumers' satisfaction level in Group A and Group B after purchasing and using the corresponding sorbent using an appropriate survey or other methods.

Calculate the mean ( $\bar{X}$ ) and standard deviation (SD) of the satisfaction level in Group A and Group B.

Use the SME formula to calculate the SME value for each group.

Compare the obtained SME values for Group A and Group B.

If the SME value for Group A is greater than the SME value for Group B, this means that marketing actions that invite consumers to use the standard sorbent are less effective than marketing actions that invite consumers to use the new sorbent. On the other hand, if the SME value for Group A is less than the SME value for Group B, this means that marketing actions that invite consumers to use the new sorbent are less effective than marketing actions that invite consumers to use the standard sorbent.

For example, if the calculations give the following results:

$$\begin{aligned} \text{Group A:} \\ \bar{X} &= 8 \\ \text{SD} &= 2 \\ \text{SME} &= \frac{(2^2)}{8} = 0.5 \\ \text{Group B:} \\ \bar{X} &= 6 \\ \text{SD} &= 3 \\ \text{SME} &= \frac{(3^2)}{6} = 1.5 \end{aligned}$$

Then it can be said that marketing actions that invite consumers to use the standard sorbent are more effective than marketing actions that invite consumers to use the new sorbent because the SME for Group A is less than the SME for Group B. Therefore, the company can use the results of this study to decide which sorbent to offer consumers in its marketing campaign.

This is just one example of how the SME formula can be used. Statistical Marketing Efficiency can be used in various business and marketing sectors, such as evaluating the effectiveness of advertising campaigns, sales, attracting new customers, etc.

**Conclusions.** We can conclude that the SME formula can be used to compare two different groups and compare the results of different marketing strategies in the same group of consumers. In this way, the SME formula is a helpful tool for evaluating the effectiveness of marketing actions and strategies.

Therefore, the Statistical Marketing Efficiency (SME) formula is used to evaluate the effectiveness of marketing actions and strategies. It is based on statistical indicators such as the mean ( $\bar{X}$ ) and standard deviation (SD), which are calculated based on the study's results. The greater the SME value, the more meaningful the marketing actions are.

Furthermore, researchers could also investigate using the SME formula to evaluate the effectiveness of marketing actions in different stages of the customer journey. The SME formula can be a valuable tool for evaluating the effectiveness of marketing actions and strategies, and future research can help to expand its applications and usefulness.

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