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## MARKETING OF INTELLIGENT SYSTEMS: CONCEPT AND DEVELOPMENT FEATURES

## МАРКЕТИНГ РОЗУМНИХ СИСТЕМ: КОНЦЕПЦІЯ ТА ОСОБЛИВОСТІ РОЗВИТКУ

**Buha Nataliia**

Candidate of Economic Sciences,  
Associate Professor of the Department of Marketing and Business Analytics,  
Vasyl' Stus Donetsk National University  
ORCID: <https://orcid.org/0000-0002-7378-9036>

**Yanchuk Tanya**

Candidate of Economic Sciences,  
Associate Professor of the Department of Marketing and Business Analytics,  
Vasyl' Stus Donetsk National University  
ORCID: <https://orcid.org/0000-0003-3901-7670>

**Буга Наталія Юріївна, Янчук Тетяна Василівна**  
Донецький національний університет імені Василя Стуса

The article examines the theoretical and practical principles of the formation of marketing of smart systems as an innovative direction in the modern business environment. The relevance of the study, caused by the rapid development of artificial intelligence technologies, the Internet of Things, cyber-physical systems, as well as changes in consumer behavior patterns in the conditions of the digital economy, is substantiated. The concept of «smart system» has been clarified from technical, business and philosophical approaches. The key features of smart system marketing are identified, including – interactivity, adaptability, data-based construction, personalization and real-time value formation. A comparative analysis of classical marketing and marketing of smart systems was carried out according to such criteria as product, life cycle, client role, sales models, analytics, etc. The work also analyzes the cases of leading companies (Target, Nest, Amazon Go, Synerise) that effectively implement smart system marketing tools in their activities. The author proved that the marketing of smart systems goes beyond the usual promotion strategies, turning into a comprehensive system of interaction between an innovative product and a consumer, based on data, transparency, ethics and trust. Special attention is paid to the concept of the user as an active participant in the creation of value (co-creation), which radically changes the logic of the market. It is proposed to interpret the marketing of smart systems as a specialized direction of innovation marketing that integrates technological, behavioral and cultural aspects. Prospective areas of further research are highlighted: ethics and cyber security, performance evaluation models, interdisciplinary integration, localization of solutions. The obtained results are of applied importance for enterprises seeking to increase competitiveness in the digital economy.

**Keywords:** marketing, intelligent system, innovation, innovation marketing, digital marketing, artificial intelligence.

У статті розглянуто теоретико-практичні засади формування маркетингу розумних систем як інноваційного напрямку в сучасному бізнес-середовищі. Обґрунтовано актуальність дослідження, зумовлену стрімким розвитком технологій штучного інтелекту, Інтернету речей, кіберфізичних систем, а також зміною споживчих моделей поведінки в умовах цифрової економіки. Уточнено поняття «розумна система» з технічного, бізнесового та філософського підходів. Визначено ключові особливості маркетингу розумних систем, серед яких – інтерактивність, адаптивність, побудова на основі даних, персоналізація та формування цінності в режимі реального часу. Проведено порівняльний аналіз класичного маркетингу та маркетингу smart-систем за такими критеріями, як продукт, життєвий цикл, роль клієнта, моделі продажу, аналітика тощо. У роботі також проаналізовано кейси провідних компаній (Target, Nest, Amazon Go, Synerise), які ефективно впроваджують інструменти маркетингу розумних систем у своїй діяльності. Автором доведено, що маркетинг розумних систем виходить за межі звичних стратегій просування, перетворюючись на комплексну систему взаємодії між інноваційним продуктом і споживачем, засновану на даних, прозорості, етиці та довірі. Особливу увагу



приділено концепції користувача як активного учасника створення цінності (co-creation), що кардинально змінює логіку ринку. Запропоновано трактувати маркетинг розумних систем як спеціалізований напрям маркетингу інновацій, що інтегрує технологічні, поведінкові та культурні аспекти. Виокремлено перспективні напрями подальших досліджень: етика й кібербезпека, моделі оцінки ефективності, міжгалузева інтеграція, локалізація рішень. Отримані результати мають прикладне значення для підприємств, що прагнуть підвищити конкурентоспроможність у цифровій економіці.

**Ключові слова:** маркетинг, розумна система, інновації, маркетинг інновацій, цифровий маркетинг, штучний інтелект.

**Statement of the problem in a general form and its connection with important scientific or practical tasks.**

In today's world, business functions in the conditions of rapid technological changes, global digitalization and the development of artificial intelligence. This leads to the emergence of smart systems – complexes that are able to collect data, analyze them and make decisions in real time. Accordingly, marketing is also undergoing a transformation: classic tools are no longer always effective, instead, the marketing of smart systems comes to the fore. It combines marketing strategies with intelligent technologies, allowing companies not only to meet consumer needs, but also to anticipate them, shape individual offers and create value at a new level.

**Analysis of the latest research and publications, on which the author relies, in which this problem and approaches to its solution are considered.**

Scientists and practitioners are actively researching the topic of smart systems. In particular: the work Smart Systems: Engineering and Managing Information for Future Success reveals fuzzy logic, AI, IoT applications in health care, cyber security, ethical issues, management of smart systems, cloud and BI [1]; research [2] emphasizes the defined roles of smart technologies (AI, ML, VR, AR, blockchain, IoT) in the field of service: logistics, retail, medicine, finance – transformation of business processes; ukrainian scientists, in particular, Tsmots I. G., Tkachenko R. O., Teslyuk V. M. reveal the component of technologies and architecture of smart systems, cyber-physical systems, smart infrastructure, smart buildings, production and regional energy-efficient management [3].

These works prove that digital technologies, artificial intelligence in marketing – is not only a trend, but a necessity dictated by the development of the digital economy.

However, the concept of «marketing smart systems» is still not found. There are several reasons for this. First, because of the novelty of technologies. Smart systems (artificial intelligence, Internet of Things, smart devices)

have been actively developing only for the past 5–10 years. Most of the focus so far has been on technical and applied aspects rather than marketing aspects. Second, smart systems marketing researchers often describe it through related areas – innovation marketing, digital marketing, AI marketing. Also, the focus in business is on implementation, not promotion. Enterprises primarily invest in the development and technical capabilities of smart solutions. Only then does the question arise of how to promote them effectively in the market.

In addition, smart systems work at the intersection of many industries – IT, production, services, which complicates the study of marketing tools, because the results depend on the specific industry.

**Formulation of the goals of the article (setting the task).** The purpose of this study is: substantiating the relevance of the direction and forming the concept of marketing smart systems, which is focused on the client, who becomes an active co-creator of value.

**Presentation of the main research material with full justification of the obtained scientific results.**

The term «smart system» can have different meanings depending on the context, including:

1. Technical significance (classical). Smart system – is a system that uses data (from sensors, users, environment), analyzes this data (sometimes with the help of AI), reacts or makes decisions, adapts to changes. So, upon request in the Google search system «, what is a smart system», the results are issued: about «smart home» and «smart city» – here lighting, heating, safety, utility infrastructure are controlled; robotic systems in production; autonomous transport systems and own vehicles; medical diagnostic systems; digital platforms for enterprise management (ERP, CRM).

The main definitions of the term «smart system» are given in Table 1.

2. Innovative/business value. A smart system – is a product or service created taking into account: the needs of the consumer, the value he creates, the efficiency of business processes,

Table 1

**A classic approach to defining the term «smart system»**

Source	Key definition
Intelligent materials and intelligent systems of the future [4]	Systems carrying out sensing, analysis, control and performing actions in adaptive mode
What is a smart system? [5]	A system that independently perceives a complex environment, analyzes and predicts
What is Smart Systems [6]	Decision Making Based on Multisensory Data
Smart and Connected Systems [7]	Device complexes (ITs, sensors, actuators) interacting autonomously
Smart Systems [8]	Optimization of energy processes through data and automation

*Source: built by the authors*

adaptability to market changes. Taking such importance into account, any startup, product or service that solves a real problem, created thoughtfully, has a viable business model can also be called a smart system.

3. Educational and philosophical interpretation. A smart system – is not only about technology, but also about thinking that combines engineering + management + creativity + ethics. Yes, if the team that creates the product is a smart system of people. Not so long ago, the concept of «smart enterprise» appeared, where modern technologies (artificial intelligence, machine learning, IoT) and management approaches are used to optimize processes, increase efficiency, adaptability and innovativeness. Such a company analyses real-time data, makes informed decisions quickly, continuously improves and is ready for change, responding to new opportunities and challenges [9; 10].

Smart systems are designed to automate the management of complex processes and environments, promote energy efficiency and reduce costs, improve the quality of life and human safety, ensure the integration of «virtual» and «physical» using IoT, AI and other innovations.

In order to promote smart systems, create value in the interaction between the system and the user, it is necessary to apply marketing technologies that can reveal the hidden needs of the client, create products that «learn» together with the user, form personalized offers, and also maintain long-term relationships with clients through data.

Marketing of smart systems will be reflected in manufacturers of smart products; IT companies and startups working in the field of artificial

intelligence, big data, cyber security; service companies, namely banks, insurance and logistics companies, where value is created on the basis of data; state and municipal structures implementing the concept of «smart city».

Of course, smart systems (AI solutions, IoT devices, cyber-physical systems, «smart» services) are often difficult for the average user to understand. However, marketing helps translate the language of technology into the language of benefits, explain what this system does, how it makes life or work easier, why you should trust it.

People are usually wary of innovation. For a user to agree «to let a smart system into their life (such as home, business processes, or finance), you need to build trust through brand, transparency, and reputation.

Smart systems create individual experiences (such as a smart watch that tracks health or a CRM with AI that «understands the customer's»). Marketing here acts as a conduit between the capabilities of the system and the needs of the client, helping to show individual benefits.

Marketing not only sells, but also «listens to the customer. For smart systems, this is critical because they work in constant update mode. Without data from users (through communication, feedback, community), the system will not be able to evolve.

Many smart systems do not work in isolation, but in networks and platforms (for example, «smart city» or smart factory). Marketing helps to establish partnerships, integrations and cross-sectoral cooperation. So, the features of smart systems marketing are:

- data as a basis – marketing is built on the analytics of large data sets;
- interactivity – product or service «communicates» with the user;

- predicting – using AI to predict customer behavior;
- adaptability – system varies depending on the situation;
- technology and business synergy – marketing integrates IOT, AI, AR/VR, blockchain.

The difference between smart systems marketing and classic marketing lies in the focus, tools and logic of interaction with the consumer. If you compare them by product and its value, product life cycle, target audience, communications, sales models, data and analytics used, trust and transparency, you will get a Table 2.

The comparison graph (Fig. 1) shows that smart systems marketing is far ahead of classic marketing on key – criteria, from product and value handling to analytics and customer role.

Smart systems marketing is used by world-renowned companies. So, Target created the Open House space in San Francisco, where smart home products (Nest Protect, Philips Hue) are presented in conditions close to real housing. With interactive elements and storytelling, customers could see how gadgets work in a complex ecosystem, which greatly improved product perception and facilitated sales [11]. The Nest thermostat analyzes the user's behavior by automatically adjusting the temperature in the house. The company, applying the concept of

marketing smart systems, emphasizes energy savings, comfort and integration with other systems (Amazon Alexa, Google Assistant), which allowed to increase the user base by 22% in 2019 [12]. Amazon Go uses sensors and IoT to track products taken from shelves and automatically debits the – account without physical checkouts. It optimizes the consumer experience as much as possible, reduces friction when buying and includes a strong marketing powerful tool [13]. The Synerise platform combines AI and Big Data to understand customer behavior both online and offline. Wi-Fi maps of customer movements, segmentation, dynamic offers, marketing automation (email, SMS, push) are used, which makes marketing as personalized as possible [14].

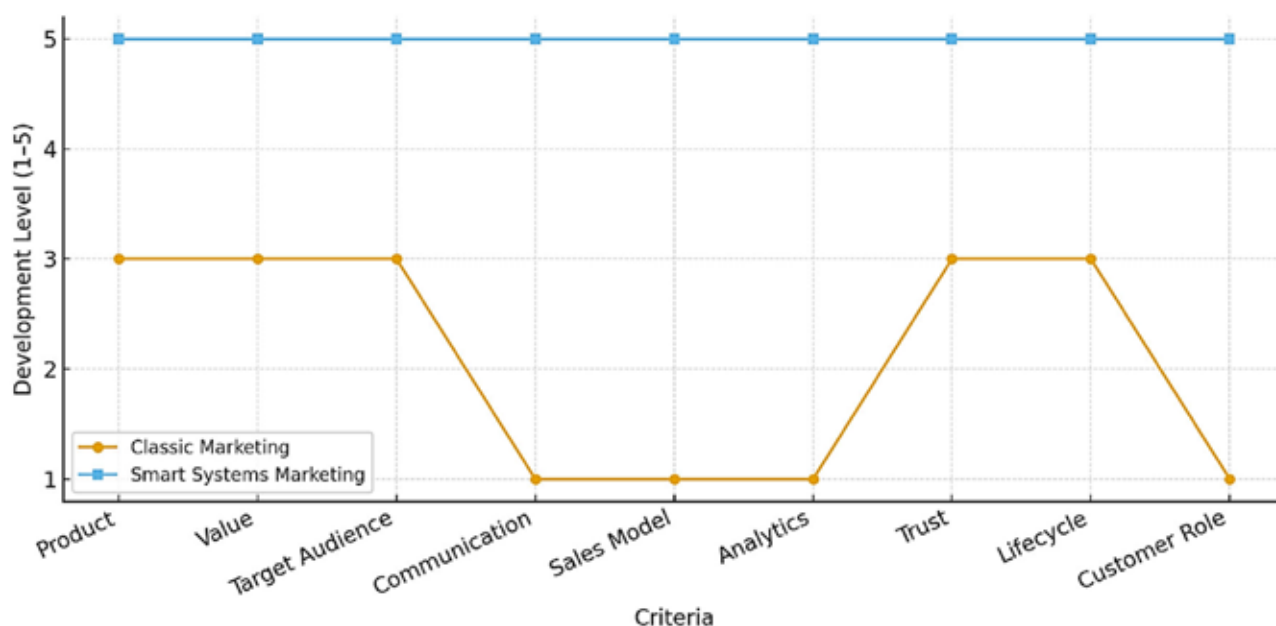
These examples are brought together by the demonstration of ecosystems, interactivity, personalization, IoT automation, integration of smart solutions, etc. Marketing of smart systems can be considered as a component of innovation marketing, because it arises precisely at the intersection of the latest technologies and market needs. If classic innovation marketing encompasses the promotion of new products, processes, and business models, smart systems marketing focuses on how products that have the properties of artificial intelligence, automation,

Table 2

**Comparison of classical marketing and marketing of smart systems according to the main criteria**

Criterion	Classic marketing	Marketing of smart systems
Product	Focus on functional characteristics (price, quality, design)	Focus on integration, data, interaction (ecosystem + services)
Value	Satisfying the basic needs of the consumer	Personalized experience, forecasting needs
Target audience	Segmentation by demography and lifestyle	Dynamic segmentation by behavior and real-time data
Communication	Linear model: advertising → purchase → service	Continuous interaction (updates, notifications, subscription)
Sales model	One-time transaction	«Product as a service» (SaaS, subscriptions, IoT ecosystems)
Analytics	Surveys, statistics, classic	Big Data research, AI analytics, IoT data, forecasting
Trust	Brand reputation, product quality	Data security, privacy, transparency of algorithms
Life cycle	Has stages (implementation, maturity, decline)	Long cycle thanks to upgrades and updates
The role of the client	Passive buyer	Active participant of common value (feedback, co-creation)

Source: built by the authors



**Fig. 1. Comparative characteristics of smart marketing and classic marketing**

*Source: built by the authors*

sensor technology, or self-renewal can create new value for the consumer. Its task – is not only to convey information about the innovativeness of the solution, but also to explain to the consumer how the «reasonableness» system provides convenience, efficiency and a new quality of life. Thus, smart systems marketing is a specialized area of innovation marketing that allows businesses to work more purposefully with market segments that expect technological breakthroughs and a high level of personalization.

**Conclusions from this study and further prospects in this direction.** Smart systems marketing is a promising field that combines classic marketing tools with innovative data-driven approaches, artificial intelligence, automation and ecosystem development. Its importance is growing in the digital economy, where smart systems are becoming an integral part of everyday life, business and public administration.

The relevance of smart systems marketing is that it allows you to bridge the gap between high-tech solutions and the end user. Today's consumers have high expectations for personalization, transparency, security and value, and only through effective marketing strategies is it possible to build trust in innovative products and ensure their acceptance on the market.

The prospects of this direction are determined by several factors, namely:

- integration of marketing with AI and Big Data – ability to predict consumer behavior, optimize solutions in real time, form dynamic business models;
- development of omnichannel communications – creation of a seamless experience for the client in the offline and online space;
- the growing importance of trust and ethics – issues of cyber security, personal data protection and transparency of algorithms become key to marketing strategies;
- by forming ecosystems – smart systems rarely work in isolation, so marketing should take into account partnerships, integrations and cross-industry interaction;
- globalization and localization – smart systems markets are at the same time global (AI, IoT, platforms), but require adaptation to local cultural and legal conditions.

At the same time, there are areas that require further research: development of models for evaluating the effectiveness of marketing smart systems (taking into account intangible assets, trust and interaction in real time); ethical and social aspects, that is, how to balance between automation, data control and consumer rights; the impact of smart systems on the transformation of business models of enterprises, in particular in industry, medicine, education and the public



sector; the role of man in interaction with intelligent systems – from consumer to co-creator of value.

Thus, the marketing of smart systems is not only a modern tool for promoting innovation, but also a key factor in the formation of a new model

of interaction between technology, business and society. Further research in this direction will allow not only to improve the theoretical foundations, but also to create practical mechanisms for the development of competitive enterprises in the future.

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